# Teachers' Retirement System of the State of Illinois

## Preliminary Actuarial Valuation and Review of Pension Benefits as of June 30, 2020

October 9, 2020

*This report has been prepared at the request of the Board of Trustees to assist in administering the System. This valuation report may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.*



Segal

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October 9, 2020

Board of Trustees
Teachers' Retirement System of the State of Illinois
2815 West Washington Street
Springfield, Illinois 62702

Dear Board Members:

This report presents the results of the annual valuation of the assets and liabilities of the Teachers' Retirement System of the State of Illinois (TRS or System) as of June 30, 2020, prepared in accordance with the funding policy specified under the Illinois Pension Code (40 ILCS 5/16). This valuation takes into account all of the pension benefits to which members are entitled.

**Actuarial Assumptions and Methods**

The valuation was based on the actuarial assumptions adopted by the Board of Trustees, reflecting the three-year demographic and economic experience review covering the period July 1, 2014, through June 30, 2017, presented at the August 2018 Board meeting, and the economic experience review presented at the August 2016 Board meeting. The economic assumptions were last reviewed in June 2020, but no changes were adopted. In our opinion, the actuarial assumptions as approved by the Board are reasonably related to the experience of and the expectations for the System. The actuarial assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice. The methods mandated by the Illinois Pension Code as described in the Funding Adequacy section are inadequate to appropriately fund TRS.

**Assets and Membership Data**

TRS reported to the actuary the individual data for members of the System as of the prior valuation date. Valuation results are projected, based upon the actuarial assumptions, to account for the one-year difference between the date of the census data and the valuation date. The impact on the valuation due to the census data that lags one year behind the valuation date has been studied and demmed immaterial.  The amount of assets in the trust fund as of the valuation date was based on statements prepared by TRS.

**Funding Adequacy**

The member and employer contribution rates are determined in accordance with the funding policy specified under the Illinois Pension Code (40 ILCS 5/16). The member contribution rate is 9.0%, which is comprised of 7.5% toward the cost of the retirement annuity, 0.5% toward the cost of the automatic annual increase in the retirement annuity, and 1.0% for survivor benefits. The employer contributions are determined such that, together with the member contributions, the plan is projected to achieve 90% funding by 2045. The 2045 funding objective of 90% was set in 1994 as a 50-year objective. TRS members have always contributed their share. **The State funding has been inadequate, resulting in TRS being among the worst funded public employee retirement systems in the United States. We strongly recommend an actuarial funding method that targets 100% funding. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability, and the principal balance**. The funding policy adopted by the Board, referred to as the Board-Adopted Actuarial Funding Policy, meets this standard.

The valuation indicates that for the fiscal year ended June 30, 2020, the actuarial experience of TRS was unfavorable, generating a net actuarial loss of $1.0 billion (0.8% of the actuarial accrued liability). This loss is the net result of a $970 million loss due to unfavorable investment return experience and a $50 million net loss due to demographic experience for fiscal 2020.

It is important to note that this actuarial valuation is based on plan assets as of June 30, 2020.  Due to the COVID-19 pandemic, market conditions have changed significantly since the valuation date. TRS' actuarial funded status does not reflect short term fluctuations of the market, but rather is based on the fair values on the last day of the plan year. While it is impossible to determine how the market will perform over the next several months, and how that will affect the results of next year's valuation, Segal is available to prepare projections of potential outcomes upon request.

Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative, and client requirements. Deterministic cost projections are based on our proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility, and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuaries.

**Actuarial Certification**

In preparing the results presented in this report, we have relied upon information TRS staff provided to us regarding the benefit provisions, System members, benefit payments and unaudited plan assets. While the scope of our engagement did not call for us to perform an audit or independent verification of this information, we have reviewed this information for reasonableness. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information.

In our opinion, the results presented comply with the Illinois Pension Code and, where applicable, the Internal Revenue Code, and the Statements of the Governmental Accounting Standards Board. While all calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board, this does not endorse the funding methodology required by the Illinois Pension Code. The undersigned are independent actuaries. They are Fellows of the Society of Actuaries, Enrolled Actuaries, and Members of the American Academy of Actuaries, and are experienced in performing valuations for large public retirement systems. They meet the Qualification Standards of the American Academy of Actuaries.

Respectfully submitted,

Segal

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# Section 1: Valuation Summary

## Overview of TRS

- The Teachers' Retirement System of the State of Illinois (TRS) was established by the State of Illinois on July 1, 1939, to provide retirement, disability, and death benefits to teachers employed by Illinois public elementary and secondary schools outside the City of Chicago. TRS is the administrator of a cost-sharing, multiple-employer defined benefit public employee retirement system. Membership is mandatory for all full-time, part-time, and substitute pubic school personnel employed outside of Chicago in positions requiring certification. Persons employed at certain state agencies are also members. TRS is governed by the Illinois Pension Code (40 ILCS 5/16).
- Members of TRS are employed by school districts, special districts, and certain state agencies. As of June 30, 2020, there were 990 employers, comprised of 851 local school districts, 129 special districts, and 10 state agencies. The membership totaled over 429,000 members as of June 30, 2019. Of the 429,000 members, 125,000 are retirees and survivors to whom TRS paid nearly $7.1 billion during the fiscal year ended June 30, 2020. As of June 30, 2020, the assets of TRS amounted to $52.3 billion on a fair value basis.
- The amount of the benefit paid to a member upon retirement, termination, disability, or death is defined by the Illinois Pension Code (40 ILCS 5/16). The contributions to fund these benefits are determined through an annual valuation based upon the funding provisions in the Illinois Pension Code (40 ILCS 5/16).

## Purpose of the Annual Actuarial Valuation

An actuarial valuation is performed annually as of June 30. The purposes of the annual actuarial valuation are to:

- Calculate the annual contribution as required by the Illinois Pension Code. This contribution is not adequate to fund TRS.
- Calculate an actuarially determined contribution based upon the funding policy adopted by the Board. This contribution, if paid, would be expected to adequately fund TRS.
- Determine the funding progress under the Illinois Pension Code's inadequate funding standard.
- Determine the annual gain and loss amounts by source.
- Satisfy regulatory and accounting requirements.

## Significant Results of the Actuarial Valuation

1. The contribution made during fiscal 2020 by the State, as required by the Illinois Pension Code, was insufficient to reduce the unfunded actuarial accrued liability.
2. This actuarial valuation continues to assume that buyout provisions introduced with Public Act 100-0587 (and amended by Public Act 101-0010) are effective through fiscal year 2022, at which point the total expected buyout amount is expected to reach the assumed $650 million share apportioned to TRS.
3. The total projected employer contribution for 2022, including State, Federal, and School Districts, is $5.79 billion. Of this amount, $1.18 billion, or about 20%, is for the employer portion of the normal cost and $4.61 billion, or about 80%, is for unfunded actuarial accrued liability. The required State contribution for 2022 is $5.69 billion, an increase from $5.14 billion for 2021.
4. The funded ratio based on the actuarial value of assets over the actuarial accrued liability as of June 30, 2020, was 40.5%, compared to 40.6% as of June 30, 2019. This ratio is a measure of funded status, and its history is a measure of funding progress.
5. For the year ended June 30, 2020, Segal has estimated that the asset return on a fair value basis was 0.52%. After gradual recognition of previous investment gains and losses under the actuarial smoothing method, the actuarial rate of return was 5.16%. This represents an experience loss when compared to the assumed rate of 7.00%. As of June 30, 2020, the actuarial value of assets ($54.9 billion) represented 104.9% of the fair value ($52.3 billion).
6. The investment loss on the actuarial value of assets for the year ended June 30, 2020, was $970 million. The combined demographic and liability experience resulted in a $1.0 billion loss (0.8% of actuarial accrued liability), largely due to unfavorable investment experience.
7. As page 30 of this report indicates, the total investment loss not yet recognized as of June 30, 2020, is $2.6 billion. These unrecognized losses will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years, to the extent they are not offset by recognition of gains derived from future experience. This means that earning the assumed rate of investment return of 7.00% per year (net of investment expenses) on a fair value basis will result in investment losses on the actuarial value of assets in the next few years.
8. As mentioned above, the current method used to determine the actuarial value of assets yields an amount that is 104.9% of the fair value of assets as of June 30, 2020. Guidelines in Actuarial Standard of Practice No. 44 (Selection and Use of Asset Valuation Methods for Pension Valuations) recommend that asset values fall within a reasonable range around the corresponding fair value. The actuarial asset method complies with this guideline.
9. The System's cash flow (contributions minus benefit payments, refunds, and expenses) as a percentage of the fair value of assets was -2.3% as of June 30, 2020, compared to -2.5% from the prior year. Negative cash flow drains the assets of the System without investment income and may cause suboptimal investment strategies.

## Significant Results of the Actuarial Valuation *continued*

10. This actuarial valuation report as of June 30, 2020, is based on financial data as of that date. Changes in the value of assets subsequent to that date are not reflected.
11. The GASB net pension liability (NPL) is equal to the difference between the TPL and the Plan's fiduciary net position. The NPL increased from $81.1 billion as of June 30, 2019, to $86.2 billion as of June 30, 2020. This is a result of the contributions required by the Illinois Pension Code being insufficient to reduce the NPL.

## Summary of Key Valuation Results

| | June 30, 2020 | June 30, 2019 |
|---|---|---|
| **Present Value of Future Benefits:** | | |
| 1. Active members | $66,164,025,238 | $64,201,943,307 |
| 2. Retired members and beneficiaries receiving benefits | 88,185,983,215 | 85,788,805,976 |
| 3. Inactive members with deferred benefits | 3,493,651,653 | 3,537,804,681 |
| 4. Total: (1) + (2) + (3) | $157,843,660,106 | $153,528,553,964 |
| **Actuarial Accrued Liability:** | | |
| 1. Active members | $43,918,912,145 | $42,130,358,296 |
| 2. Retired members and beneficiaries receiving benefits | 88,185,983,215 | 85,788,805,976 |
| 3. Inactive members with deferred benefits | 3,493,651,653 | 3,537,804,681 |
| 4. Total: (1) + (2) + (3) | $135,598,547,013 | $131,456,968,953 |
| **Funded Status:** | | |
| 1. Actuarial accrued liability | $135,598,547,013 | $131,456,968,953 |
| 2. Actuarial value of assets (AVA) | 54,890,975,828 | 53,391,192,733 |
| 3. Unfunded actuarial accrued liability (AVA basis): (1) – (2) | $80,707,571,185 | $78,065,776,220 |
| 4. Funded ratio (AVA basis): (2) / (1) | 40.5% | 40.6% |
| 5. Fair value of assets (FVA) | $52,316,477,771 | $53,262,789,367 |
| 6. Unfunded actuarial accrued liability (FVA basis): (1) – (5) | 83,282,069,242 | 78,194,179,586 |
| 7. Funded ratio (FVA basis): (5) / (1) | 38.6% | 40.5% |
| **Summary of State Contributions for Fiscal Year:** | **2022** | **2021** |
| 1. Based on Statutory Funding Plan | $5,694,106,973 | $5,140,736,721 |
| 2. Based on Board-Adopted Actuarial Funding Policy | 8,850,455,308 | 8,344,196,301 |
| 3. Difference between Board-Adopted Actuarial Funding Policy and Statutory Funding: (2) – (1) | $3,156,348,335 | $3,203,459,580 |
| 4. Normal cost rate based on Statutory Funding Plan | | |
| (a) Total (including administrative expenses) | 19.31% | 19.41% |
| (b) Member rate | 9.00% | 9.00% |
| (c) Employer: (4a) – (4b) | 10.31% | 10.41% |

## Summary of Key Valuation Results *continued*

| | June 30, 2020 | June 30, 2019 |
|---|---|---|
| **Summary of State Contributions for Fiscal Year (continued):** | **2022** | **2021** |
| 5. Total normal cost based on Statutory Funding Plan | | |
| (a) Total | $2,174,576,470 | $2,145,060,808 |
| (b) Administrative expenses | 40,892,235 | 31,439,548 |
| (c) Expected member contributions | 1,032,339,073 | 1,009,317,615 |
| (d) Total employer normal cost: (5a) + (5b) – (5c) | $1,183,129,632 | $1,167,182,741 |
| **GASB Information:** | | |
| 1. Long-term expected rate of return | 7.00% | 7.00% |
| 2. Municipal bond index* | 2.21% | 3.50% |
| 3. Single equivalent discount rate | 7.00% | 7.00% |
| 4. Total pension liability | $138,531,733,887 | $134,370,954,628 |
| 5. Plan fiduciary net position | 52,316,477,771 | 53,262,789,367 |
| 6. Net pension liability: (4) – (5) | $86,215,256,116 | $81,108,165,261 |
| 7. Plan fiduciary net position as a percentage of total pension liability: (5) / (4) | 37.8% | 39.6% |
| **Demographic data used for valuation as of June 30**:** | **2019** | **2018** |
| 1. Number of active members | | |
| (a) Full-time and regular part-time | 135,752 | 134,160 |
| (b) Substitute, part-time, and hourly paid | 27,323 | 26,592 |
| (c) Total | 163,075 | 160,752 |
| 2. Number of inactive members | | |
| (a) Eligible for deferred annuities | 19,363 | 19,726 |
| (b) Eligible for refunds or single sum benefits only | 121,908 | 119,833 |
| 3. Number of annuitants | 124,791 | 122,895 |
| 4. Total membership: (1c) + (2a) + (2b) + (3) | 429,137 | 423,206 |
| 5. Annual salaries | | |
| (a) Full-time and regular part-time | $10,120,309,474 | $9,807,965,387 |
| (b) Substitute, part-time, and hourly paid | 163,335,209 | 154,944,377 |
| (c) Total | $10,283,644,683 | $9,962,909,764 |
| 6. Annual Annuities | $6,927,481,534 | $6,639,967,327 |

* *Bond Buyer's 20-Bond GO index.*

** *Member data used in the valuation is as of the prior valuation date.*

## Significant Issues Facing TRS

**Funding Policy**

A funding policy outlines the parameters for calculating an actuarially determined contribution rate and ensures the systematic funding of future benefit payments. An actuarially determined contribution is comprised of the Normal Cost and an amortization of the Unfunded Actuarial Accrued Liability. These amounts are determined by the following three funding policy components:

- *Actuarial Cost Method*: The Actuarial Cost Method allocates the total present value of future benefits to each year (Normal Cost) including all past years (Actuarial Accrued Liability or AAL)
- *Asset Smoothing Method*: The techniques that spread the recognition of investment gains or losses over a period of time for the purposes of determining the Actuarial Value of Assets used in the actuarial valuation
- *Amortization Policy*: The method on how, in terms of duration and pattern, to fund the Unfunded Actuarial Accrued Liability, or UAAL

**Historical Underfunding by the State**

The Illinois Pension Code sets the parameters for funding TRS. The employer contributions are determined such that, together with the member contributions, the System is projected to achieve 90% funded by 2045. The 2045 funding objective of 90% was set in 1994 as a 50-year objective. TRS members have always contributed their share. **The State funding has been inadequate, resulting in TRS being among the worst funded public employee retirement systems in the United States.**

The State has historically underfunded TRS by the use of funding policies that do not provide for adequate funding of TRS and include:

- Establishing a 50-year period in 1994, over which to amortize the Unfunded Actuarial Accrued Liability
- Back loading the 50-year period by requiring a 15-year period to ramp up to full contributions as determined under the Illinois funding policy
- Setting a funding target of 90% of the actuarial accrued liability (as opposed to 100%)
- Requiring the use of the projected unit credit cost method, which further back loads the contributions to TRS as compared to the entry age normal cost method, which is a level cost funding method
- Imposing a maximum contribution based upon Pension Obligation Bond (POB) debt payments despite the fact that not all of the POB proceeds were contributed to TRS

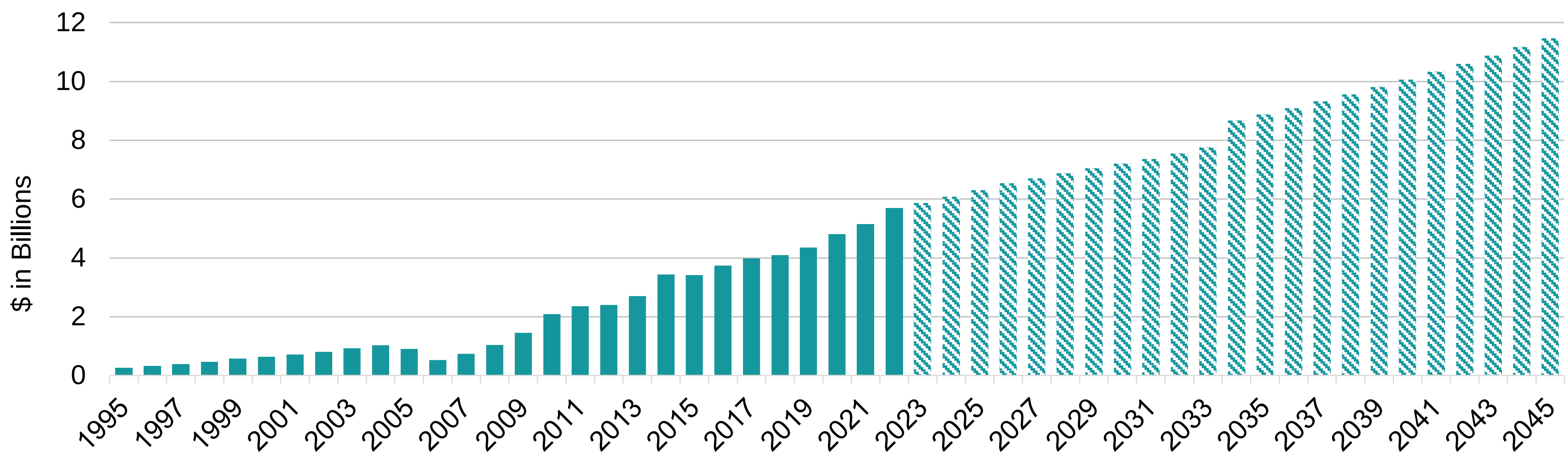
## Significant Issues Facing TRS *continued*

**Historical Underfunding by the State** *continued*

- Reducing contributions for fiscal years ended June 30, 2006 and 2007
- Modifying the asset valuation method to reduce contributions for the fiscal year ended June 30, 2011; further reducing FY 2011 contributions by requiring TRS to recertify the 2009 valuation to assume that Tier II had been in effect in 2009
- Requiring Tier II benefit provisions for members to be hired in the future be reflected in the determination of the contribution, resulting in reduced and back-loaded contributions
- Reducing contributions by phasing in the effect of increased liabilities as a result of assumption changes

The graph below shows a history and projection of the State required contributions under the Illinois Pension Code. The graph illustrates the effect of inadequate State contributions on projected future contributions.

State Required Contribution for Fiscal Year Ending June 30



## Significant Issues Facing TRS *continued*

**Historical Underfunding by the State** *continued*

The insufficiency of the State contributions is the primary reason for the historical and projected increases in UAAL as shown in the graph below.


**Funding Policy Certified by the Board**

Because State contributions under the Illinois Pension Code are inadequate, the Board of Trustees adopted a funding policy ("Board-Adopted Actuarial Funding Policy"), comprised of the following components:

- *Actuarial Cost Method*: The entry age normal method, which allocates costs evenly as a level percentage of salary
- *Asset Smoothing Method:* The actuarial value of assets is based on the fair value of assets with a five-year phase-in of investment returns in excess of (or less than) expected investment income

# Significant Issues Facing TRS *continued*

**Funding Policy Certified by the Board** *continued*

- *Amortization Policy:* The amortization policy is a layered amortization approach. Effective with the June 30, 2015, actuarial valuation, the UAAL is amortized over a closed 20-year period. Sources of UAAL that emerge in subsequent valuations are amortized over closed 20-year periods. The amortization payment increases at the expected rate of future State revenue growth (assumed to be 2.0%, which is conservative but reasonable compared to shorter-term projections of State revenue growth). The minimum contribution is the normal cost.

The Board of Trustees prepares an annual certification, which includes State contributions under the Illinois Pension Code and the Board-Adopted Actuarial Funding Policy. Unlike the current funding policy, the Board-Adopted Actuarial Funding Policy would bring TRS to full funding by decreasing the UAAL every year. **We strongly recommend an actuarial funding method that targets 100% funding where payments ultimately cover interest on the unfunded actuarial accrued liability and a portion of the principal balance.** The funding policy adopted by the Board, referred to as the Board-Adopted Actuarial Funding Policy, meets this standard.

**Implications of Tier II**

*Lower Benefit Structure/Same Contribution Rate as Tier I*

- Tier II members are those who first established membership with TRS or a reciprocal system after December 31, 2010. While Tier II member contribution rates are the same as Tier I member contribution rates, the value of Tier II benefits is lower than Tier I benefits. This is because Tier II members have to work longer to be eligible for retirement, the final average salary period is longer, pensionable salaries are capped, and the cost-of-living adjustments (COLAs) are smaller.
- The Tier II wage cap, which applies to benefits and contributions, was established in 2011 at $106,800. The wage cap increases each fiscal year by the lesser of 3% or one-half of the CPI-U as of the preceding September. For the fiscal year ended June 30, 2020, the limit is $115,929. Based upon the current actuarial assumptions, it is projected that the wage cap will affect the majority of full career Tier II members' final average salary.

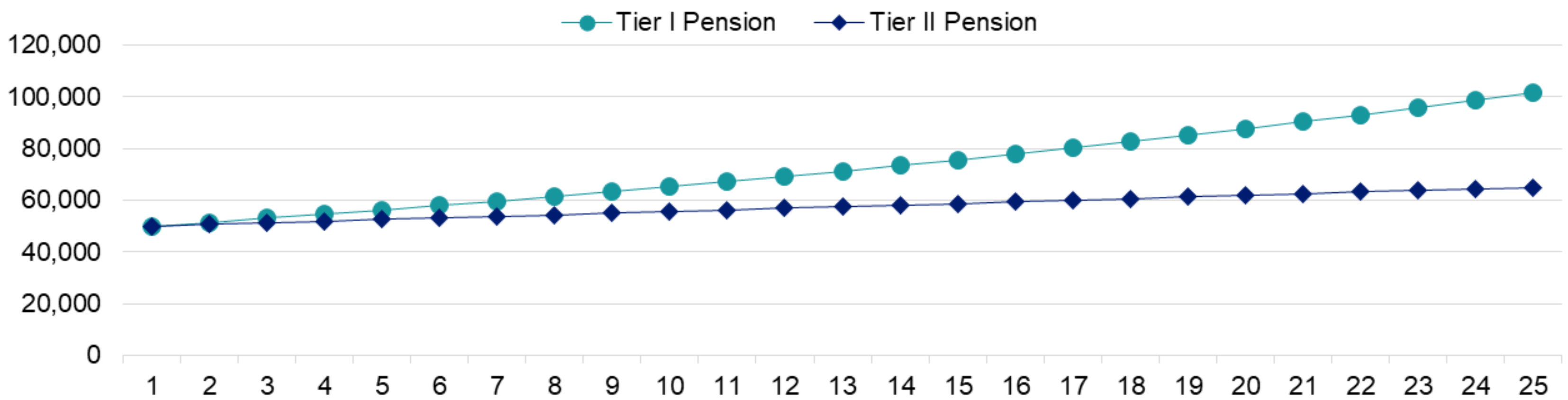
## Significant Issues Facing TRS *continued*

**Implications of Tier II** *continued*

*Cost-of-living Adjustment*

- The Tier II cost-of-living adjustment (COLA) is calculated using the lesser of 3% or one-half of CPI-U as of the preceding September, of the originally granted retirement annuity as compared to the Tier I COLA, which is a 3% compound COLA. The Tier II COLA will not keep pace with inflation, eroding the purchasing power of Tier II pensions during retirement. The chart below shows the comparison of a $50,000 pension under the Tier I and Tier II COLA provisions.

Illustration of Tier I and II COLA Based on Initial Annual Benefit of $50,000



# Significant Issues Facing TRS *continued*

**Implications of Tier II** *continued*

*Total Normal Cost Rate Compared to Member Contribution Rate*

- The following chart compares the Tier I and Tier II member contribution rates to the normal cost rates for fiscal year 2022 using the projected unit credit cost method, as required by the Illinois Pension Code. The normal cost rate is the cost of benefits that accrue during the year expressed as a percentage of payroll, based on the actuarial assumptions. Currently, the total normal cost for Tier I is approximately three times the normal cost rate for Tier II, reflecting the differences in the benefits, as well as the relative age composition of the older, closed Tier I population compared to the younger, ongoing Tier II group. The Tier II total normal cost rate is currently less than the member contribution rate. As a result, based upon the actuarial assumptions, Tier II members are funding their pension benefit and paying a portion of the interest on the UAAL.

## Allocation of Member Contribution Rate

| | | For Fiscal Year 2022 | | |
|---|---|---|---|---|
| | | Tier I | Tier II | Total |
| 1. | Total normal cost rate, including administrative expenses | 22.99% | 7.71% | 19.31% |
| 2. | Less: member contribution rate | (9.00%) | (9.00%) | (9.00%) |
| 3. | Employer normal cost rate | 13.99% | (1.29%) | 10.31% |
| 4. | Allocation of member contribution rate | | | |
| | a. Normal cost rate | 9.00% | 7.71% | 9.00% |
| | b. Unfunded actuarial accrued liability | 0.00% | 1.29% | 0.00% |
| | c. Total | 9.00% | 9.00% | 9.00% |

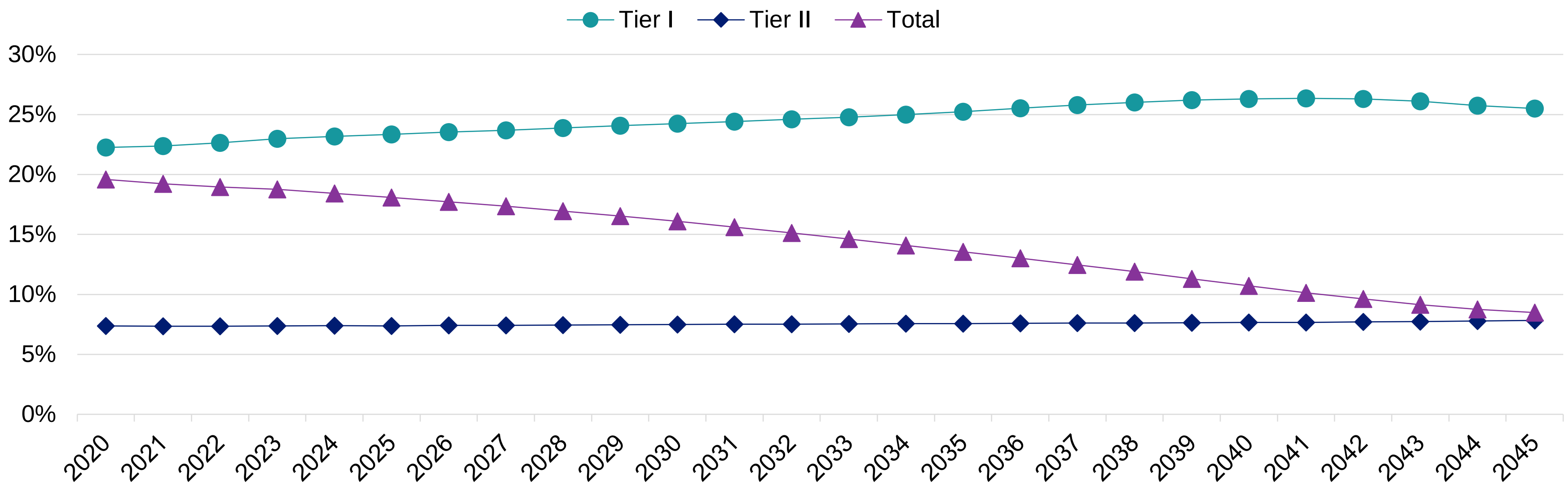
## Significant Issues Facing TRS *continued*

**Implications of Tier II** *continued*

*Projection of Total Normal Cost Rate by Tier*

- The following graph shows a projection of the total normal cost rates for Tier I, Tier II, and in total. The chart shows that the total normal cost rate will decline over time as the Tier I members terminate and retire and are replaced by Tier II members. The funding policy under the Illinois Pension Code, which targets a 90% funded ratio by 2045, requires the funding and benefit provisions for future Tier II members to be reflected in the determination of the contribution. The contributions, as determined by the Illinois Pension Code, are based on a projection of normal cost and actuarial accrued liability for Tier II members who will be hired after the valuation date and through 2045. This results in a deferral of contributions to later years.

Projection of Total Normal Cost Rate for Fiscal Year Ending June 30



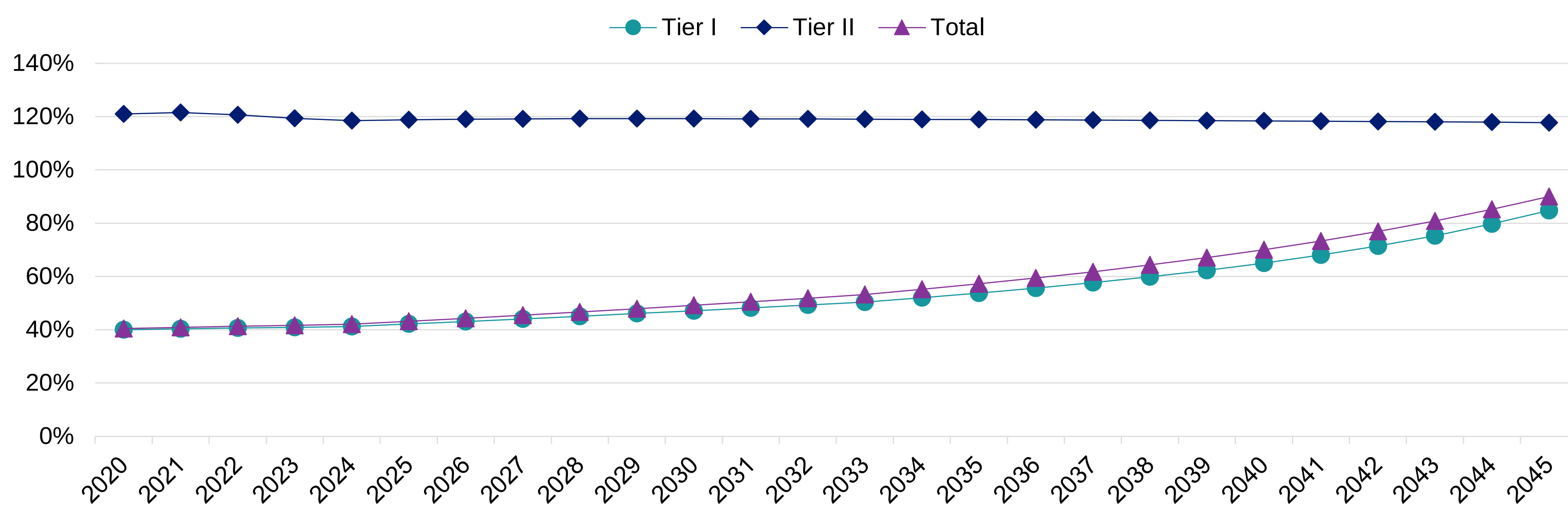
## Significant Issues Facing TRS *continued*

**Implications of Tier II** *continued*

*Tier II Contribution Toward Unfunded Actuarial Accrued Liability*

- As described above, Tier II members are funding a portion of the interest on the UAAL along with the normal cost of their benefits. Tier I and Tier II liabilities and assets are not allocated separately for purposes of determining the funded ratio and contribution requirements. However, if the assets and liabilities were allocated separately, a projection of the funded ratio for each tier would show that the Tier II funded ratio is 121% as of June 30, 2020, decreasing over time to a funded ratio of 118% as of June 30, 2045. In contrast, the Tier I funded ratio is 40% as of June 30, 2020, increasing to 85% as of June 30, 2045. For the total System, the funded ratio is 41% as of June 30, 2020, increasing to 90% as of June 30, 2045. Tier II member contributions assist in increasing the total funded ratio to 90% as of 2045. The graph below illustrates this.

Projection of Funded Ratio for Fiscal Year Ending June 30



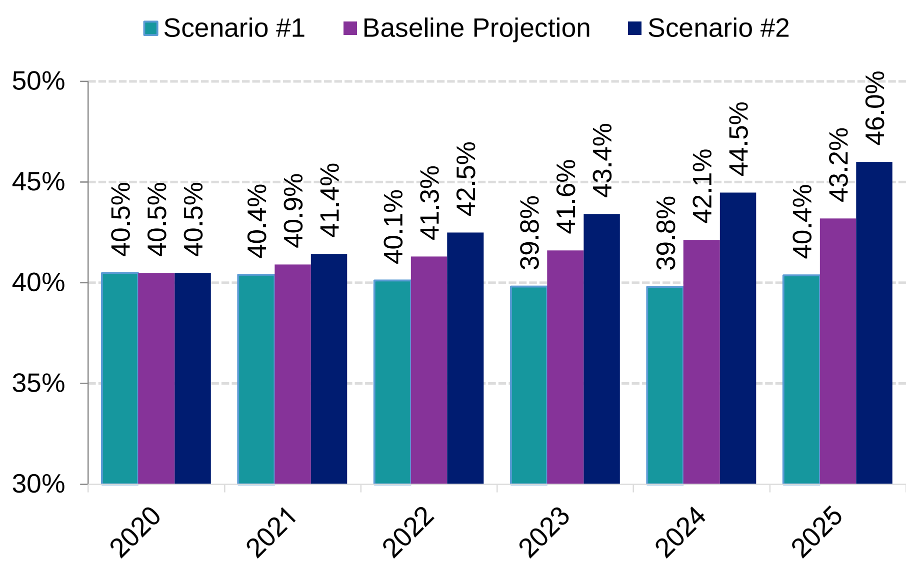
## Sensitivity Projections

The following charts show projections of valuation results under alternative investment return scenarios and their impact on the funded status and State contributions for the next five years. The projections are based on the current actuarial assumptions and assume that all actuarial assumptions are realized, with the exception of the investment return for the year ending June 30, 2021:

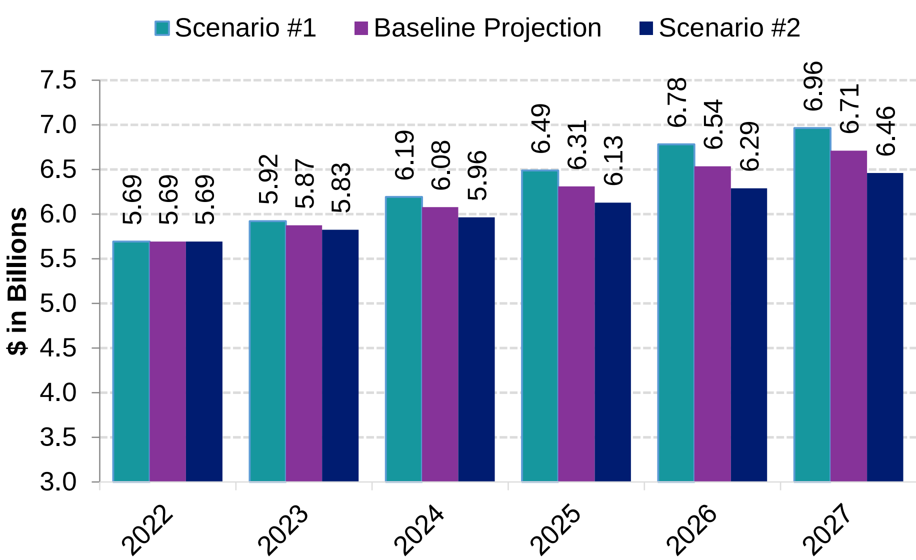
- Scenario 1 assumes a 0% investment return for the year ending June 30, 2021
- Scenario 2 assumes a 14% investment return for the year ending June 30, 2021

Because investment gains and losses are recognized in the actuarial value of assets over a five-year period, the effect on the funded status and State contribution in the first year is small. However, by the fifth year, the investment returns are fully reflected in the valuation. The charts show that investment gains and losses will have a significant effect on the valuation results.

Projection of Funded Ratio for Fiscal Year Ending June 30




Projection of State Contribution for Fiscal Year Ending June 30

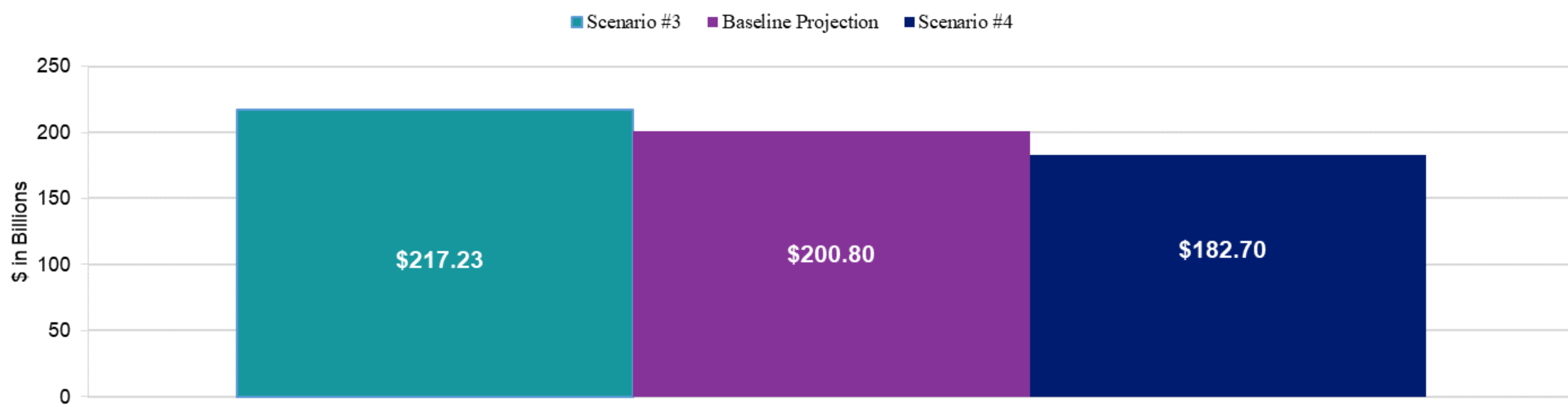


## Sensitivity Projections *continued*

The following chart shows the total State contributions for the fiscal years June 30, 2022, through June 30, 2045, based on the current actuarial assumptions and assuming that all actuarial assumptions are realized with the exception of the investment returns as follows:

- Scenario 3 assumes investment returns of 6.00% for each year beginning with the year ending June 30, 2021, through June 30, 2045
- Scenario 4 assumes investment returns of 8.00% for each year beginning with the year ending June 30, 2021, through June 30, 2045

### Total State Contribution from Year Ending June 30, 2022 Through June 30, 2045




Note that, under the Board-Adopted Actuarial Funding Policy, the total contribution amount paid by the System through fiscal year ending June 30, 2020 would be $161.25 billion, which would result in an overall savings of $39.55 billion through June 30, 2045, compared to current Statutory Funding Policy (as shown in the baseline projection scenario above).

## Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

- **Plan of benefits** Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
- **Participant data** An actuarial valuation for the System is based on data provided to the actuary by TRS. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
- **Assets** The valuation is based on the fair value of assets as of the valuation date, as provided by TRS, and uses an "actuarial value of assets" that differs from fair value to gradually reflect year-to-year changes in the fair value of assets in determining the contribution requirements.
- **Actuarial assumptions** In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the System's assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

## Important Information About Actuarial Valuations *continued*

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the TRS Board. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the System's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the System will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- If the TRS Board is aware of any event or trend that was not considered in the valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the System's provisions, but they may be subject to alternative interpretations. TRS should look to their other advisors for expertise in these areas.
- The measurements shown in this actuarial valuation may not be applicable for other purposes. 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); and changes in plan provisions or applicable law.

As Segal has no discretionary authority with respect to the management or assets of the System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

# Section 2: Actuarial Valuation Results

## A. Membership Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active members, inactive members, retirees and beneficiaries.

This section presents a summary of significant statistical data on these member groups.

Data used for the valuation is as of the prior valuation date. Any changes in liabilities due to demographic experience during the most recent plan year are captured in the subsequent valuation.

More detailed information for this valuation year and the preceding valuation can be found in Section 3, Exhibits A, B, C, D, E, and G.

### Member Population: 2010 – 2019*

| June 30 | Full-Time and Regular Part-Time Active Members | Substitutes, Part-Time and Hourly Paid | Inactive Members Eligible for Deferred Annuities | Inactive Members Eligible for Refunds | Annuitants and Survivor Annuitants | Ratio of Full-Time Actives to Annuitants |
|---|---|---|---|---|---|---|
| 2010 | 137,711 | 32,479 | 16,266 | 99,029 | 101,352 | 1.36 |
| 2011 | 133,752 | 32,120 | 16,811 | 104,970 | 105,499 | 1.27 |
| 2012 | 132,956 | 29,073 | 16,995 | 108,531 | 106,102 | 1.25 |
| 2013 | 132,886 | 28,104 | 17,250 | 110,403 | 109,448 | 1.21 |
| 2014 | 132,916 | 26,920 | 17,575 | 113,012 | 112,682 | 1.18 |
| 2015 | 133,478 | 26,206 | 18,362 | 115,360 | 115,273 | 1.16 |
| 2016 | 133,505 | 26,080 | 19,038 | 117,817 | 117,990 | 1.13 |
| 2017 | 133,761 | 26,664 | 19,531 | 119,738 | 120,453 | 1.11 |
| 2018 | 134,160 | 26,592 | 19,726 | 119,833 | 122,895 | 1.09 |
| 2019 | 135,752 | 27,323 | 19,363 | 121,908 | 124,791 | 1.09 |

* *Member data used in the valuation is as of the prior valuation date.*

## A. Membership Data *continued*

**Active Members**

Plan costs are affected by the age, years of service, and compensation of active members. As of June 30, 2019 (the date as of which census data is collected for the June 30, 2020, valuation), there were 135,752 full-time and regular part-time active members with an average age of 42.2, average years of service of 13.2, and average compensation of $74,550. The 134,160 full-time and regular part-time active members in the prior valuation had an average age of 42.0, average years of service of 13.1, and average compensation of $73,106.

In addition, as of June 30, 2019, there were 27,323 active members who were substitutes, part-time, and hourly paid on either a flexible or limited work schedule.

Additional information is shown on the following page.

**Inactive Members**

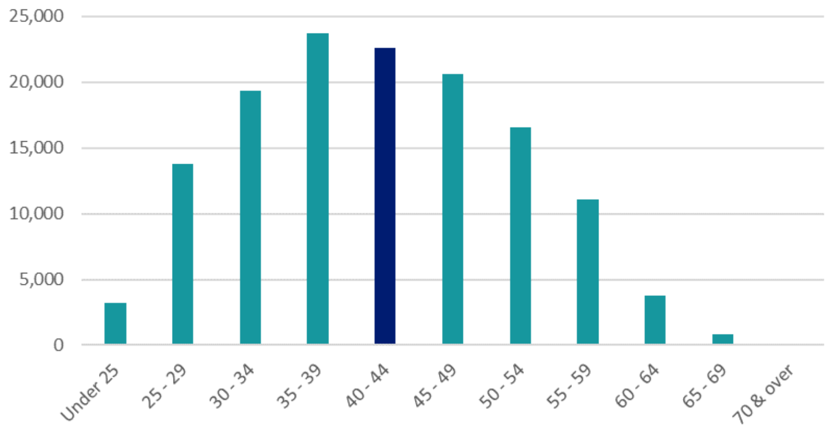
As of June 30, 2019 (the date at which census data is collected for the June 30, 2020, valuation), there were 19,337 participants and 26 survivors with a vested right to a deferred benefit. Inactive members may also be eligible for a refund of their retirement benefit contributions or a single sum benefit.

In addition, there were 121,908 participants entitled to a return of their employee contributions.

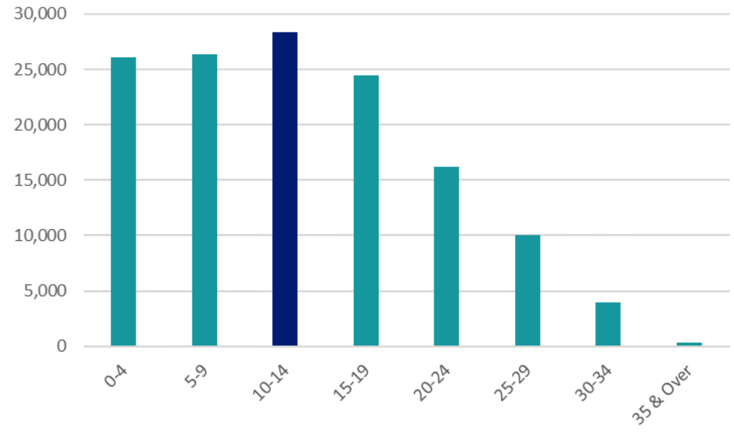
## A. Membership Data *continued*

### Full-Time and Regular Part-Time Active Participant Data as of June 30, 2019*

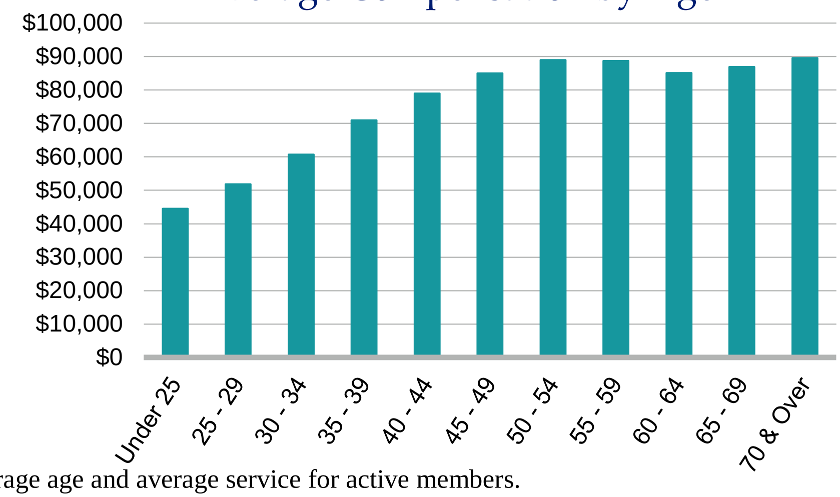
#### By Age




#### By Years of Service




#### Average Compensation by Age




Note: The dark blue bar represents the average age and average service for active members.

* *Member data used for the valuation is as of the prior valuation date*

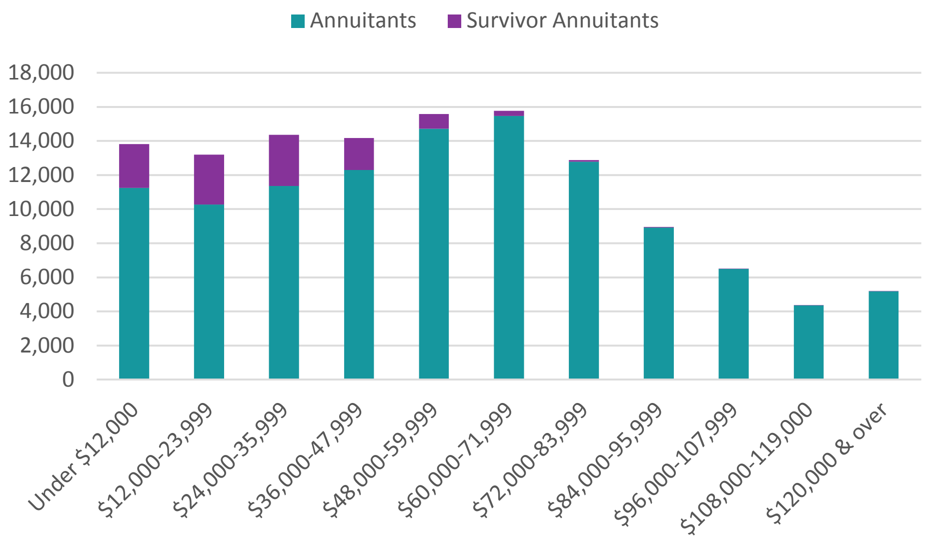
## A. Membership Data *continued*

**Annuitants and Survivor Annuitants**

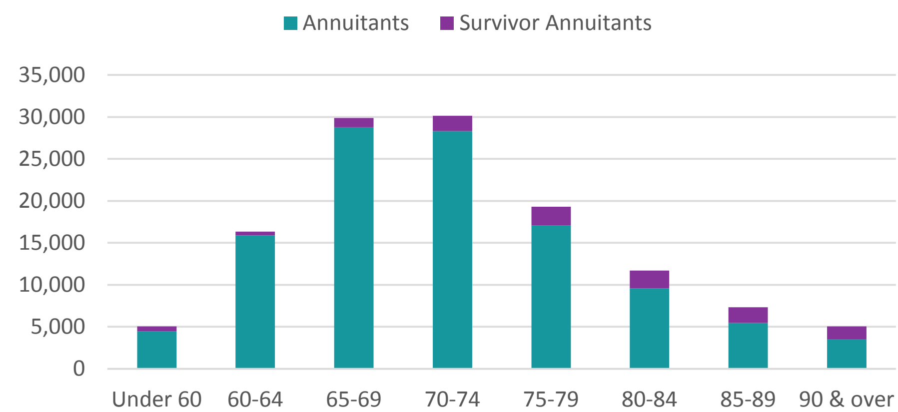
As of June 30, 2019 (the date as of which census data is collected for the June 30, 2020, valuation), 113,116 annuitants and 11,675 survivor annuitants were receiving total annual benefits of $6,927,481,533. For comparison, in the previous valuation, there were 111,559 annuitants and 11,336 survivor annuitants were receiving total annual benefits of $6,639,967,327.

### Distribution of Annuitants and Survivor Annuitants

#### By Annual Benefit as of June 30, 2019*




#### By Age as of June 30, 2019*




* *Member data used in the valuation is as of the prior valuation date.*

## B. Financial Information

Two actuarial values of assets are used for determining the statutory contribution under the Illinois Pension Code, one that includes the Pension Obligation Bond (POB) and one that excludes the POB. The recommended contribution under the Board's funding policy (Board-Adopted Actuarial Funding Policy) includes the POB. The actuarial value of assets used in determining both contributions gradually adjusts to fair value. Under this asset valuation method, the full value of market fluctuations is recognized over a five-year period as opposed to in a single year. The amount of the adjustment to recognize fair value is treated as income, which may be positive or negative.

Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

To determine the employer contributions, the actuarial value of assets are projected one year from the valuation date to the beginning of the contribution fiscal year.

See charts on the following two pages for additional information.

## B. Financial Information *continued*

### Determination of Actuarial Value of Assets and Projected Actuarial Value of Assets with POB for June 30, 2020 and June 30, 2019 Actuarial Valuations

| | | | | 2020 | | 2019 |
|---|---|---|---|---|---|---|
| 1. | Fair value of assets with POB available for benefits | | | $52,316,477,771 | | $53,262,389,367 |
| 2. | Calculation of unrecognized return* | Original Amount** | % Not Recognized | | % Not Recognized | |
| | (a) Year ended June 30, 2020 | ($3,409,956,524) | 80% | ($2,727,965,219) | | |
| | (b) Year ended June 30, 2019 | (974,076,334) | 60% | (584,445,800) | 80% | ($779,261,067) |
| | (c) Year ended June 30, 2018 | 643,913,847 | 40% | 257,565,539 | 60% | 386,348,308 |
| | (d) Year ended June 30, 2017 | 2,401,737,113 | 20% | 480,347,423 | 40% | 960,694,845 |
| | (e) Year ended June 30, 2016 | (3,482,927,259) | | 0 | 20% | (696,585,452) |
| | (f) Total unrecognized return | | | ($2,574,498,057) | | ($128,803,366) |
| 3. | Actuarial value of assets with POB (Current Assets): (1) – (2f) | | | $54,890,975,828 | | $53,391,192,733 |
| 4. | Actuarial value as a percent of fair value: (3) ÷ (1) | | | 104.9% | | 100.2% |
| 5. | Projected actuarial value of assets | | | | | |
| | (a) Assumed contributions | | | $6,247,115,602 | | $5,893,184,063 |
| | (b) Assumed distributions | | | 7,476,643,962 | | 7,176,323,805 |
| | (c) Expected return at 7.00% | | | 3,799,334,815 | | 3,692,473,600 |
| | (d) Projected actuarial value of assets: (3) + (5a) – (5b) + (5c) | | | $57,460,782,283 | | $55,800,526,591 |

* *Recognition at 20% per year over 5 years*
** *Total return minus expected return on fair value*

## B. Financial Information *continued*

For determining the actuarial value of assets without the POB, the fair value of assets is estimated by adjusting for the POB. The fair value of assets without the POB as of the valuation date is equal to the fair value of assets without the POB as of the prior valuation date, increased by contributions excluding the POB debt service, decreased by disbursements, and credited with interest based upon the investment return of the fair value of assets with the POB.

### Determination of Actuarial Value of Assets and Projected Actuarial Value of Assets without POB for June 30, 2020 and June 30, 2019 Actuarial Valuations

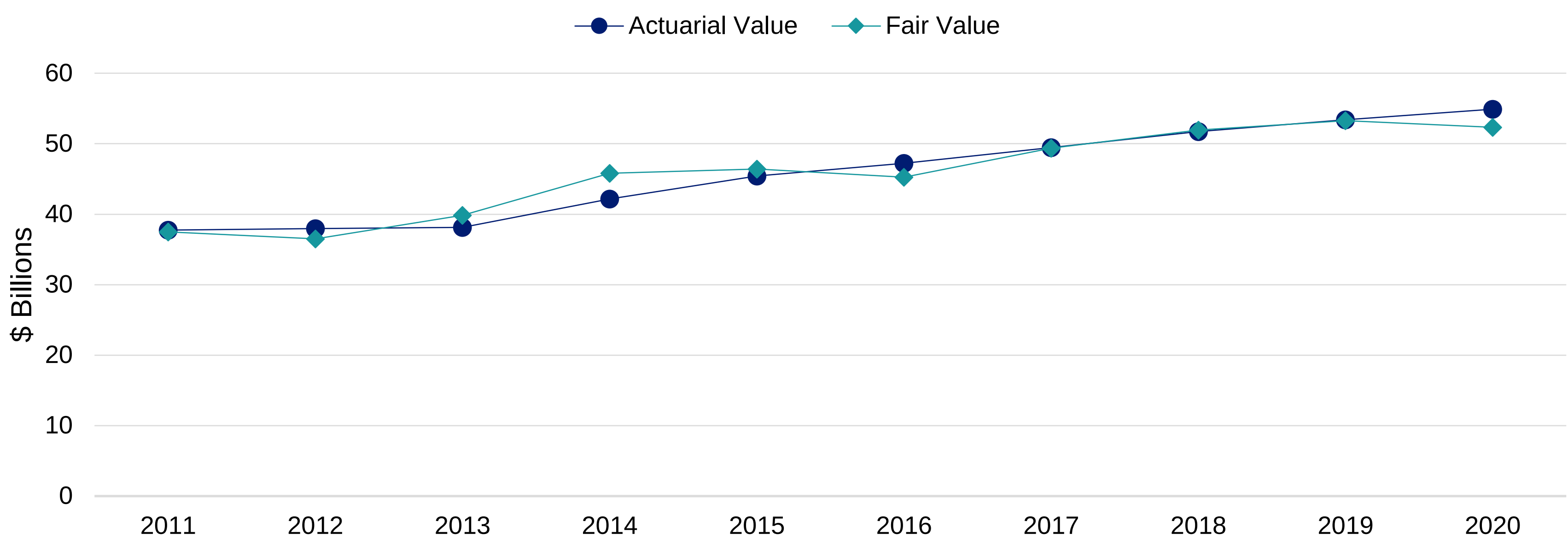
| | | | | 2020 | | 2019 | |
|---|---|---|---|---|---|---|---|
| 1. | Estimated fair value of assets without POB available for benefits | | | | $47,749,372,530 | | $48,321,312,518 |
| 2. | Calculation of unrecognized return* | | Original Amount** | % Not Recognized | | % Not Recognized | |
| | (a) | Year ended June 30, 2020 | ($3,102,850,180) | 80% | ($2,482,281,744) | | |
| | (b) | Year ended June 30, 2019 | (881,437,935) | 60% | (528,862,761) | 80% | ($705,150,348) |
| | (c) | Year ended June 30, 2018 | 579,778,319 | 40% | 231,911,328 | 60% | 347,866,991 |
| | (d) | Year ended June 30, 2017 | 2,152,156,362 | 20% | 430,431,272 | 40% | 860,862,545 |
| | (e) | Year ended June 30, 2016 | (3,104,582,596) | | 0 | 20% | (620,916,519) |
| | (f) | Total unrecognized return | | | ($2,348,801,905) | | ($117,337,331) |
| 3. | Actuarial value of assets without POB (Current Assets): (1) – (2f) | | | | $50,098,174,435 | | $48,438,649,849 |
| 4. | Actuarial value as a percent of fair value: (3) ÷ (1) | | | | 104.9% | | 100.2% |
| 5. | Projected actuarial value of assets | | | | | | |
| | (a) | Assumed contributions | | | $6,669,313,120 | | $6,292,382,753 |
| | (b) | Assumed distributions | | | 7,476,643,962 | | 7,176,323,805 |
| | (c) | Expected return at 7.00% | | | 3,478,615,631 | | 3,359,767,553 |
| | (d) | Projected actuarial value of assets: (3) + (5a) – (5b) + (5c) | | | $52,769,459,224 | | $50,914,476,350 |

* *Recognition at 20% per year over 5 years*
** *Total return minus expected return on fair value*

## B. Financial Information *continued*

Both the actuarial value and fair value of assets are a representation of the TRS financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the fair value of assets. The actuarial asset value is significant because TRS liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

### Actuarial Value of Assets vs. Fair Value of Assets as of June 30, 2011 – 2020 (with POB)



## C. Actuarial Experience

To calculate the actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. Overall favorable experience relative to the assumptions (an actuarial gain) causes a decrease in the contribution requirement. On the other hand, overall less favorable experince relative to the assumptions (an actuarial loss) causes an increase in the contribution requirement.

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single years' experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total loss is $1,019,711,060; $972,850,068 from investment losses and $46,860,992 in losses from all other sources. The net experience variation from individual sources other than investments was approximately 0.03% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

### Actuarial Experience for Year Ended June 30, 2020

| | | |
|---|---|---|
| 1. | Net loss from investments* | ($972,850,068) |
| 2. | Net loss from other experience** | (46,860,992) |
| 3. | Net experience loss: (1) + (2) | ($1,019,711,060) |

* *Details on page 34*

** *Details in page 37*

## C. Actuarial Experience *continued*

**Investment Rate of Return**

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the TRS investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.0%. The actual rate of return on an actuarial basis for the year ended June 30, 2020, was 5.16%.

Since the actual return for the year was less than the assumed return, TRS experienced an actuarial loss during the fiscal year ended June 30, 2020, with regard to its investments.

### Investment Experience for Year Ended June 30, 2020

| | | Fair Value With POB | Fair Value Without POB | Actuarial Value With POB |
|---|---|---|---|---|
| 1. | Value of assets as of June 30, 2019 | $53,262,789,367 | $48,321,312,518 | $53,391,192,733 |
| 2. | Contributions during fiscal year ended June 30, 2020 | 5,900,510,333 | 6,299,709,023* | 5,900,510,333 |
| 3. | Benefits and expenses during fiscal year ended June 30, 2020 | 7,122,491,327 | 7,122,491,327 | 7,122,491,327 |
| 4. | Value of assets as of June 30, 2020 | 52,316,477,771 | 47,749,372,530 | 54,890,975,828 |
| 5. | Total investment income: (4) – (1) – (2) + (3) | 275,669,398 | 250,842,316 | 2,721,764,089 |
| 6. | Average value of assets: (1) + ((2) – (3)) ÷ 2 | 52,651,798,870 | 47,909,921,366 | 52,780,202,236 |
| 7. | Actual rate of return: (5) ÷ (6) | 0.52% | 0.52% | 5.16% |
| 8. | Assumed rate of return | 7.00% | 7.00% | 7.00% |
| 9. | Expected return: (6) x (8) | $3,685,625,922 | $3,353,694,496 | $3,694,614,157 |
| 10. | Actuarial loss: (5) – (9) | ($3,409,956,524) | ($3,102,852,180) | ($972,850,068) |

* *Includes POB debt service*

## C. Actuarial Experience *continued*

**Investment Rate of Return** *continued*

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the market value investment return for the last twenty years, including five-year, ten-year, fifteen-year, and twenty-year averages.

Note that the actuarial value of assets was equal to the fair value of assets prior to June 30, 2009. Effective June 30, 2009, the actuarial value of assets was changed to a method under which market fluctuations in excess of or below the assumed investment return are recognized over a five-year period. The returns were determined by the actuary and may be different from the returns reported in the Comprehensive Annual Financial Report.

### Investment Return
### Fair Value vs. Actuarial: 2001 – 2020

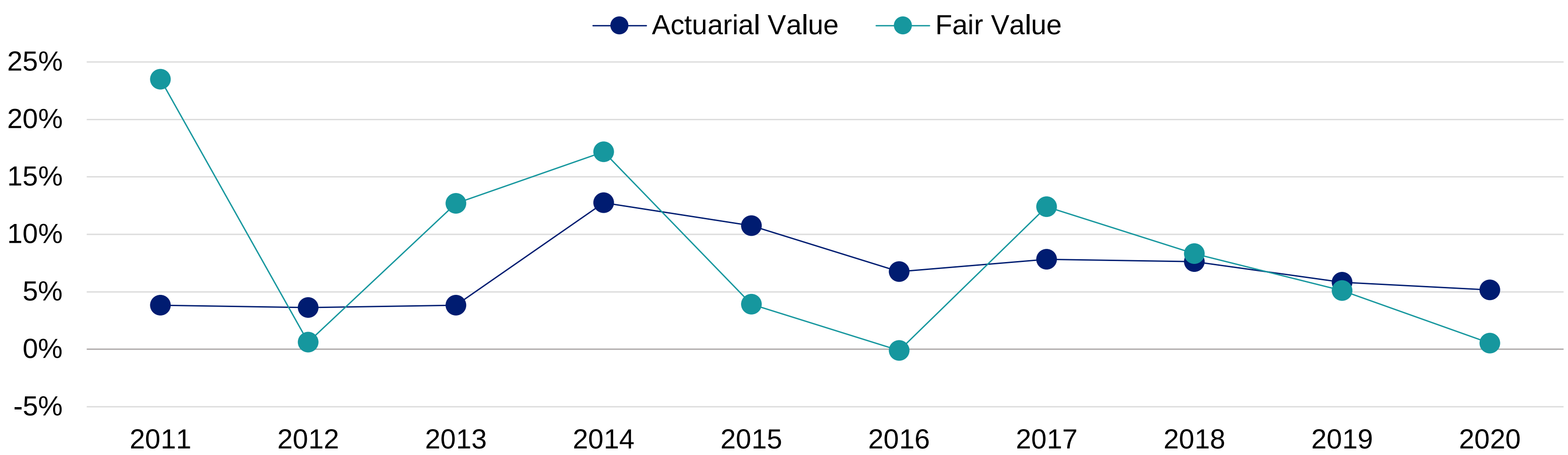
| Year Ended June 30 | Fair Value | Actuarial Value | Year Ended June 30 | Fair Value | Actuarial Value |
|---|---|---|---|---|---|
| 2001 | (4.16%) | (4.16%) | 2011 | 23.50% | 3.84% |
| 2002 | (3.12%) | (3.12%) | 2012 | 0.61% | 3.64% |
| 2003 | 4.78% | 4.78% | 2013 | 12.70% | 3.83% |
| 2004 | 16.46% | 16.46% | 2014 | 17.19% | 12.75% |
| 2005 | 10.69% | 10.69% | 2015 | 3.91% | 10.76% |
| 2006 | 11.98% | 11.98% | 2016 | (0.10%) | 6.46% |
| 2007 | 19.07% | 19.07% | 2017 | 12.39% | 7.83% |
| 2008 | (4.89%) | (4.89%) | 2018 | 8.32% | 7.63% |
| 2009 | (22.89%) | 2.22% | 2019 | 5.10% | 5.84% |
| 2010 | 12.97% | 0.71% | 2020 | 0.52% | 5.16% |
| | Most recent five-year average return | | | 5.1% | 6.6% |
| | Most recent ten-year average return | | | 8.2% | 6.8% |
| | Most recent fifteen-year average return | | | 6.1% | 6.3% |
| | Most recent twenty-year average return | | | 5.7% | 5.9% |

## C. Actuarial Experience *continued*

**Investment Rate of Return** *continued*

The actuarial asset valuation method gradually takes into account fluctuations in the fair value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs. The chart below illustrates the effect that the asset returns on a fair value basis are more volatile than asset returns on an actuarial basis.

### Fair Value and Actuarial Rates of Return for Years Ended June 30, 2011 – 2020



## C. Actuarial Experience *continued*

**Other Experience**

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include but are not limited to:

- salary increases different than assumed,
- retirement experience (earlier or later than expected),
- disability experience different than assumed,
- the extent of turnover among participants,
- mortality (more or fewer deaths than expected), and
- new entrants.

The loss from this other experience for the year ended June 30, 2020, amounted to $46,860,992, which is approximately 0.03% of the actuarial accrual liability. This is largely due to retirement experience. A five-year history of the demographic gain/(loss) experience is shown in the chart below.

### Experience Due to Changes in Demographics For Years Ended June 30, 2016 to June 30, 2020

| | | 2020 | 2019 | 2018 | 2017 | 2016 |
|---|---|---|---|---|---|---|
| 1. | Salary increases | $41,780,212 | $84,011,865 | $40,293,935 | ($29,518,579) | $65,504,184 |
| 2. | Retirement experience | (178,155,930) | (324,388,173) | (341,957,544) | (365,965,251) | (237,492,448) |
| 3. | Disability experience | 17,701,086 | 17,840,394 | 24,275,853 | 23,361,862 | 16,091,632 |
| 4. | Termination experience | (49,417,489) | (60,351,523) | (19,458,838) | (25,597,354) | (15,147,793) |
| 5. | Mortality experience | (14,135,952) | (10,977,383) | (42,624,422) | (24,539,086) | (49,779,799) |
| 6. | Rehires | (41,266,774) | (39,508,399) | (36,264,543) | (32,789,033) | (23,266,945) |
| 7. | New entrants | 10,456,950 | 10,851,490 | 16,845,581 | 16,627,360 | 17,516,646 |
| 8. | Other | 166,176,905 | (29,494,007) | (983,112,072)* | (165,896,422) | (737,480,200)** |
| 9. | Total | ($46,860,992) | ($352,015,736) | ($1,342,002,050) | ($604,316,503) | ($964,054,723) |

** Primarily due to programming enhancements.*

***Primarily due to a change in software/actuary, which is within a normal range for this change for a plan the size of TRS.*

# D. Development of Employer Costs

**Statutory Funding under Illinois Pension Code**

The amount of the employer contribution as determined by the Illinois Pension Code is the amount, which, as a level percentage of member payroll, will result in the System being 90% funded by June 30, 2045. The employer contributions include contributions from the State, School Districts, and Federal Funds. Federal Funds contributions are based on the assumption that 2.00% of total payroll is attributable to Federal Funds payroll. For fiscal 2022, the School Districts' contributions are expected to equal 0.58% of total payroll under Sec. 16-158(e), approximately 0.04% of total payroll under Sec. 16-158(f), and approximately 0.03% of total payroll under Sec. 16-158(i-5). The actuarial cost method is the projected unit credit method.

The methodology for calculating the Federal Funds contribution and, therefore, the State contribution has been changed effective for fiscal years 2021 and thereafter. Based on the modified approach, the Federal Funds contributions are treated in a similar manner as some School District contributions (i.e., a stream of projected contributions estimated as of the valuation date) resulting in the State contribution being the level percent of payroll required to attain 90% funded by fiscal year 2045.

**Recommended Funding under Board-Adopted Actuarial Funding Policy**

The actuarially determined contribution under the Board's funding policy, called the Board-Adopted Actuarial Funding Policy, is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability. The amortization of the unfunded accrued liability is a closed 20-year period effective June 30, 2015, and will decline by one year in each subsequent valuation. Sources of unfunded actuarial accrued liability that emerge in subsequent valuations are amortized over closed 20-year periods. Contributions toward the unfunded actuarial accrued liability increase by 2% each year, the estimated increase in future State revenue growth. The actuarial cost method is the entry age normal method. The minimum contribution is the normal cost.

The chart on the following page shows the development of employer contributions under Statutory Funding and the Board-Adopted Actuarial Funding Policy.

# D. Development of Employer Costs *continued*

## Employer Contributions

| | Fiscal Year Ending June 30 | |
|---|---|---|
| | **2022** | **2021** |
| **Based on Statutory Funding Plan** | | |
| 1. Benefit Trust Reserve: | | |
| a. Employer's cost as percentage of membership payroll | 50.29% | 47.12% |
| b. Total employer contribution: (1a) x (8) | $5,768,670,673 | $5,284,597,987 |
| c. School Districts contributions under Sec. 16-158 | (74,211,665) | (74,112,385) |
| d. Federal Funds contribution | (23,652,035) | (23,348,881) |
| e. Phase-in of the effect of assumption changes | 22,900,000 | (46,800,000) |
| f. State Contribution: (1b) + (1c) + (1d) + (1e) | $5,693,706,973 | $5,140,336,721 |
| 2. Guaranteed Minimum Annuity Reserve | 400,000 | 400,000 |
| 3. Total State Contribution: (1f) + (2) | $5,694,106,973 | $5,140,736,721 |
| **Based on Board-Adopted Actuarial Funding Policy (Actuarially Determined Contribution)** | | |
| 4. Benefit Trust Reserve: | | |
| a. Normal cost plus amortization of UAAL | $8,947,919,008 | $8,441,257,567 |
| b. School Districts contribution under Sec. 16-158 | (74,211,665) | (74,112,385) |
| c. Federal Funds contribution | (23,652,035) | (23,348,881) |
| d. State contribution: (4a) + (4b) + (4c) | $8,850,055,308 | $8,343,796,301 |
| 5. Guaranteed Minimum Annuity Reserve | 400,000 | 400,000 |
| 6. Total State Contribution: (4d) + (5) | $8,850,455,308 | $8,344,196,301 |
| **Difference Between Board-Adopted Actuarial Funding Policy and Statutory Fund** | | |
| 7. Shortfall/(Excess): (6) – (3) | $3,156,348,335 | $3,203,459,580 |
| **Expected Membership Payroll** | | |
| 8. Total membership payroll | $11,470,434,147 | $11,214,640,162 |

## E. Risk

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the Plan. Upon request, a more detailed assessment of the risks can be provided to enable a better understanding of the risks specific to your Plan. Given the System's current funding level and contribution history, we recommended a detailed risk assessment be performed for TRS.

**Investment Risk**

If the actual return on the fair value of assets for the next Plan Year were 1% different from the assumed (either higher or lower), the projected unfunded actuarial liability would change by 0.6%, or about $500 million.

Since the Plan's assets are much larger than contributions, investment performance may create significant volatility in contribution requirements. For example, for each 1% difference in return from the assumed return, the Board-Adopted Actuarial Funding Policy contribution would increase or decrease by approximately $650 million (6.0% of payroll) and the Statutory contribution requirement would increase or decrease by approximately $500 million (4.5% of payroll).

The fair value rate of return over the last 10 years has ranged from a low of -0.1% to a high of 23.5%, with an average of 8.2%. However, looking over a longer historical period of 20 years, the fair value rate of return has an average of 5.7%.

**Longevity Risk**

The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the TRS funding policy and statutorily required contribution requirement.

**Contribution Risk**

The TRS funding policy contribution requires payment of the System's normal cost and an amortization payment according to a schedule sufficient to pay down unfunded actuarial liability over time. If the TRS funding policy contribution were adhered to, contribution risk would be negligible.

## E. Risk *continued*

**Contribution Risk** *continued*

However, Plan contributions are set by statute. The statutorily-required amount systematically underfunds TRS. Among other things, it: a) is based on a funding target of 90% of the actuarial accrued liability (as opposed to 100%); b) requires the use of the projected unit credit cost method, which further back loads the contributions to TRS as compared to the entry age normal cost method, which is a level cost funding method; c) imposes a maximum contribution based upon Pension Obligation Bond (POB) debt payments despite the fact that not all of the POB proceeds were contributed to TRS; and d) requires Tier II benefit provisions for members to be hired in the future be reflected in the determination of the contribution, resulting in reduced and back-loaded contributions.

If contributions remain at current level and future experience matches the current assumptions, we project the unfunded actuarial accrued liability will not be paid off.

**Demographic Risk**

Examples of this risk include:

- Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
- More or less active participant turnover than assumed.
- Individual salary increases higher or lower than assumed.

**Actual Experience Over the Last 10 years and Implications for the Future**

Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past ten years:

- The investment gain/(loss) for a year has ranged from a gain of $1,792 million to a loss of $1,806 million.
- The non-investment gain/(loss) for a year has ranged from a gain of $592 million to a loss of $1,342 million.
- The funded percentage on the actuarial value of assets has ranged from a low of 39.8% to a high of 46.5% since 2011.

**Maturity Measures**

As pension plans mature, the cash need to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.

Currently the Plan has a full-time actives to annuitant ratio of 1.09. For the prior year, contributions received were $1.20 billion less than benefits paid. As the Plan continues to mature, more cash will be needed from the investment portfolio to meet benefit payments.

# Section 3: Supplemental Information

## Exhibit A – Summary of Membership Data

| Category | Valuation as of June 30* 2020 | Valuation as of June 30* 2019 | Change From Prior Year |
|---|---|---|---|
| **Active members:** | | | |
| 1. Number | | | |
| a. Full-time and regular part-time | | | |
| Tier I | 103,691 | 106,275 | (2.43%) |
| Tier II | 32,061 | 27,885 | 14.98% |
| Total | 135,752 | 134,160 | 1.19% |
| b. Substitutes, part-time, and hourly paid | | | |
| Tier I | 12,570 | 13,297 | (5.47%) |
| Tier II | 14,753 | 13,295 | 10.97% |
| Total | 27,323 | 26,592 | 2.75% |
| c. Total number of active members | | | |
| Tier I | 116,261 | 119,572 | (2.77%) |
| Tier II | 46,814 | 41,180 | 13.68% |
| Total | 163,075 | 160,752 | 1.45% |
| 2. Annual salaries | | | |
| a. Full-time and regular part-time | | | |
| Tier I | $8,401,822,836 | $8,370,721,244 | 0.37% |
| Tier II | 1,718,486,638 | 1,437,244,143 | 19.57% |
| Total | $10,120,309,474 | $9,807,965,387 | 3.18% |
| b. Substitutes, part-time, and hourly paid | | | |
| Tier I | $83,475,985 | $84,574,824 | (1.30%) |
| Tier II | 79,859,224 | 70,369,553 | 13.49% |
| Total | $163,335,209 | $154,944,377 | 5.42% |
| c. Total number of active members | | | |
| Tier I | $8,485,298,821 | $8,455,296,068 | 0.35% |
| Tier II | 1,798,345,862 | 1,507,613,696 | 19.28% |
| Total | $10,283,644,683 | $9,962,909,764 | 3.22% |

**Member data used in the valuation is as of the prior valuation date.*

## Exhibit A – Summary of Membership Data *continued*

| Category | | | Valuation as of June 30* 2020 | 2019 | Change From Prior Year |
|---|---|---|---|---|---|
| **Active members (continued):** | | | | | |
| 3. | Average age | | | | |
| | a. | Full-time and regular part-time | 42.2 | 42.0 | N/A |
| | b. | Substitutes, part-time, and hourly paid | 45.8 | 45.5 | N/A |
| | c. | Total | 42.8 | 42.6 | N/A |
| 4. | Average service | | | | |
| | a. | Full-time and regular part-time | 13.2 | 13.1 | N/A |
| | b. | Substitutes, part-time, and hourly paid | 2.3 | 2.4 | N/A |
| | c. | Total | 11.4 | 11.3 | N/A |
| **Inactive members:** | | | | | |
| | Eligible for deferred annuities | | 19,363 | 19,726 | (1.84%) |
| | Eligible for refunds or single sum benefits | | 121,908 | 119,833 | 1.73% |
| | Total | | 141,271 | 139,559 | 1.23% |
| **Service retirees:** | | | | | |
| 1. | Number | | | | |
| | a. | Regular | 80,064 | 77,628 | 3.14% |
| | b. | ERI | 8,368 | 8,720 | (4.04%) |
| | c. | ERO | 23,595 | 24,108 | (2.13%) |
| | d. | Total | 112,027 | 110,456 | 1.42% |
| 2. | Annual annuities | | | | |
| | a. | Regular | $4,313,682,589 | $4,065,125,791 | 6.11% |
| | b. | ERI | 529,261,885 | 535,961,733 | (1.25%) |
| | c. | ERO | 1,736,595,235 | 1,715,171,725 | 1.25% |
| | d. | Total | $6,579,539,709 | $6,316,259,249 | 4.17% |
| 3. | Average age | | 72.3 | 71.9 | N/A |
| 4. | Average monthly benefit | | $4,894 | $4,765 | 2.71% |

**Member data used in the valuation is as of the prior valuation date.*

# Exhibit A – Summary of Membership Data *continued*

| Category | Valuation as of June 30* 2020 | Valuation as of June 30* 2019 | Change From Prior Year |
|---|---|---|---|
| **Disability Annuitants:** | | | |
| 1. Number | | | |
| a. Retirement Allowance | 825 | 816 | 1.10% |
| b. Occupational | 7 | 8 | (12.50%) |
| c. Temporary | 257 | 279 | (7.89%) |
| d. Total | 1,089 | 1,103 | (1.27%) |
| 2. Annual annuities | | | |
| a. Retirement Allowance | $24,253,789 | $23,163,914 | 4.71% |
| b. Occupational | 283,635 | 323,779 | (12.40%) |
| c. Temporary | 8,181,739 | 8,673,612 | (5.67%) |
| d. Total | $32,719,163 | $32,161,305 | 1.73% |
| 3. Average age | 60.3 | 59.9 | N/A |
| 4. Average monthly benefit | $2,504 | $2,430 | 3.04% |
| **Survivor Annuitants:** | | | |
| 1. Number | | | |
| a. Children | 73 | 75 | (2.67%) |
| b. Survivors | 11,392 | 11,058 | 3.02% |
| c. Reversionary | 210 | 203 | 3.45% |
| d. Total | 11,675 | 11,336 | 2.99% |
| 2. Annual annuities | | | |
| a. Retirement Allowance | $893,923 | $901,176 | (0.80%) |
| b. Occupational | 305,532,658 | 282,235,640 | 8.25% |
| c. Temporary | 8,796,081 | 8,409,957 | 4.59% |
| d. Total | $315,222,662 | $291,546,773 | 8.12% |
| 3. Average age | 78.4 | 78.2 | N/A |
| 4. Average monthly benefit | $2,250 | $2,143 | 4.99% |
| **Total number of participants** | 429,137 | 423,206 | 1.40% |

**Member data used in the valuation is as of the prior valuation date.*

# Exhibit B – Active Membership Data as of June 30, 2019 used in June 30, 2020 Actuarial Valuation (Number and Average Annual Salary)

| | Full-Time and Regular Part-Time | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Years of Service | | | | | | | | | |
| Age | Total | 0 – 4 | 5 – 9 | 10 – 14 | 15 – 19 | 20 – 24 | 25 – 29 | 30 – 34 | 35 - 39 | 40 & over |
| Under 25 | 3,248 | 3,248 | -- | -- | -- | -- | -- | -- | -- | -- |
| | $44,498 | $44,498 | -- | -- | -- | -- | -- | -- | -- | -- |
| 25 – 29 | 13,803 | 9,516 | 4,287 | -- | -- | -- | -- | -- | -- | -- |
| | $51,850 | $49,911 | $56,155 | -- | -- | -- | -- | -- | -- | -- |
| 30 – 34 | 19,384 | 4,635 | 10,544 | 4,205 | -- | -- | -- | -- | -- | -- |
| | $60,688 | $53,653 | $60,329 | $69,344 | -- | -- | -- | -- | -- | -- |
| 35 – 39 | 23,697 | 3,030 | 4,528 | 11,820 | 4,319 | -- | -- | -- | -- | -- |
| | $70,980 | $55,386 | $62,794 | $73,788 | $82,816 | -- | -- | -- | -- | -- |
| 40 – 44 | 22,625 | 2,247 | 2,624 | 4,771 | 9,811 | 3,172 | -- | -- | -- | -- |
| | $79,017 | $54,798 | $61,844 | $75,319 | $85,965 | $94,455 | -- | -- | -- | -- |
| 45 – 49 | 20,646 | 1,543 | 1,956 | 3,123 | 4,416 | 7,153 | 2,455 | -- | -- | -- |
| | $85,023 | $56,960 | $63,025 | $73,706 | $86,965 | $95,767 | $99,785 | -- | -- | -- |
| 50 – 54 | 16,535 | 948 | 1,262 | 2,150 | 2,677 | 3,116 | 4,924 | 1,458 | -- | -- |
| | $88,958 | $55,961 | $62,160 | $72,506 | $85,269 | $95,091 | $102,442 | $105,993 | -- | -- |
| 55 – 59 | 11,061 | 553 | 751 | 1,509 | 2,048 | 1,873 | 2,006 | 2,205 | 116 | -- |
| | $88,681 | $56,318 | $63,610 | $73,335 | $82,277 | $90,854 | $102,024 | $106,666 | $110,255 | -- |
| 60 – 64 | 3,768 | 250 | 312 | 615 | 952 | 704 | 545 | 238 | 130 | 22 |
| | $85,124 | $55,484 | $64,564 | $73,296 | $85,024 | $91,821 | $98,420 | $105,005 | $115,045 | $112,870 |
| 65 – 69 | 832 | 55 | 67 | 110 | 200 | 181 | 93 | 59 | 27 | 40 |
| | $86,884 | $55,927 | $64,636 | $75,168 | $86,035 | $90,643 | $99,825 | $104,811 | $114,365 | $111,080 |
| 70 & Older | 153 | 17 | 8 | 19 | 28 | 35 | 20 | 9 | 7 | 10 |
| | $89,567 | $60,707 | $56,172 | $79,932 | $93,187 | $94,034 | $94,763 | $102,347 | $103,830 | $125,997 |
| Total | 135,752 | 26,042 | 26,339 | 28,322 | 24,451 | 16,234 | 10,043 | 3,969 | 280 | 72 |
| | $74,550 | $51,808 | $60,666 | $73,255 | $85,176 | $94,582 | $101,451 | $106,282 | $112,715 | $113,699 |

# Exhibit C – 10-Year History of Active Membership Data

| Full-Time and Regular Part-Time | | | | | |
|---|---|---|---|---|---|
| Census Date June 30 | Number | Percentage Change in Membership | Total Salaries | Average Annual Salary | Percent Change in Average Salary |
| 2010 | 137,711 | N/A | $9,412,873,000 | $68,352 | N/A |
| 2011 | 133,752 | (2.9%) | 9,358,470,000 | 69,969 | 2.4% |
| 2012 | 132,956 | (0.6%) | 8,874,281,176 | 66,476 | (4.6%) |
| 2013 | 132,886 | (0.1%) | 8,984,821,118 | 67,613 | 1.3% |
| 2014 | 132,916 | 0.0% | 9,115,480,030 | 68,581 | 1.4% |
| 2015 | 133,478 | 0.4% | 9,286,852,068 | 69,576 | 1.5% |
| 2016 | 133,505 | 0.0% | 9,450,737,426 | 70,789 | 1.7% |
| 2017 | 133,761 | 0.2% | 9,610,001,605 | 71,845 | 1.5% |
| 2018 | 134,160 | 0.3% | 9,807,965,387 | 73,106 | 1.8% |
| 2019 | 135,752 | 1.2% | 10,120,309,474 | 74,550 | 2.0% |

| Substitutes, Part-Time and Hourly Paid | | | | | |
|---|---|---|---|---|---|
| Census Date June 30 | Number | Percentage Change in Membership | Total Salaries | Average Annual Salary | Percent Change in Average Salary |
| 2010 | 32,479 | N/A | $161,461,000 | $4,971 | N/A |
| 2011 | 32,120 | (1.1%) | 153,261,000 | 4,772 | (4.0%) |
| 2012 | 29,073 | (9.5%) | 154,240,000 | 5,305 | 11.2% |
| 2013 | 28,104 | (3.3%) | 143,217,984 | 5,096 | (3.9%) |
| 2014 | 26,920 | (4.2%) | 143,897,458 | 5,345 | 4.9% |
| 2015 | 26,206 | (2.7%) | 148,630,024 | 5,672 | 6.1% |
| 2016 | 26,080 | (0.5%) | 154,723,494 | 5,933 | 4.6% |
| 2017 | 26,664 | 2.2% | 152,390,955 | 5,715 | (3.7%) |
| 2018 | 26,592 | (0.3%) | 154,944,377 | 5,827 | 2.0% |
| 2019 | 27,323 | 2.8% | 163,335,209 | 5,978 | 2.6% |

# Exhibit D – History of Active Membership Data

| Tier I | | | | | |
|---|---|---|---|---|---|
| **Census Date June 30** | **Number** | **Percentage Change in Membership** | **Total Salaries** | **Average Annual Salary** | **Percent Change in Average Salary** |
| 2013 | 144,987 | N/A | $8,975,899,676 | $61,908 | N/A |
| 2014 | 138,700 | (4.3%) | 8,705,746,049 | 62,767 | 1.4% |
| 2015 | 133,498 | (3.8%) | 8,649,528,420 | 64,791 | 3.2% |
| 2016 | 128,262 | (3.9%) | 8,587,965,096 | 66,956 | 3.3% |
| 2017 | 123,933 | (3.4%) | 8,508,107,682 | 68,651 | 2.5% |
| 2018 | 119,572 | (3.5%) | 8,455,296,068 | 70,713 | 3.0% |
| 2019 | 116,261 | (2.8%) | 8,485,298,821 | 72,985 | 3.2% |

| Tier II | | | | | |
|---|---|---|---|---|---|
| **Census Date June 30** | **Number** | **Percentage Change in Membership** | **Total Salaries** | **Average Annual Salary** | **Percent Change in Average Salary** |
| 2013 | 16,003 | N/A | $360,008,829 | $22,496 | N/A |
| 2014 | 21,136 | 32.1% | 553,631,439 | 26,194 | 16.4% |
| 2015 | 26,186 | 23.9% | 785,878,433 | 30,011 | 14.6% |
| 2016 | 31,323 | 19.6% | 1,017,495,824 | 32,484 | 8.2% |
| 2017 | 36,492 | 16.5% | 1,254,284,878 | 34,372 | 5.8% |
| 2018 | 41,180 | 12.9% | 1,507,613,696 | 36,610 | 6.5% |
| 2019 | 46,814 | 13.7% | 1,798,345,863 | 38,415 | 4.9% |

* *Note: Membership data by Tier includes substitutes, part-time, and hourly paid members.*

## Exhibit E – 10-Year History of Annuitant and Survivor Annuitant Membership

| Valuation as of June 30 | Number | Percentage Change in Number of Recipients | Annual Allowances | Percent Change in Allowances | Average Annual Annuity |
|---|---|---|---|---|---|
| 2010 | 101,352 | N/A | $4,418,017,000 | N/A | $43,591 |
| 2011 | 105,499 | 4.1% | 4,780,743,000 | 8.2% | 45,316 |
| 2012 | 106,102 | 0.6% | 4,811,370,000 | 0.6% | 45,347 |
| 2013 | 109,448 | 3.2% | 5,204,460,272 | 8.2% | 47,552 |
| 2014 | 112,682 | 3.0% | 5,505,783,524 | 5.8% | 48,861 |
| 2015 | 115,273 | 2.3% | 5,728,198,887 | 4.0% | 49,692 |
| 2016 | 117,990 | 2.4% | 6,033,050,890 | 5.3% | 51,132 |
| 2017 | 120,453 | 2.1% | 6,336,471,817 | 5.0% | 52,605 |
| 2018 | 122,895 | 2.0% | 6,639,967,327 | 4.8% | 54,030 |
| 2019 | 124,791 | 1.5% | 6,927,481,533 | 4.3% | 55,513 |

# Exhibit F – Benefit Stream for Guaranteed Minimum Annuity Reserve

| Fiscal Year | Projected Benefit Stream for Guaranteed Minimum Annuity Reserve | Fiscal Year | Projected Benefit Stream for Guaranteed Minimum Annuity Reserve |
|---|---|---|---|
| 2021 | $402,251 | 2046 | $9,742 |
| 2022 | 356,234 | 2047 | 8,023 |
| 2023 | 312,954 | 2048 | 6,548 |
| 2024 | 273,383 | 2049 | 5,250 |
| 2025 | 238,185 | 2050 | 4,189 |
| | | | |
| 2026 | 207,231 | 2051 | 3,301 |
| 2027 | 180,079 | 2052 | 2,565 |
| 2028 | 156,425 | 2053 | 1,964 |
| 2029 | 135,816 | 2054 | 1,481 |
| 2030 | 117,896 | 2055 | 1,097 |
| | | | |
| 2031 | 102,356 | 2056 | 798 |
| 2032 | 88,860 | 2057 | 570 |
| 2033 | 77,109 | 2058 | 400 |
| 2034 | 66,868 | 2059 | 275 |
| 2035 | 57,901 | 2060 | 174 |
| | | | |
| 2036 | 50,059 | 2061 | 112 |
| 2037 | 43,191 | 2062 | 71 |
| 2038 | 37,174 | 2063 | 43 |
| 2039 | 31,907 | 2064 | 25 |
| 2040 | 27,302 | 2065 | 15 |
| | | | |
| 2041 | 23,282 | 2066 | 8 |
| 2042 | 19,759 | 2067 | 4 |
| 2043 | 16,705 | 2068 | 2 |
| 2044 | 14,049 | 2069 | 1 |
| 2045 | 11,736 | 2070 | 1 |

## Exhibit G – Reconciliation of Membership Data

| | Active Members | Inactive Members Eligible for Allowance | Inactive Members Eligible for Refund | Service Retirees | Disabled Retirees | Beneficiaries | Deferred Beneficiaries | Total |
|---|---|---|---|---|---|---|---|---|
| A. Number as of June 30, 2018 | 160,752 | 19,695 | 119,833 | 110,456 | 1,103 | 11,336 | 31 | 423,206 |
| B. New members | 11,994 | N/A | N/A | N/A | N/A | N/A | N/A | 11,994 |
| C. Participant movement | | | | | | | | |
| 1. Retirements | (3,167) | (606) | (159) | 3,932 | 0 | 0 | 0 | 0 |
| 2. Disabilities | (102) | 0 | 0 | 0 | 102 | 0 | 0 | 0 |
| 3. Conversion from disability to service pension | N/A | N/A | N/A | 33 | (33) | N/A | N/A | 0 |
| 4. Died with beneficiary | (31) | (1) | (1) | (890) | (11) | 1,018 | 2 | 86* |
| 5. Died without beneficiary | (66) | (32) | (291) | (1,519) | (22) | (666) | 0 | (2,596) |
| 6. Terminations – with vested rights | (2,108) | 2,108 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7. Terminations – without vested rights | (8,232) | 0 | 8,232 | 0 | 0 | 0 | 0 | 0 |
| 8. Refunds | (597) | (785) | (2,180) | N/A | N/A | N/A | 0 | (3,562) |
| 9. Rehired as active | 4,632 | (1,042) | (3,550) | (1) | (39) | 0 | 0 | 0 |
| 10. Temporary annuity expired | N/A | N/A | NA | N/A | N/A | (5) | N/A | (5) |
| D. Data adjustment | 0 | 0 | 24 | 16 | (11) | (8) | (7) | 14 |
| E. Number as of June 30, 2019 | 163,075 | 19,337 | 121,908 | 112,027 | 1,089 | 11,675 | 26 | 429,137 |

* *Includes multiple beneficiaries*

# Exhibit H – Summary Statement of Income and Expenses on a Fair Value Basis

| | Year Ended June 30, 2020 | | Year Ended June 30, 2019 | |
|---|---|---|---|---|
| **Net assets at fair value at the beginning of the year** | | $53,262,789,367 | | $51,969,546,694 |
| **Contribution income:** | | | | |
| Members | $994,400,416 | | $963,972,120 | |
| State of Illinois | 4,813,451,679 | | 4,466,020,692 | |
| Employers: | | | | |
| Early retirement | 2,715 | | 32,449 | |
| Federal funds | 23,215,568 | | 18,472,267 | |
| 2.2 Benefit formula | 61,448,091 | | 62,744,266 | |
| Excess salary/sick leave | 7,991,864 | | 7,265,799 | |
| Total contribution income | | $5,900,510,333 | | $5,518,507,593 |
| **Investment income:** | | | | |
| Net appreciation (depreciation) | ($612,669,770) | | $1,491,025,634 | |
| Alternative | 889,779,706 | | 975,251,437 | |
| Interest and dividends | 851,670,919 | | 924,617,550 | |
| Other | 8,623,422 | | 35,183,396 | |
| Securities lending | 9,370,679 | | 11,541,157 | |
| Less alternatives expense | (465,877,890) | | (470,341,524) | |
| Less direct investment expense | (404,665,431) | | (348,753,860) | |
| Less securities lending management fees | (562,237) | | (692,458) | |
| Net investment income | | 275,669,398 | | 2,617,831,332 |
| **Total income available for benefits** | | $6,176,179,731 | | $8,136,338,925 |
| **Less benefit payments and administrative expenses:** | | | | |
| Retirement benefits | ($6,672,266,721) | | ($6,405,907,842) | |
| Survivor benefits | (329,872,581) | | (306,502,713) | |
| Disability benefits | (33,168,197) | | (33,133,627) | |
| Refund of contributions | (64,217,456) | | (73,216,390) | |
| Administrative expenses | (22,966,372) | | (24,335,680) | |
| Net benefit payments and administrative expenses | | ($7,122,491,327) | | ($6,843,096,252) |
| **Net assets at fair value at the end of the year** | | $52,316,477,771 | | $53,262,789,367 |

# Exhibit I – Summary Statement of System Assets

| | Year Ended June 30, 2020 | | Year Ended June 30, 2019 | |
|---|---|---|---|---|
| **Cash equivalents** | | $24,329,683 | | $27,358,430 |
| **Accounts receivable and prepaid expenses:** | | | | |
| Member contributions | $71,553,987 | | $55,256,930 | |
| Employer contributions | 10,866,919 | | 8,215,327 | |
| State of Illinois | 641,247,379 | | 558,757,463 | |
| Investment income | 131,878,957 | | 344,551,118 | |
| Investments sold | 3,639,595,787 | | 6,195,921,852 | |
| Prepaid expenses | 1,649,596 | | 2,171,724 | |
| Total accounts receivable and prepaid expenses | | $4,496,792,625 | | $7,164,874,414 |
| **Investments at fair value:** | | | | |
| Fixed income | $9,887,918,930 | | $11,434,967,808 | |
| Public equities | 16,764,439,384 | | 17,823,681,423 | |
| Alternative investments | 23,063,736,143 | | 21,926,188,422 | |
| Derivatives | 6,184,038 | | (55,888,377) | |
| Short-term investments | 1,652,527,489 | | 1,601,845,805 | |
| Foreign currency | 79,352,928 | | 95,012,450 | |
| Total investments | | $51,454,158,912 | | $52,825,807,531 |
| **Invested securities lending collateral** | | 2,023,876,139 | | 2,540,713,046 |
| **Capital assets, net of accumulated depreciation** | | 6,130,809 | | 2,856,794 |
| **Total assets** | | $58,005,288,168 | | $62,561,610,215 |
| **Less accounts payable:** | | | | |
| Benefits and refunds payable | ($9,908,110) | | ($6,844,767) | |
| Administrative and investment expenses payable | (49,768,751) | | (44,756,293) | |
| Pending investment purchases | (3,605,267,896) | | (6,706,535,186) | |
| Securities lending collateral | (2,023,865,640) | | (2,540,684,602) | |
| Total accounts payable | | ($5,688,810,397) | | ($9,298,820,848) |
| **Net assets at fair value** | | $52,316,477,771 | | $53,262,789,367 |

# Exhibit J – History of System Revenue and Expenses

| Year Ending June 30 | Fair Value of Assets Beginning of Year | Member Contributions | Employer Contributions | Net Investment Return | Admin Expenses | Benefit Payments | Fair Value of Assets End of Year | Investment Return* |
|---|---|---|---|---|---|---|---|---|
| 2011 | $31,323,784,214 | $909,577,109 | $2,326,028,622 | $7,234,539,490 | $17,792,071 | $4,304,870,170 | $37,471,267,194 | 23.6% |
| 2012 | 37,471,267,194 | 917,661,328 | 2,561,259,102 | 224,106,719 | 19,011,899 | 4,638,457,105 | 36,516,825,339 | 0.8% |
| 2013 | 36,516,825,339 | 921,422,657 | 2,860,491,456 | 4,561,768,383 | 20,257,553 | 4,981,481,783 | 39,858,768,499 | 12.7% |
| 2014 | 39,858,768,499 | 928,745,853 | 3,596,717,490 | 6,782,031,720 | 21,218,069 | 5,320,662,979 | 45,824,382,514 | 17.2% |
| 2015 | 45,824,382,514 | 935,451,049 | 3,523,256,530 | 1,770,549,533 | 21,686,860 | 5,625,037,173 | 46,406,915,593 | 3.9% |
| 2016 | 46,406,915,593 | 951,809,398 | 3,890,510,012 | (44,103,178) | 22,967,917 | 5,931,207,177 | 45,250,956,731 | (0.1%) |
| 2017 | 45,250,956,731 | 929,130,165 | 4,135,859,276 | 5,520,453,001 | 22,728,735 | 6,438,005,920 | 49,375,664,518 | 12.4% |
| 2018 | 49,375,664,518 | 938,037,245 | 4,179,758,475 | 4,049,271,728 | 21,550,896 | 6,551,634,376 | 51,969,546,694 | 8.3% |
| 2019 | 51,969,546,694 | 963,972,120 | 4,554,535,473 | 2,617,831,332 | 24,335,680 | 6,818,760,572 | 53,262,789,367 | 5.1% |
| 2020 | 53,262,789,367 | 994,400,416 | 4,906,109,917 | 275,669,398 | 22,966,372 | 7,099,524,955 | 52,316,477,771 | 0.5% |

* *Calculated by the actuary and may not match the investment return reported in the Comprehensive Annual Financial Report.*

# Exhibit K – Development of Unfunded Actuarial Accrued Liability

| | | Year Ended June 30 | | | |
|---|---|---|---|---|---|
| | | 2020 | | 2019 | |
| 1. | Unfunded actuarial accrued liability at beginning of year | | $78,065,776,220 | | $75,288,440,204 |
| 2. | Total normal cost at beginning of year | | 2,067,036,527 | | 2,051,272,978 |
| 3. | Total member and employer contributions* | | 5,849,516,439 | | 5,517,256,877 |
| 4. | Interest on: | | | | |
| | (a) Unfunded actuarial accrued liability and normal cost | $5,609,296,892 | | $5,413,779,923 | |
| | (b) Total contributions | 204,733,075 | | 193,103,991 | |
| | (c) Total interest: (4a) – (4b) | | 5,404,563,817 | | 5,220,675,932 |
| 5. | Expected unfunded actuarial accrued liability: (1) + (2) – (3) + (4c) | | $79,687,860,125** | | $77,043,132,237 |
| 6. | Changes due to (gain)/loss from: | | | | |
| | (a) Investments | $972,850,068 | | $589,910,262 | |
| | (b) Demographics | 46,860,992 | | 352,015,736 | |
| | (c) Total changes due to (gain)/loss: (6a) + (6b) | | 1,019,711,060 | | 941,925,998 |
| 7. | Change due to new buyout provisions | | 0 | | 0 |
| 8. | Change in actuarial assumptions | | 0 | | 80,717,984 |
| 9. | Unfunded actuarial accrued liability at end of year: (5) + (6c) + (7) + (8) | | $80,707,571,185 | | $78,065,776,220 |

* *Excludes guaranteed minimum annuity contributions, excess sick leave contributions, and penalty contributions.*

** *The unfunded actuarial accrued liability increased $1,622,083,905 during the year ended June 30, 2020 due to total contributions being less than total normal cost plus interest on the unfunded actuarial accrued liability.*

# Section 4: Reporting Information

## Exhibit I – Derivation of Employer Contributions under Illinois Pension Code

| | | | Fiscal Year Ending June 30, 2022 | As Percentage of Total Payroll |
|---|---|---|---|---|
| 1. | Assumed Payroll: | | | |
| | a. | Total payroll | $11,470,434,147 | |
| | b. | Less Federal Funds payroll | (229,408,683) | |
| | c. | State payroll | $11,241,025,464 | |
| 2. | Employer contribution that would have been required without funds provided by Sec. 7.2(d) of General Obligation Bond Act | | | |
| | a. | Employer's cost | $6,212,402,313 | 54.16% |
| | b. | Less School Districts' contributions under Sec. 16-158 | (74,211,665) | (0.65%) |
| | c. | Less Federal Funds contribution | (23,652,035) | (0.21%)* |
| | d. | Less State debt service for TRS portion of all funds provided under Sec 7.2 of General Obligation Bond Act | (443,731,640) | (3.87%) |
| | e. | Maximum State contribution under PA 94-0004 | $5,670,806,973 | 49.43% |
| 3. | Employer contribution recognizing all system assets, before limiting State contribution | | | |
| | a. | Employer's cost | $5,900,259,838 | 51.44% |
| | b. | Less School Districts' contributions under Sec. 16-158 | (74,211,665) | (0.65%) |
| | c. | Less Federal Funds contribution | (23,652,035) | (0.21%)* |
| | d. | State contribution | $5,802,396,138 | 50.58% |
| 4. | State contribution under PA 100-0023 | | | |
| | a. | Lesser of amounts under (2) and (3) | $5,670,806,973 | 49.43% |
| | b. | Phase-in of the effect of assumption changes | 22,900,000 | 0.20% |
| | c. | State contribution | $5,693,706,973** | 49.63% |
| 5. | Employer contributions | | | |
| | a. | State contribution | $5,693,706,973 | 49.63% |
| | b. | Plus School Districts' contributions under Sec. 16-158 | 74,211,665 | 0.65% |
| | c. | Plus Federal Funds contribution | 23,652,035 | 0.21%* |
| | d. | Total employer contribution | $5,791,570,673 | 50.49% |

* *Federal Funds contribution is equal to 10.31% of assumed Federal Funds payroll.*

** *The Benefit Trust Reserve State Contribution does not include the Guaranteed Minimum Annuity Reserve contribution. See page 39 for more details.*

# Exhibit I – Derivation of Employer Contributions under Illinois Pension Code *continued*

**Notes about employer contributions**

1) **Assumed Payrolls**

   TRS staff estimated that Federal Funds payroll for the fiscal year ending June 30, 2022 would be 2.00% of total payroll.

2) **Determination of Maximum State Contribution under Public Act 94-0004**

   Under Section 7.2(d) of the General Obligation Bond Act (GOBA), TRS received $4.33 billion on July 2, 2003. Commencing with fiscal year 2005, the maximum State contribution under the Act equals the State contribution that would have been required had the $4.33 billion contribution not been made, reduced, but not below zero, by the State's debt service on the TRS portion of the full $10 billion of Pension Obligation Bonds issued under Section 7.2 of the GOBA.

3) **Employer Contribution Recognizing $4.33 Billion Received July 2, 2003**

   A gross employer contribution is determined that recognizes all System assets, and that meets the cost of maintaining and administering the System on a 90% funded basis by June 30, 2045, with a level percentage of payroll contribution after a 15-year phase-in beginning in fiscal year 1996.

4) **State and Federal Funds Contribution under Public Act 100-0023**

   The State contribution is the lesser of the maximum contribution determined under (2) or the contribution determined under (3), adjusted to reflect the phase-in of the effect of assumption changes. In accordance with Public Act 100-0340, the Federal Funds contribution rate is equal to the employer normal cost rate.

5) **Employer Contributions**

   The required employer contribution equals the sum of the State, Federal, and School Districts' contributions. For fiscal year 2022, the expected School Districts' contributions under Sec. 16-158(e), 16-158(f), and 16-158(i-5) are $66,528,518, $4,063,578, and $3,619,569, respectively.

6) **State Contribution Amount for FY 2006 and FY 2007 under Public Act 94-0004**

   PA 94-0004 specified actual contribution amounts for fiscal years 2006 and 2007 made by the State to the Benefit Trust Reserve.

## Exhibit I – Derivation of Employer Contributions under Illinois Pension Code *continued*

**Notes about employer contributions** *continued*

**Additional information:**

The following contributions made to the Benefit Trust Reserve are not shown on Exhibit I:

a) **From Members:**
   i) Sec. 16-128 payments for the purchase of optional service credit
   ii) Sec. 16-152 career contributions of 9.0% of salary

b) **From School Districts:**
   i) Sec. 16-128(d-10) payments for excessive sick leave service credit

Although these types of contributions are not shown in the exhibits, they are all, with the exception of Sec. 16-128(d-10) payments and Sec. 16-128 member payments for the purchase of optional service credit, taken into account in the actuarial projection of the assets and funded status of the system. The actuarial projection is performed after the above contributions have been taken into account.

Payments under Sec. 16-158(f) have been included since the recertified June 30, 2004, valuation. There are no current assumptions for excessive sick leave service credit, and therefore the actuarial projections do not currently include projected payments under Sec. 16-128(d-10).

The methodology for calculating the Federal Funds contribution and, therefore, the State contribution has been changed effective for fiscal years 2021 and thereafter. Based on the modified approach, the Federal Funds contributions are treated in a similar manner as some School District contributions (i.e., a stream of projected contributions estimated as of the valuation date) resulting in the State contribution being the level percent of payroll required to attain 90% funded by fiscal year 2045.

# Exhibit II – Development of Statutory State Contribution under Illinois Pension Code

| | | Fiscal Year Ending June 30, 2022 |
|---|---|---|
| 1. | Present value as of June 30, 2021 of future obligations to fund: | |
| | a. 90% of June 30, 2045 Actuarial Accrued Liability | $37,023,215,704 |
| | b. Benefit disbursements and administrative expenses through June 30, 2045 | 124,504,628,813 |
| | c. Total | $161,527,844,517 |
| 2. | Projected actuarial value of assets as of June 30, 2021 | |
| | a. With POB proceeds | 57,460,782,283 |
| | b. Without POB proceeds | 52,769,459,224 |
| 3. | Present value as of June 30, 2021 of future member contributions through June 30, 2045 | 15,515,466,477 |
| 4. | Present value as of June 30, 2021 of future School District contributions through June 30, 2045 | |
| | a. 2.2% formula under §16-158(e) | $999,885,617 |
| | b. 6% FAS cap increases under §16-158(f) | 62,429,845 |
| | c. Salaries above the Governor's salary under §16-158(i-5) | 62,514,087 |
| | d. Total | $1,124,829,549 |
| 5. | Present value as of June 30, 2021 of future Federal Funds contributions through June 30, 2045 | 220,067,269 |
| 6. | Present value as of June 30, 2021 of future State contributions through June 30, 2045 | |
| | a. Including POB proceeds: (1c) – (2a) – (3) – (4d) – 5 | 87,206,698,939 |
| | b. Excluding POB proceeds: (1c) – (2b) – (3) – (4d) – 5 | 91,898,021,998 |
| 7. | Present value as of June 30, 2021 of future covered payroll through June 30, 2045 | 172,394,071,963 |
| 8. | Determination of preliminary contribution rates for State and Federal Funds for year ended June 30, 2022 | |
| | a. Including POB proceeds: (6a) / (7) | 50.58% |
| | b. Excluding POB proceeds: (6b) / (7) | 53.30% |

## Exhibit II – Development of Statutory State Contribution under Illinois Pension Code *continued*

| | | | | Fiscal Year Ending June 30, 2022 |
|---|---|---|---|---|
| 9. | Determination of State contribution for year ending June 30, 2022: | | | |
| | a. | Projected payroll: | | $11,470,434,147 |
| | b. | State contribution before maximum: | | |
| | | i) | Gross contribution: (8a) x (9a) | $5,802,396,138 |
| | | ii) | Phase-in of the effect of assumption changes | (22,900,000) |
| | | iii) | Net contribution: (i) – (ii) | $5,825,296,138 |
| | c. | State contribution maximum: | | |
| | | i) | Gross maximum: (8b) x (9a) | $6,114,538,613 |
| | | ii) | State's debt service | 443,731,640 |
| | | iii) | Phase-in of the effect of assumption changes | (22,900,000) |
| | | iv) | Net contribution: (i) – (ii) – (iii) | $5,693,706,973 |
| | d. | State contribution after maximum: minimum of (9b)(iii) and (9c)(iv) | | $5,693,706,973* |

* *The Benefit Trust Reserve State Contribution does not include the Guaranteed Minimum Annuity Reserve contribution. See page 39 for more details.*

## Exhibit III – Development of State Contribution Based on Board-Adopted Actuarial Funding Policy

| | | | Fiscal Year Ending June 30, 2022 |
|---|---|---|---|
| 1. | Projected employer Normal Cost for year ending June 30, 2022 | | |
| | a. | Total | $2,108,474,590 |
| | b. | Administrative expenses | 40,892,235 |
| | c. | Member contributions | 1,032,339,073 |
| | d. | Employer Normal Cost: (a) + (b) – (c) | $1,117,027,752 |
| 2. | Projected Unfunded Actuarial Accrued Liability as of June 30, 2021 | | |
| | a. | Actuarial Accrued Liability | $142,673,890,369 |
| | b. | Actuarial Value of Assets | 57,460,782,283 |
| | c. | Unfunded Actuarial Accrued Liability: (a) – (b) | $85,213,108,086 |
| 3. | Payment toward projected Unfunded Actuarial Accrued Liability for year ending June 30, 2022 (see Exhibit IV) | | 7,830,891,256 |
| 4. | Total employer contribution for year ending June 30, 2022: (1d) + (3) | | $8,947,919,008 |
| 5. | Projected School District contributions for year ending June 30, 2022 | | |
| | a. | 2.2% formula under §16-158(e) | $66,528,518 |
| | b. | 6% FAS cap increases under §16-158(f) | 4,063,578 |
| | c. | Salaries above the Governor's salary under §16-158(i-5) | 3,619,569 |
| | d. | Total | $74,211,665 |
| 6. | Estimated Federal Funds contribution for year ending June 30, 2022 | | 23,652,035 |
| 7. | State contribution for year ending June 30, 2022: (4) – (5d) – (6) | | $8,850,055,308 |

# Exhibit IV – Components of Unfunded Liability Bases and Amortization Payment under Board-Adopted Actuarial Funding Policy

| | Original Amount | Balance as of June 30, 2021 | Remaining Amortization Period | 2022 Amortization |
|---|---|---|---|---|
| June 30, 2015 valuation base: | | | | |
| Projected UAAL as of June 30, 2016 | $68,126,860,208 | $62,646,502,416 | 15 | $5,912,066,217 |
| June 30, 2016 valuation base: | | | | |
| Projected (gain)/loss as of June 30, 2017 | 8,625,889,107 | 8,109,002,137 | 16 | 732,655,606 |
| June 30, 2017 valuation base: | | | | |
| Projected (gain)/loss as of June 30, 2018 | 3,216,359,048 | 3,084,740,383 | 17 | 267,830,701 |
| June 30, 2018 valuation base: | | | | |
| Projected (gain)/loss as of June 30, 2019 | 3,150,844,586 | 3,072,886,254 | 18 | 257,230,609 |
| June 30, 2019 valuation base: | | | | |
| Projected (gain)/loss as of June 30, 2020 | 4,015,729,497 | 3,970,880,057 | 19 | 321,410,412 |
| June 30, 2020 valuation base: | | | | |
| Projected (gain)/loss as of June 30, 2021 | 4,329,096,839 | 4,329,096,839 | 20 | 339,697,711 |
| Total | | $85,213,108,086 | | $7,830,891,256 |

# Exhibit V – Components of Phase-in of the Effect of Assumption Changes

| Valuation Date June 30 | Fiscal Year State Contribution First Affected | Effect on State Contribution | Phase in of the Effect of Assumption Changes for Fiscal Year | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2021 | 2022 | 2023 | 2024 | 2025 |
| 2016 | 2018 | $410,000,000 | ($82,000,000) | - - | - - | - - | - - |
| 2017 | 2019 | - - | - - | - - | - - | - - | - - |
| 2018 | 2020 | (70,000,000) | 42,000,000 | $28,000,000 | $14,000,000 | - - | - - |
| 2019 | 2021 | 8,500,000 | (6,800,000) | (5,100,000) | (3,400,000) | ($1,700,000) | - - |
| 2020 | 2022 | - - | - - | - - | - - | - - | - - |
| Total | | | ($46,800,000) | $22,900,000 | $10,600,000 | ($1,700,000) | - - |

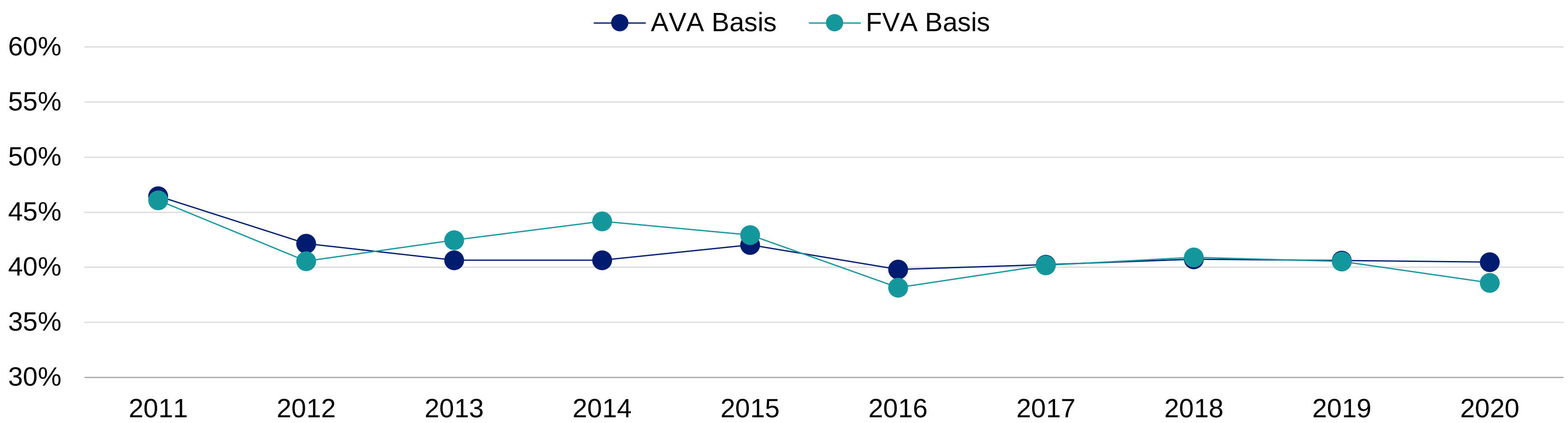
# Exhibit VI – 10-Year History of Unfunded Actuarial Liability and Funded Ratio ($ in thousands)

| | Assets | | | Unfunded Liability Using Assets Based on | | Funded Ratio Using Assets Based on | |
|---|---|---|---|---|---|---|---|
| As of June 30 | Actuarial Accrued Liability | Actuarial Value of Assets | Fair Value of Assets | Actuarial Value of Assets | Fair Value of Assets | Actuarial Value of Assets | Fair Value of Assets |
| 2011 | $81,299,745 | $37,769,753 | $37,471,267 | $43,529,992 | $43,828,478 | 46.5% | 46.1% |
| 2012 | 90,024,945 | 37,945,397 | 36,516,825 | 52,079,548 | 53,508,120 | 42.1 | 40.6 |
| 2013 | 93,886,989 | 38,155,191 | 39,858,768 | 55,731,798 | 54,028,220 | 40.6 | 42.5 |
| 2014 | 103,740,377 | 42,150,765 | 45,824,383 | 61,589,612 | 57,915,994 | 40.6 | 44.2 |
| 2015 | 108,121,825 | 45,435,193 | 46,406,916 | 62,686,632 | 61,714,909 | 42.0 | 42.9 |
| 2016 | 118,629,890 | 47,222,098 | 45,250,957 | 71,407,792 | 73,378,934 | 39.8 | 38.1 |
| 2017 | 122,904,034 | 49,467,525 | 49,375,665 | 73,436,509 | 73,528,370 | 40.2 | 40.2 |
| 2018 | 127,019,330 | 51,730,890 | 51,969,547 | 75,288,440 | 75,049,783 | 40.7 | 40.9 |
| 2019 | 131,456,969 | 53,391,193 | 53,262,789 | 78,065,776 | 78,194,180 | 40.6 | 40.5 |
| 2020 | 135,598,547 | 54,890,976 | 52,316,478 | 80,707,571 | 83,282,069 | 40.5 | 38.6 |

# Exhibit VII – Funded Ratio

A critical piece of information regarding the System's financial status is the funded ratio. This ratio compares the actuarial value and fair value of assets to the actuarial accrued liabilities of the System as calculated. High ratios indicate a well-funded plan with assets sufficient to cover the plan's actuarial accrued liabilities. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other factors.

The chart below depicts a history of the funded ratios for this System.



# Exhibit VIII – Department of Insurance Information

| | June 30, 2020 | June 30, 2019 |
|---|---|---|
| **Actuarial Accrued Liabilities:** | | |
| Service Retirement | $85,020,813,858 | $82,809,306,042 |
| Disability Retirement | 433,596,768 | 425,709,005 |
| Survivor | 2,731,572,589 | 2,553,790,929 |
| Subtotal | $88,185,983,215 | $85,788,805,976 |
| Inactive | 3,493,651,653 | 3,537,804,681 |
| Active | 43,918,912,145 | 42,130,358,296 |
| Total | $135,598,547,013 | $131,456,968,953 |
| **Headcounts and Salaries for Active Members:** | | |
| Male | | |
| Count | 37,797 | 37,477 |
| Salaries | $2,737,852,055 | $2,662,229,567 |
| Female | | |
| Count | 125,278 | 123,275 |
| Salaries | $7,545,792,628 | $7,300,680,197 |
| Total | | |
| Count | 163,075 | 160,752 |
| Salaries | $10,283,644,683 | $9,962,909,764 |

## Exhibit IX – Roll Forward of Actuarial Accrued Liability and Normal Cost

| | Actuarial Accrued Liabilities Developed for June 30, 2020 Valuation | Amount |
|---|---|---|
| 1. | Actuarial Accrued Liability measured as of June 30, 2019 | $131,224,977,697 |
| 2. | Normal Cost measured for fiscal year ended June 30, 2020 | 2,046,240,515 |
| 3. | Expected benefit payments for fiscal year ended June 30, 2020 | 7,159,843,409 |
| 4. | Interest on (1), (2), and (3) to June 30, 2020 | 9,078,390,756 |
| 5. | Adjustment for future AAI and APB buyouts as of June 30, 2020 | 408,781,454 |
| 6. | Actuarial Accrued Liability as of June 30, 2020: (1) + (2) – (3) + (4) + (5) | $135,598,547,013 |
| | | |
| 7. | Normal Cost measured for fiscal year ended June 30, 2021 | 2,067,771,015 |
| 8. | Expected benefit payments for fiscal year ended June 30, 2021 | 7,692,094,614* |
| 9. | Interest on (6), (7), and (8) to June 30, 2021 | 9,367,418,950 |
| 10. | Actuarial Accrued Liability as of June 30, 2021 (6) + (7) – (8) + (9) | $139,341,642,364 |

*Based on member census as of June 30, 2019, assumptions and methods as of June 30, 2020, including the Projected Unit Credit actuarial cost method.*

* *Includes $246,890,200 of projected buyout payments expected to be paid via additional state funds not included in the FY2021 State contribution amount.*

# Exhibit X – State's Share of the Contribution to TRS Necessary to Fund Normal Cost Plus Interest on the Unfunded Actuarial Accrued Liability (UAAL)

| | | | Fiscal Year 2022 |
|---|---|---|---|
| 1. | Employer normal cost plus interest on UAAL | | |
| | a. | Employer normal cost | $1,183,129,632 |
| | b. | Interest on the projected June 30, 2021 UAAL | 5,569,285,905 |
| | c. | Total employer normal cost plus interest on UAAL | $6,752,415,537 |
| 2. | Contributions from sources other than State and Federal Funds | | |
| | a. | School District contributions under §16-158(e) | ($66,528,518) |
| | b. | School District contributions under §16-158(f) | (4,063,578) |
| | c. | School District contributions under §16-158(i-5) | (3,619,569) |
| | d. | Federal Funds contribution | (23,348,881) |
| | e. | Total contributions from sources other than State and Federal Funds | ($97,560,546) |
| 3. | State share of normal cost plus interest on UAAL: (1c) + (2e) | | $6,654,854,991 |
| 4. | State contribution requirement | | |
| | a. | State's share of normal cost plus interest on UAAL | $6,654,854,991 |
| | b. | Guaranteed Minimum Annuity Reserve contribution | 400,000 |
| | c. | Total State contribution requirement | $6,655,254,991 |

## Exhibit XI – Development of Actuarial Determined Contribution (ADC)

| | | Fiscal Year Ended June 30, 2020 |
|---|---|---|
| **Development of the ADC:** | | |
| 1. | Employer Normal Cost | $1,097,240,566 |
| 2. | Amortization of Unfunded Actuarial Accrued Liability | 6,891,371,717 |
| 3. | Actuarially Determined Contribution: (1) + (2) | $7,988,612,283 |

The ADC for fiscal year ended June 30, 2020, is based on the valuation date of June 30, 2018, prepared by Segal.

| | |
|---|---|
| Actuarial Cost Method: | Entry Age Normal |
| Amortization Method: | Layered |
| Amortization Period: | 20 years |
| Payroll Growth Assumption: | 2% (assumed rate of future State revenue growth) |
| Asset Valuation Method: | 5-Year Smoothing |
| Investment Rate of Return: | 7.00% |
| Projected Salary Increases: | 4.00% – 9.50%; composite approximately 4.94% |
| Includes Inflation at: | 2.50% |
| Post-retirement Increase: | Tier I 3% compounded<br>Tier II 1.25% not compounded<br>(lesser of 3% or 1/2 CPI increase, but not less than zero) |

# Section 5: Projections

## Overview

Based on the results of the June 30, 2020, actuarial valuation, we have projected valuation results to June 30, 2046 commencing with Fiscal Year 2021.

Our projections of contributions, liabilities, and assets are based on the actuarial assumptions, membership data and benefit provisions that were used for the regular actuarial valuation.

In order to determine projected contributions, liabilities, and assets, certain calculations needed to be made that are not normally required in a regular actuarial valuation. Benefit payout requirements, actuarial liabilities, and payroll were estimated over the period from 2021 through 2046 by projecting the membership of TRS over the period, taking into account the impact of new entrants into the System.

To make the required projections, assumptions needed to be made regarding the age and salary distribution of new entrants as well as the size of the active membership of TRS. The characteristics regarding the profile of new entrants to TRS were revised for the June 30, 2020 valuation, per the recommendation of the State Actuary, to reflect the attributes of new hires over the past five years. The size of the active membership of the System was assumed to remain constant over the projection period. The results of our projections are shown on the following pages.

The assets haven been allocated by Tier for illustration purposes. Estimated Tier II assets were initially based on the June 30, 2013, accumulated member contributions of $70,783,523, and have been rolled forward each year with expected member contributions, expected benefit payments, and the proportionate share of investment earnings.

## Table 1 – Projection of Funded Ratio to 2046

Amounts above the black line are based on prior valuations and amounts below the line are based on the current valuation.

| Year Ended June 30 | Actuarial Accrued Liability | Actuarial Value of Assets | Unfunded Actuarial Accrued Liability | Tier I Funded Ratio | Tier II Funded Ratio | Total Funded Ratio |
|---|---|---|---|---|---|---|
| 1995 | $23,980,566,000 | $12,641,865,000 | ($11,338,701,000) | | | 52.7% |
| 1996 | 26,141,794,000 | 13,829,711,000 | (12,312,083,000) | | | 52.9% |
| 1997 | 26,951,585,000 | 17,393,108,000 | (9,558,477,000) | | | 64.5% |
| 1998 | 29,908,241,000 | 19,965,887,000 | (9,942,354,000) | | | 66.8% |
| 1999 | 33,205,513,000 | 22,237,709,000 | (10,967,804,000) | | | 67.0% |
| 2000 | 35,886,404,000 | 24,481,413,000 | (11,404,991,000) | | | 68.2% |
| 2001 | 39,166,697,000 | 23,315,646,000 | (15,851,051,000) | | | 59.5% |
| 2002 | 43,047,674,000 | 22,366,285,000 | (20,681,389,000) | | | 52.0% |
| 2003 | 46,933,432,000 | 23,124,823,000 | (23,808,609,000) | | | 49.3% |
| 2004 | 50,947,451,000 | 31,544,729,000 | (19,402,722,000) | | | 61.9% |
| 2005 | 56,075,029,000 | 34,085,218,000 | (21,989,811,000) | | | 60.8% |
| 2006 | 58,996,913,000 | 36,584,889,000 | (22,412,024,000) | | | 62.0% |
| 2007 | 65,648,395,000 | 41,909,318,000 | (23,739,077,000) | | | 63.8% |
| 2008 | 68,632,367,000 | 38,430,723,000 | (30,201,644,000) | | | 56.0% |
| 2009 | 73,027,198,000 | 38,026,043,512 | (35,001,154,488) | | | 52.1% |
| 2010 | 77,293,198,000 | 37,439,091,771 | (39,854,106,229) | | | 48.4% |
| 2011 | 81,299,745,000 | 37,769,752,971 | (43,529,992,029) | | | 46.5% |
| 2012 | 90,024,945,000 | 37,945,397,211 | (52,079,547,789) | | | 42.1% |
| 2013 | 93,886,988,785 | 38,155,191,497 | (55,731,797,288) | | | 40.6% |
| 2014 | 103,740,377,267 | 42,150,765,261 | (61,589,612,006) | 40.6% | 120.5% | 40.6% |
| 2015 | 108,121,825,171 | 45,435,192,645 | (62,686,632,526) | 41.9% | 162.8% | 42.0% |
| 2016 | 118,629,890,305 | 47,222,097,809 | (71,407,792,496) | 39.6% | 153.9% | 39.8% |
| 2017 | 122,904,034,268 | 49,467,525,209 | (73,436,509,059) | 40.0% | 144.0% | 40.2% |
| 2018 | 127,019,330,164 | 51,730,889,960 | (75,288,440,204) | 40.4% | 130.9% | 40.7% |
| 2019 | 131,456,968,953 | 53,391,192,733 | (78,065,776,220) | 40.3% | 124.7% | 40.6% |
| 2020 | 135,598,547,013 | 54,890,975,829 | (80,707,571,184) | 40.1% | 113.7% | 40.5% |

## Table 1 – Projection of Funded Ratio to 2046 *continued*

| Year Ended June 30 | Actuarial Accrued Liability | Actuarial Value of Assets | Unfunded Actuarial Accrued Liability | Tier I Funded Ratio | Tier II Funded Ratio | Total Funded Ratio |
|---|---|---|---|---|---|---|
| 2021 | $139,358,761,207 | $57,012,891,041 | ($82,345,870,166) | 40.4% | 121.5% | 40.9% |
| 2022 | 143,162,786,496 | 59,128,426,847 | (84,034,359,650) | 40.7% | 120.6% | 41.3% |
| 2023 | 147,201,689,302 | 61,249,647,061 | (85,952,042,240) | 40.9% | 119.3% | 41.6% |
| 2024 | 151,258,656,487 | 63,727,981,213 | (87,530,675,274) | 41.3% | 118.4% | 42.1% |
| 2025 | 155,316,328,757 | 67,077,915,193 | (88,238,413,565) | 42.2% | 118.8% | 43.2% |
| 2026 | 159,361,969,607 | 70,615,607,000 | (88,746,362,606) | 43.1% | 119.0% | 44.3% |
| 2027 | 163,373,062,247 | 74,287,714,260 | (89,085,347,987) | 44.1% | 119.1% | 45.5% |
| 2028 | 167,331,148,998 | 78,076,150,530 | (89,254,998,468) | 45.1% | 119.2% | 46.7% |
| 2029 | 171,219,753,306 | 81,988,535,313 | (89,231,217,993) | 46.1% | 119.2% | 47.9% |
| 2030 | 175,018,711,038 | 86,013,960,182 | (89,004,750,856) | 47.1% | 119.2% | 49.1% |
| 2031 | 178,706,458,688 | 90,160,260,848 | (88,546,197,839) | 48.1% | 119.2% | 50.5% |
| 2032 | 182,260,044,092 | 94,446,899,388 | (87,813,144,704) | 49.2% | 119.1% | 51.8% |
| 2033 | 185,652,734,238 | 98,892,369,491 | (86,760,364,747) | 50.4% | 119.0% | 53.3% |
| 2034 | 188,864,751,140 | 104,243,055,781 | (84,621,695,359) | 52.0% | 119.0% | 55.2% |
| 2035 | 191,876,430,493 | 109,830,059,924 | (82,046,370,569) | 53.8% | 118.9% | 57.2% |
| 2036 | 194,677,297,507 | 115,685,085,830 | (78,992,211,677) | 55.6% | 118.8% | 59.4% |
| 2037 | 197,251,038,226 | 121,842,328,785 | (75,408,709,440) | 57.7% | 118.7% | 61.8% |
| 2038 | 199,569,095,958 | 128,327,719,673 | (71,241,376,285) | 59.9% | 118.6% | 64.3% |
| 2039 | 201,615,612,289 | 135,179,814,423 | (66,435,797,865) | 62.3% | 118.5% | 67.0% |
| 2040 | 203,379,105,591 | 142,444,685,326 | (60,934,420,265) | 65.0% | 118.4% | 70.0% |
| 2041 | 204,883,551,393 | 150,207,544,283 | (54,676,007,110) | 68.0% | 118.3% | 73.3% |
| 2042 | 206,125,504,525 | 158,526,659,906 | (47,598,844,619) | 71.4% | 118.2% | 76.9% |
| 2043 | 207,134,842,310 | 167,490,528,922 | (39,644,313,388) | 75.3% | 118.0% | 80.9% |
| 2044 | 207,960,496,887 | 177,206,947,472 | (30,753,549,415) | 79.7% | 117.9% | 85.2% |
| 2045 | 208,661,484,270 | 187,795,335,843 | (20,866,148,427) | 84.7% | 117.7% | 90.0% |
| 2046 | 209,304,921,787 | 188,374,429,608 | (20,930,492,179) | 84.1% | 117.6% | 90.0% |

# Table 2 – Projection of Contributions to Trust to 2046 (Dollars)

Amounts above the black line are based on prior valuations and amounts below the line are based on the current valuation. See Notes.

| Year Ended June 30 | Contributions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Member | School District | | | | Federal Funds | State | Total |
| | | §16-158(e) (2.2 Formula) | §16-158(f) (6% FAS Cap) | §16-158(i-5) (Payroll above Gov.) | Total | | | |
| 1995 | $421,726,521 | - | - | - | - | $16,500,000 | $262,864,800 | $701,091,321 |
| 1996 | 422,238,847 | - | - | - | - | 17,000,000 | 324,276,242 | 763,515,089 |
| 1997 | 420,762,625 | - | - | - | - | 17,300,000 | 377,968,984 | 816,031,609 |
| 1998 | 440,967,595 | - | - | - | - | 18,000,000 | 460,439,267 | 919,406,862 |
| 1999 | 866,369,000 | $16,675,000 | - | - | $16,675,000 | 18,500,000 | 567,067,600 | 1,468,611,600 |
| 2000 | 619,622,000 | 34,145,066 | - | - | 34,145,066 | 18,200,000 | 634,038,560 | 1,306,005,626 |
| 2001 | 643,563,000 | 36,375,498 | - | - | 36,375,498 | 20,000,000 | 719,356,841 | 1,419,295,339 |
| 2002 | 681,151,770 | 38,664,380 | - | - | 38,664,380 | 23,000,000 | 810,618,724 | 1,553,434,874 |
| 2003 | 732,020,451 | 12,808,373 | - | - | 12,808,373 | 25,000,000 | 926,049,918 | 1,695,878,742 |
| 2004 | 768,661,300 | 42,604,912 | - | - | 42,604,912 | 29,400,000 | 1,027,258,994 | 1,867,925,206 |
| 2005 | 761,790,009 | 44,481,074 | - | - | 44,481,074 | 37,860,000 | 902,243,532 | 1,746,374,615 |
| 2006 | 799,034,336 | 45,656,648 | $14,974,781 | - | 60,631,429 | 24,070,387 | 531,827,700 | 1,415,563,852 |
| 2007 | 826,249,007 | 46,047,720 | 19,353,893 | - | 225,741,253 | 41,328,022 | 735,514,500 | 1,828,832,782 |
| 2008 | 865,400,168 | 48,102,405 | - | - | 131,239,475 | 47,829,058 | 1,039,194,988 | 2,083,663,689 |
| 2009 | 876,182,122 | 51,141,422 | 3,000,000 | - | 148,460,852 | 55,707,046 | 1,449,888,800 | 2,530,238,820 |
| 2010 | 909,642,774 | 53,666,271 | 3,000,000 | - | 145,878,411 | 75,718,545 | 2,087,668,469 | 3,218,908,199 |
| 2011 | 948,286,581 | 56,171,181 | 5,000,000 | - | 147,747,541 | 75,405,839 | 2,357,040,597 | 3,528,480,558 |
| 2012 | 976,364,866 | 57,976,440 | 5,000,000 | - | 147,745,130 | 84,654,093 | 2,405,172,175 | 3,613,936,264 |
| 2013 | 967,910,390 | 57,610,031 | 5,000,000 | - | 133,102,941 | 83,575,603 | 2,702,277,829 | 3,886,866,763 |
| 2014 | 1,004,368,089 | 57,896,194 | 5,000,000 | - | 124,446,854 | 97,203,752 | 3,437,478,152 | 4,663,496,847 |
| 2015 | 1,045,996,125 | 60,413,797 | 5,782,580 | - | 124,562,387 | 25,074,310 | 3,411,877,643 | 4,607,510,465 |
| 2016 | 1,041,807,455 | 61,478,785 | 5,027,434 | - | 124,554,918 | 80,263,377 | 3,741,802,194 | 4,988,427,944 |
| 2017 | 1,034,264,612 | 61,138,899 | 2,190,130 | - | 63,329,029 | 77,196,619 | 3,985,783,351 | 5,160,573,611 |
| 2018 | 939,719,161 | 60,559,679 | 4,295,624 | $2,477,050 | 67,332,353 | 21,091,475 | 4,094,616,146 | 5,122,759,135 |
| 2019 | 958,472,559 | 61,768,232 | 4,150,160 | 2,385,898 | 68,304,290 | 20,979,899 | 4,353,323,925 | 5,401,080,673 |
| 2020 | 985,912,521 | 63,536,585 | 4,188,240 | 3,113,849 | 70,838,674 | 23,355,172 | 4,813,077,696 | 5,893,184,063 |

## Table 2 – Projection of Contributions to Trust to 2046 (Dollars) *continued*

| Year Ended June 30 | Contributions: Member | School District: §16-158(e) (2.2 Formula) | School District: §16-158(f) (6% FAS Cap) | School District: §16-158(i-5) (Payroll above Gov.) | School District: Total | Federal Funds | State | Total |
|---|---|---|---|---|---|---|---|---|
| 2021 | $1,009,317,615 | $65,044,913 | $4,119,231 | $4,948,241 | $74,112,385 | $23,348,881 | $5,140,336,721 | $6,247,115,602 |
| 2022 | 1,032,339,073 | 66,528,518 | 4,063,578 | 3,619,569 | 74,211,665 | 23,652,035 | 5,693,706,973 | 6,823,909,746 |
| 2023 | 1,063,473,313 | 68,534,947 | 4,317,040 | 3,985,590 | 76,837,577 | 23,892,700 | 5,874,516,413 | 7,038,720,003 |
| 2024 | 1,094,903,925 | 70,560,475 | 4,407,760 | 4,400,798 | 79,369,034 | 23,795,912 | 6,077,544,029 | 7,275,612,900 |
| 2025 | 1,126,656,149 | 72,606,730 | 4,748,800 | 4,790,561 | 82,146,091 | 23,634,742 | 6,309,101,221 | 7,541,538,204 |
| 2026 | 1,157,414,074 | 74,588,907 | 4,845,120 | 5,142,984 | 84,577,011 | 23,379,764 | 6,535,444,304 | 7,800,815,154 |
| 2027 | 1,188,221,000 | 76,574,242 | 5,104,960 | 5,576,961 | 87,256,163 | 22,998,678 | 6,711,582,696 | 8,010,058,537 |
| 2028 | 1,218,528,671 | 78,527,403 | 5,207,440 | 5,922,884 | 89,657,727 | 22,502,163 | 6,871,382,410 | 8,202,070,971 |
| 2029 | 1,249,557,055 | 80,527,010 | 5,363,680 | 6,279,379 | 92,170,070 | 21,908,900 | 7,037,852,669 | 8,401,488,694 |
| 2030 | 1,281,099,337 | 82,559,735 | 5,684,000 | 6,689,131 | 94,932,866 | 21,209,311 | 7,194,933,874 | 8,592,175,389 |
| 2031 | 1,313,595,405 | 84,653,926 | 5,814,480 | 6,972,755 | 97,441,161 | 20,375,324 | 7,360,865,331 | 8,792,277,221 |
| 2032 | 1,346,247,228 | 86,758,155 | 5,957,280 | 7,234,485 | 99,949,920 | 19,415,877 | 7,545,562,363 | 9,011,175,387 |
| 2033 | 1,379,139,738 | 88,877,894 | 6,128,640 | 7,452,681 | 102,459,215 | 18,327,235 | 7,748,789,747 | 9,248,715,934 |
| 2034 | 1,412,399,432 | 91,021,297 | 6,100,080 | 7,387,631 | 104,509,008 | 17,105,726 | 8,665,135,738 | 10,199,149,905 |
| 2035 | 1,446,746,813 | 93,234,795 | 6,148,800 | 7,270,767 | 106,654,362 | 15,785,615 | 8,875,858,507 | 10,445,045,297 |
| 2036 | 1,482,469,424 | 95,536,918 | 6,048,000 | 7,099,466 | 108,684,384 | 14,396,425 | 9,095,018,374 | 10,700,568,607 |
| 2037 | 1,519,994,998 | 97,955,233 | 6,123,600 | 6,680,302 | 110,759,135 | 12,936,846 | 9,325,239,507 | 10,968,930,487 |
| 2038 | 1,558,899,313 | 100,462,400 | 6,293,280 | 6,215,947 | 112,971,627 | 11,293,359 | 9,563,919,274 | 11,247,083,574 |
| 2039 | 1,598,658,516 | 103,024,660 | 6,270,320 | 5,540,913 | 114,835,893 | 9,449,848 | 9,807,843,821 | 11,530,788,078 |
| 2040 | 1,639,706,289 | 105,669,961 | 6,254,640 | 4,652,407 | 116,577,008 | 7,542,649 | 10,059,673,805 | 11,823,499,751 |
| 2041 | 1,682,526,047 | 108,429,456 | 5,972,960 | 3,671,267 | 118,073,684 | 5,608,420 | 10,322,374,997 | 12,128,583,148 |
| 2042 | 1,727,283,862 | 111,313,849 | 5,660,480 | 2,648,227 | 119,622,556 | 3,723,256 | 10,596,966,258 | 12,447,595,932 |
| 2043 | 1,773,366,098 | 114,283,593 | 5,285,280 | 1,528,490 | 121,097,363 | 2,009,815 | 10,879,682,905 | 12,776,156,181 |
| 2044 | 1,820,744,304 | 117,336,855 | 4,830,560 | 405,230 | 122,572,645 | 485,532 | 11,170,350,389 | 13,114,152,869 |
| 2045 | 1,869,899,356 | 120,504,625 | 4,199,440 | - | 124,704,065 | - | 11,471,918,901 | 13,466,522,322 |
| 2046 | 1,921,297,381 | 123,816,942 | 3,576,160 | - | 127,393,102 | - | 1,145,841,914 | 3,194,532,397 |

# Table 2 – Projection of Contributions to Trust to 2046 (Dollars) *continued*

**Notes**

1) The administrative staff of the System estimated the Federal Funds contribution for fiscal years prior to 2006. Commencing with the contribution for fiscal 2006, total payroll for the valuation is split into State and Federal Funds payrolls. Federal Funds payrolls for 2006 – 2019 were estimated to be 4.33%, 5.32%, 4.40%, 3.70%, 3.50%, 3.10%, 3.40%, 3.00%, 2.75%, 3.00%, 2.10%, 1.90%, 2.00%, and 2.00%, respectively, of total payrolls for those years. For 2020 – 2022, the estimate is 2.00% of payroll. All payrolls are assumed to increase at the same rate for years subsequent to 2022.
2) School District contributions under Sec. 16-158(e) for years subsequent to 2005 are expected to equal 0.58% of total payroll. Sec. 16-158(f) contributions for 2008 – 2014 were estimated by the administrative staff of the System.
3) School District contributions under Sec. 16-133.2 are included in the total School District contributions for years 2007 – 2016, which can be found in the June 30, 2016 valuation report. These contributions no longer apply because the ERO was discontinued at the end of fiscal year 2016.
4) Employer Rates, Contribution Amounts, and Assumed Payroll shown for fiscal years 1995 – 2022 are based on the June 30, 1993 – June 30, 2020 actuarial valuations and are certified amounts, with the following exceptions. The 2006 amount is the recertified amount and 2007 is the certified amount required by per PA 94-0004. The 2011 amount is the originally certified amount, not the recertified amount per PA 96-1511. The 2015 amount is the certified amount; however, PA 98-0674 subsequently lowered state contributions and increased federal contributions. The 2017 Sec. 133.2 contribution was removed because ERO was discontinued at the end of fiscal 2016. The 2018 and 2019 amounts are the recertified amounts. Items subsequent to 2021 are based on the June 30, 2020 valuation.
5) Schedule excludes State ERI contributions of $1,000,000 for 2004, and $1,684,000 for 2005 (under Public Act 92-0056, as amended).
6) Effective for fiscal years 2021 and thereafter, the “FAS Cap” threshold reverted back to 6% to reflect the repeal of the 3% “FAS Cap” threshold per PA 101-001 (SB 1814).
7) The methodology for calculating the Federal Funds contribution and, therefore, the State contribution has been changed effective for fiscal years 2021 and thereafter. Based on the modified approach, the Federal Funds contributions are treated in a similar manner as some School District contributions (i.e., a stream of projected contributions estimated as of the valuation date) resulting in the State contribution being the level percent of payroll required to attain 90% funded by fiscal year 2045.

# Table 3 – Projection of Contributions to Trust to 2046 (Percent of Payroll)

Amounts above the black line are based on prior valuations and amounts below the line are based on the current valuation. See Notes.

| Year Ended June 30 | Assumed Payroll | Contributions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | School District | | | | | | |
| | | Member | §16-158(e) (2.2 Formula) | §16-158(f) (6% FAS Cap) | §16-158(i-5) (Payroll above Gov.) | Total | Federal Funds | State | Total |
| 1995 | $4,633,650,000 | 9.10% | - | - | - | - | 0.36% | 5.67% | 15.13% |
| 1996 | 4,863,544,432 | 8.68% | - | - | - | - | 0.35% | 6.67% | 15.70% |
| 1997 | 4,903,151,093 | 8.58% | - | - | - | - | 0.35% | 7.71% | 16.64% |
| 1998 | 5,264,732,966 | 8.38% | - | - | - | - | 0.34% | 8.75% | 17.46% |
| 1999 | 5,558,349,721 | 15.59% | 0.30% | - | - | 0.30% | 0.33% | 10.20% | 26.42% |
| 2000 | 5,887,080,405 | 10.53% | 0.58% | - | - | 0.58% | 0.31% | 10.77% | 22.18% |
| 2001 | 6,271,637,672 | 10.26% | 0.58% | - | - | 0.58% | 0.32% | 11.47% | 22.63% |
| 2002 | 6,666,272,399 | 10.22% | 0.58% | - | - | 0.58% | 0.35% | 12.16% | 23.30% |
| 2003 | 7,115,762,553 | 10.29% | 0.18% | - | - | 0.18% | 0.35% | 13.01% | 23.83% |
| 2004 | 7,345,674,585 | 10.46% | 0.58% | - | - | 0.58% | 0.40% | 13.98% | 25.43% |
| 2005 | 7,669,150,690 | 9.93% | 0.58% | - | - | 0.58% | 0.49% | 11.76% | 22.77% |
| 2006 | 7,871,835,902 | 10.15% | 0.58% | 0.19% | - | 0.77% | 0.31% | 6.76% | 17.98% |
| 2007 | 7,939,262,146 | 10.41% | 0.58% | 0.24% | - | 2.84% | 0.52% | 9.26% | 23.04% |
| 2008 | 8,293,518,065 | 10.43% | 0.58% | - | - | 1.58% | 0.58% | 12.53% | 25.12% |
| 2009 | 8,817,486,572 | 9.94% | 0.58% | 0.03% | - | 1.68% | 0.63% | 16.44% | 28.70% |
| 2010 | 9,252,805,323 | 9.83% | 0.58% | 0.03% | - | 1.58% | 0.82% | 22.56% | 34.79% |
| 2011 | 9,684,686,327 | 9.79% | 0.58% | 0.05% | - | 1.53% | 0.78% | 24.34% | 36.43% |
| 2012 | 9,995,937,994 | 9.77% | 0.58% | 0.05% | - | 1.48% | 0.85% | 24.06% | 36.15% |
| 2013 | 9,932,764,038 | 9.74% | 0.58% | 0.05% | - | 1.34% | 0.84% | 27.21% | 39.13% |
| 2014 | 9,982,102,443 | 10.06% | 0.58% | 0.05% | - | 1.25% | 0.97% | 34.44% | 46.72% |
| 2015 | 10,416,171,908 | 10.04% | 0.58% | 0.06% | - | 1.20% | 0.24% | 32.76% | 44.23% |
| 2016 | 10,599,790,566 | 9.83% | 0.58% | 0.05% | - | 1.18% | 0.76% | 35.30% | 47.06% |
| 2017 | 10,541,189,447 | 9.81% | 0.58% | 0.02% | - | 0.60% | 0.73% | 37.81% | 48.96% |
| 2018 | 10,441,324,011 | 9.00% | 0.58% | 0.04% | 0.02% | 0.64% | 0.20% | 39.22% | 49.06% |
| 2019 | 10,649,695,100 | 9.00% | 0.58% | 0.04% | 0.02% | 0.64% | 0.20% | 40.88% | 50.72% |
| 2020 | 10,954,583,571 | 9.00% | 0.58% | 0.04% | 0.03% | 0.65% | 0.21% | 43.94% | 53.80% |

# Table 3 – Projection of Contributions to Trust to 2046 (Percent of Payroll)
*continued*

| Year Ended June 30 | Assumed Payroll | Contributions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | School District | | | | | | |
| | | Member | §16-158(e) (2.2 Formula) | §16-158(f) (6% FAS Cap) | §16-158(i-5) (Payroll above Gov.) | Total | Federal Funds | State | Total |
| 2021 | $11,214,640,162 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.21% | 45.84% | 55.71% |
| 2022 | 11,470,434,147 | 9.00% | 0.58% | 0.04% | 0.03% | 0.65% | 0.21% | 49.63% | 59.49% |
| 2023 | 11,816,370,146 | 9.00% | 0.58% | 0.04% | 0.03% | 0.65% | 0.20% | 49.72% | 59.57% |
| 2024 | 12,165,599,166 | 9.00% | 0.58% | 0.04% | 0.04% | 0.65% | 0.20% | 49.96% | 59.80% |
| 2025 | 12,518,401,659 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.19% | 50.40% | 60.24% |
| 2026 | 12,860,156,380 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.18% | 50.82% | 60.66% |
| 2027 | 13,202,455,554 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.17% | 50.84% | 60.67% |
| 2028 | 13,539,207,461 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.17% | 50.75% | 60.58% |
| 2029 | 13,883,967,283 | 9.00% | 0.58% | 0.04% | 0.05% | 0.66% | 0.16% | 50.69% | 60.51% |
| 2030 | 14,234,437,083 | 9.00% | 0.58% | 0.04% | 0.05% | 0.67% | 0.15% | 50.55% | 60.36% |
| 2031 | 14,595,504,496 | 9.00% | 0.58% | 0.04% | 0.05% | 0.67% | 0.14% | 50.43% | 60.24% |
| 2032 | 14,958,302,532 | 9.00% | 0.58% | 0.04% | 0.05% | 0.67% | 0.13% | 50.44% | 60.24% |
| 2033 | 15,323,774,864 | 9.00% | 0.58% | 0.04% | 0.05% | 0.67% | 0.12% | 50.57% | 60.36% |
| 2034 | 15,693,327,019 | 9.00% | 0.58% | 0.04% | 0.05% | 0.67% | 0.11% | 55.22% | 64.99% |
| 2035 | 16,074,964,586 | 9.00% | 0.58% | 0.04% | 0.05% | 0.66% | 0.10% | 55.22% | 64.98% |
| 2036 | 16,471,882,484 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.09% | 55.22% | 64.96% |
| 2037 | 16,888,833,312 | 9.00% | 0.58% | 0.04% | 0.04% | 0.66% | 0.08% | 55.22% | 64.95% |
| 2038 | 17,321,103,476 | 9.00% | 0.58% | 0.04% | 0.04% | 0.65% | 0.07% | 55.22% | 64.93% |
| 2039 | 17,762,872,398 | 9.00% | 0.58% | 0.04% | 0.03% | 0.65% | 0.05% | 55.22% | 64.92% |
| 2040 | 18,218,958,767 | 9.00% | 0.58% | 0.03% | 0.03% | 0.64% | 0.04% | 55.22% | 64.90% |
| 2041 | 18,694,733,855 | 9.00% | 0.58% | 0.03% | 0.02% | 0.63% | 0.03% | 55.22% | 64.88% |
| 2042 | 19,192,042,908 | 9.00% | 0.58% | 0.03% | 0.01% | 0.62% | 0.02% | 55.22% | 64.86% |
| 2043 | 19,704,067,755 | 9.00% | 0.58% | 0.03% | 0.01% | 0.61% | 0.01% | 55.22% | 64.84% |
| 2044 | 20,230,492,269 | 9.00% | 0.58% | 0.02% | 0.00% | 0.61% | 0.00% | 55.22% | 64.82% |
| 2045 | 20,776,659,510 | 9.00% | 0.58% | 0.02% | 0.00% | 0.60% | 0.00% | 55.22% | 64.82% |
| 2046 | 21,347,748,674 | 9.00% | 0.58% | 0.02% | 0.00% | 0.60% | 0.00% | 5.37% | 14.96% |

## Table 3 – Projection of Contributions to Trust to 2046 (Percent of Payroll) *continued*

**Notes**

1) Effective with the 2016 valuation, the member contribution rate is equal to the statutory 9% rate because of the elimination of ERO and the assumption for the members’ cost of optional service.
2) The table on pages 75 and 76 shows historical contribution rates as reported in prior valuation reports. The amounts are based on the assumptions used for each valuation and are not adjusted retrospectively to reflect actual experience.

# Table 4 – Projection of Employer Normal Cost and Amortization Amount to 2046

Amounts above the black line are based on prior valuations and amounts below the line are based on the current valuation. See Notes.

| Year Ended June 30 | Amortization Year | Employer Rate | | | Amount of Employer Contribution | | |
|---|---|---|---|---|---|---|---|
| | | Total | Normal Cost | Amortization | Total | Normal Cost | Amortization |
| 1995 | 0 | 6.03% | 8.12% | (2.09%) | $279,364,800 | $376,122,700 | ($96,757,900) |
| 1996 | 1 | 7.02% | 8.23% | (1.21%) | 341,276,242 | 400,134,055 | (58,857,813) |
| 1997 | 2 | 8.06% | 8.21% | (0.15%) | 395,268,984 | 402,771,457 | (7,502,473) |
| 1998 | 3 | 9.09% | 8.38% | 0.71% | 478,439,267 | 441,403,004 | 37,036,263 |
| 1999 | 4 | 10.83% | 7.84% | 2.99% | 602,242,600 | 435,910,961 | 166,331,639 |
| 2000 | 5 | 11.66% | 8.15% | 3.51% | 686,383,626 | 479,928,856 | 206,454,770 |
| 2001 | 6 | 12.37% | 8.65% | 3.72% | 775,732,339 | 542,794,806 | 232,937,533 |
| 2002 | 7 | 13.09% | 8.84% | 4.25% | 872,283,104 | 588,971,933 | 283,311,171 |
| 2003 | 8 | 13.55% | 8.83% | 4.72% | 963,858,291 | 628,536,783 | 335,321,508 |
| 2004 | 9 | 14.96% | 8.15% | 6.81% | 1,099,263,906 | 598,462,925 | 500,800,981 |
| 2005 | 10 | 12.84% | 8.32% | 4.52% | 984,584,606 | 637,971,250 | 346,613,356 |
| 2006 | 11 | 7.64% | 8.20% | (0.56%) | 601,554,735 | 645,705,698 | (44,150,963) |
| 2007 | 12 | 10.36% | 8.20% | 2.16% | 822,890,242 | 650,835,074 | 172,055,168 |
| 2008 | 13 | 13.69% | 8.22% | 5.47% | 1,135,126,451 | 681,651,502 | 453,474,949 |
| 2009 | 14 | 17.66% | 9.27% | 8.39% | 1,556,737,268 | 817,320,366 | 739,416,902 |
| 2010 | 15 | 23.96% | 9.15% | 14.81% | 2,217,053,286 | 846,936,893 | 1,370,116,393 |
| 2011 | 16 | 25.70% | 8.77% | 16.93% | 2,488,617,617 | 849,716,122 | 1,638,901,495 |
| 2012 | 17 | 25.49% | 8.43% | 17.06% | 2,547,802,708 | 842,532,254 | 1,705,270,454 |
| 2013 | 18 | 28.63% | 8.23% | 20.40% | 2,843,463,463 | 817,433,027 | 2,026,030,436 |
| 2014 | 19 | 35.99% | 7.89% | 28.10% | 3,592,578,098 | 787,230,469 | 2,805,347,629 |
| 2015 | 20 | 33.58% | 8.02% | 25.56% | 3,497,365,750 | 835,810,326 | 2,661,555,424 |
| 2016 | 21 | 36.64% | 9.36% | 27.27% | 3,883,544,356 | 992,489,371 | 2,891,054,985 |
| 2017 | 22 | 39.12% | 8.27% | 30.86% | 4,124,118,869 | 871,335,169 | 3,252,783,700 |
| 2018 | 23 | 40.02% | 10.10% | 29.92% | 4,178,744,350 | 1,054,630,171 | 3,124,114,179 |
| 2019 | 24 | 41.72% | 9.85% | 31.87% | 4,466,178,109 | 1,049,301,284 | 3,416,876,825 |
| 2020 | 25 | 44.94% | 10.66% | 34.28% | 4,923,519,270 | 1,167,213,754 | 3,756,305,516 |

## Table 4 – Projection of Employer Normal Cost and Amortization Amount to 2046 *continued*

| Year Ended June 30 | Amortization Year | Employer Rate Total | Employer Rate Normal Cost | Employer Rate Amortization | Amount of Employer Contribution Total | Amount of Employer Contribution Normal Cost | Amount of Employer Contribution Amortization |
|---|---|---|---|---|---|---|---|
| 2021 | 26 | 46.71% | 10.41% | 36.30% | $5,237,797,987 | $1,167,182,742 | $4,070,615,245 |
| 2022 | 27 | 50.49% | 10.31% | 40.18% | 5,791,570,673 | 1,183,129,632 | 4,608,441,041 |
| 2023 | 28 | 50.57% | 10.11% | 40.46% | 5,975,246,690 | 1,194,548,788 | 4,780,697,902 |
| 2024 | 29 | 50.80% | 9.78% | 41.02% | 6,180,708,975 | 1,190,286,503 | 4,990,422,471 |
| 2025 | 30 | 51.24% | 9.44% | 41.81% | 6,414,882,054 | 1,181,326,374 | 5,233,555,680 |
| 2026 | 31 | 51.66% | 9.09% | 42.57% | 6,643,401,080 | 1,168,965,596 | 5,474,435,484 |
| 2027 | 32 | 51.67% | 8.71% | 42.96% | 6,821,837,537 | 1,149,810,026 | 5,672,027,511 |
| 2028 | 33 | 51.58% | 8.31% | 43.27% | 6,983,542,300 | 1,124,984,538 | 5,858,557,761 |
| 2029 | 34 | 51.51% | 7.89% | 43.63% | 7,151,931,639 | 1,095,009,920 | 6,056,921,719 |
| 2030 | 35 | 51.36% | 7.45% | 43.92% | 7,311,076,051 | 1,059,924,668 | 6,251,151,383 |
| 2031 | 36 | 51.24% | 6.98% | 44.26% | 7,478,681,816 | 1,018,597,917 | 6,460,083,900 |
| 2032 | 37 | 51.24% | 6.49% | 44.75% | 7,664,928,160 | 970,620,997 | 6,694,307,162 |
| 2033 | 38 | 51.36% | 5.98% | 45.38% | 7,869,576,196 | 915,906,259 | 6,953,669,938 |
| 2034 | 39 | 55.99% | 5.45% | 50.54% | 8,786,750,473 | 855,081,484 | 7,931,668,989 |
| 2035 | 40 | 55.98% | 4.91% | 51.07% | 8,998,298,484 | 789,347,075 | 8,208,951,409 |
| 2036 | 41 | 55.96% | 4.37% | 51.59% | 9,218,099,184 | 720,643,352 | 8,497,455,831 |
| 2037 | 42 | 55.95% | 3.83% | 52.12% | 9,448,935,488 | 646,554,772 | 8,802,380,717 |
| 2038 | 43 | 55.93% | 3.26% | 52.68% | 9,688,184,261 | 564,026,522 | 9,124,157,739 |
| 2039 | 44 | 55.92% | 2.66% | 53.25% | 9,932,129,562 | 473,098,035 | 9,459,031,527 |
| 2040 | 45 | 55.90% | 2.07% | 53.82% | 10,183,793,462 | 377,442,855 | 9,806,350,607 |
| 2041 | 46 | 55.88% | 1.50% | 54.38% | 10,446,057,101 | 280,280,941 | 10,165,776,160 |
| 2042 | 47 | 55.86% | 0.97% | 54.89% | 10,720,312,070 | 186,690,199 | 10,533,621,872 |
| 2043 | 48 | 55.84% | 0.51% | 55.33% | 11,002,790,083 | 100,069,171 | 10,902,720,912 |
| 2044 | 49 | 55.82% | 0.12% | 55.70% | 11,293,408,565 | 24,067,697 | 11,269,340,869 |
| 2045 | 50 | 55.82% | (0.17%) | 55.98% | 11,596,622,966 | (34,357,336) | 11,630,980,301 |
| 2046 | 51 | 5.96% | (0.35%) | 6.31% | 1,273,235,017 | (73,808,532) | 1,347,043,549 |

## Table 4 – Projection of Employer Normal Cost and Amortization Amount to 2046 *continued*

**Notes**

1) Contributions to the Benefit Trust Reserve represent the sum of State and Federal Funds contributions, as well as School District contributions for the 2.2% formula (commencing in 1999). Starting in fiscal year 2019, School District contributions under Sec. 16-158(f) and 16-158(i-5) are included. Sec. 16-158 requires calculations of State contribution amounts.
2) The following employer contributions to the Benefit Trust Reserve were taken into account when determining the above schedule, but are not included in this schedule:
   a) State ERI contributions of $1,000,000 for fiscal year 2004 and $1,684,000 for fiscal year 2005, which were made under a separate funding plan. (Beginning in fiscal year 2007, the cost of ERI is part of the 50-year funding plan, and included in this schedule);
   b) For fiscal years prior to 2019, School District contributions to the Benefit Trust Reserve under Sec. 16-133.2, 16-158(f) and 16-158(i-5), which are shown in Table 2; and
   c) for FY 1999, additional State funding due to PA 90-0582, and $9,695,600 in additional State Pensions Fund appropriations. No School District contributions are anticipated under Sec. 16-128(d-10).
3) The amortization rate in fiscal years 1995-1997 and 2006 is negative because contributions do not cover normal cost. A negative employer normal cost after 2022 means member contributions are projected to exceed the cost of benefits accruing.
4) Employer Rates, Contribution Amounts, and Assumed Payroll shown for fiscal years 1995 – 2022 are based on the June 30, 1993 – June 30, 2020 actuarial valuations and are certified amounts, with the following exceptions. The 2006 amount is the recertified amount and 2007 is the certified amount required per PA 94-0004. The 2011 amount is the originally certified amount, not the recertified amount per PA 96-1511. The 2015 amount is the certified amount; however, PA 98-0674 subsequently lowered state contributions and increased federal contributions. The 2018 and 2019 amounts are the recertified amounts. Items subsequent to 2021 are based on the June 30, 2020 valuation.
5) Modified ERO retirements are recognized commencing with the June 30, 2005 actuarial liability, while FY 2006 and FY 2007 Pipeline ERO retirements are first recognized in the June 30, 2006 and 2007 accrued liabilities. ERO was discontinued effective June 30, 2016.
6) For calculation purposes, Employer Rates include 15 decimal places. For ease of presentation, only 2 decimal places are shown.

## Table 4 – Projection of Employer Normal Cost and Amortization Amount to 2046 *continued*

**Notes** *continued*

7) Assumptions and methodology:
   - Payroll Growth based on valuation assumptions
   - Valuation Interest Rate = 8.00% prior to 1997, 8.50% for 1997 – 2011, 8.0% for 2012 – 2013 and 7.50% for 2013 – 2015 and 7.00% after 2015
   - Return on investment equals valuation interest rate
   - Assets at cost value prior to 1997, fair value 1997-2008 and 5-year smoothing actuarial value after 2008

## Table 5 – Projection of Funded Ratio to 2046 by Tier (Total)

Amounts above the black line are based on prior valuations and amounts below the line are based on the current valuation. See Notes.

| Year Ended June 30 | Contributions | Benefits and Expenses | Fair Value Asset Return | Actuarial Value of Assets | Fair Value of Assets | Actuarial Accrued Liability | Unfunded Actuarial Accrued Liability | AVA Funded Ratio |
|---|---|---|---|---|---|---|---|---|
| 1995 | $701,091,321 | $1,108,283,000 | | $12,641,865,000 | $12,641,865,000 | $23,980,566,000 | $11,338,701,000 | 52.7% |
| 1996 | 763,515,089 | 1,148,919,000 | $1,573,249,911 | 13,829,711,000 | 13,829,711,000 | 26,141,794,000 | 12,312,083,000 | 52.9% |
| 1997 | 816,031,609 | 1,186,203,042 | 3,933,568,433 | 17,393,108,000 | 17,393,108,000 | 26,951,585,000 | 9,558,477,000 | 64.5% |
| 1998 | 919,406,862 | 1,237,762,773 | 2,891,134,911 | 19,965,887,000 | 19,965,887,000 | 29,908,241,000 | 9,942,354,000 | 66.8% |
| 1999 | 1,468,611,600 | 1,314,929,000 | 2,118,139,400 | 22,237,709,000 | 22,237,709,000 | 33,205,513,000 | 10,967,804,000 | 67.0% |
| 2000 | 1,306,005,626 | 1,437,474,000 | 2,375,172,374 | 24,481,413,000 | 24,481,413,000 | 35,886,404,000 | 11,404,991,000 | 68.2% |
| 2001 | 1,419,295,339 | 1,611,050,000 | (974,012,339) | 23,315,646,000 | 23,315,646,000 | 39,166,697,000 | 15,851,051,000 | 59.5% |
| 2002 | 1,553,434,874 | 1,809,763,000 | (693,032,874) | 22,366,285,000 | 22,366,285,000 | 43,047,674,000 | 20,681,389,000 | 52.0% |
| 2003 | 1,695,878,742 | 2,051,953,000 | 1,114,612,258 | 23,124,823,000 | 23,124,823,000 | 46,933,432,000 | 23,808,609,000 | 49.3% |
| 2004 | 1,867,925,206 | 2,320,690,844 | 8,872,671,638 | 31,544,729,000 | 31,544,729,000 | 50,947,451,000 | 19,402,722,000 | 61.9% |
| 2005 | 1,746,374,615 | 2,604,081,011 | 3,398,195,396 | 34,085,218,000 | 34,085,218,000 | 56,075,029,000 | 21,989,811,000 | 60.8% |
| 2006 | 1,415,563,852 | 2,948,023,574 | 4,032,130,722 | 36,584,889,000 | 36,584,889,000 | 58,996,913,000 | 22,412,024,000 | 62.0% |
| 2007 | 1,828,832,782 | 3,184,574,659 | 6,680,170,877 | 41,909,318,000 | 41,909,318,000 | 65,648,395,000 | 23,739,077,000 | 63.8% |
| 2008 | 2,083,663,689 | 3,498,960,895 | (2,063,297,794) | 38,430,723,000 | 38,430,723,000 | 68,632,367,000 | 30,201,644,000 | 56.0% |
| 2009 | 2,530,238,820 | 3,723,108,308 | (8,706,541,270) | 38,026,043,512 | 28,531,312,242 | 73,027,198,000 | 35,001,154,488 | 52.1% |
| 2010 | 3,218,908,199 | 4,003,538,821 | 3,577,102,594 | 37,439,091,771 | 31,323,784,214 | 77,293,198,000 | 39,854,106,229 | 48.4% |
| 2011 | 3,528,480,558 | 4,329,807,307 | 6,948,809,729 | 37,769,752,971 | 37,471,267,194 | 81,299,745,000 | 43,529,992,029 | 46.5% |
| 2012 | 3,613,936,264 | 4,641,424,675 | 73,046,556 | 37,945,397,211 | 36,516,825,339 | 90,024,945,000 | 52,079,547,789 | 42.1% |
| 2013 | 3,886,866,763 | 4,969,794,354 | 4,424,870,751 | 38,155,191,497 | 39,858,768,499 | 93,886,988,785 | 55,731,797,288 | 40.6% |
| 2014 | 4,524,563,343 | 5,340,981,048 | 6,782,031,720 | 42,150,765,261 | 45,824,382,514 | 103,740,377,267 | 61,589,612,006 | 40.6% |
| 2015 | 4,457,907,579 | 5,645,924,033 | 1,770,549,533 | 45,435,192,645 | 46,406,915,593 | 108,121,825,171 | 62,686,632,526 | 42.0% |
| 2016 | 4,842,319,410 | 5,954,175,094 | (44,103,178) | 47,222,097,809 | 45,250,956,731 | 118,629,890,305 | 71,407,792,496 | 39.8% |
| 2017 | 5,064,989,441 | 6,460,734,655 | 5,520,453,001 | 49,467,525,209 | 49,375,664,518 | 122,904,034,268 | 73,436,509,059 | 40.2% |
| 2018 | 5,117,795,720 | 6,573,185,272 | 4,049,271,728 | 51,730,889,960 | 51,969,546,694 | 127,019,330,164 | 75,288,440,204 | 40.7% |
| 2019 | 5,518,507,593 | 6,843,096,252 | 2,617,531,332 | 53,391,192,733 | 53,262,489,367 | 131,456,968,953 | 78,065,776,220 | 40.6% |
| 2020 | 5,900,510,333 | 7,122,491,327 | 275,969,398 | 54,890,975,829 | 52,316,477,771 | 135,598,547,013 | 80,707,571,184 | 40.5% |

## Table 5 – Projection of Funded Ratio to 2046 by Tier (Total) *continued*

| Year Ended June 30 | Contributions | Benefits and Expenses | Fair Value Asset Return | Actuarial Value of Assets | Fair Value of Assets | Actuarial Accrued Liability | Unfunded Actuarial Accrued Liability | AVA Funded Ratio |
|---|---|---|---|---|---|---|---|---|
| 2021 | $6,247,115,602 | $7,476,643,962 | $248,718,130 | $57,012,891,041 | $54,706,069,362 | $139,358,761,207 | $82,345,870,166 | 40.9% |
| 2022 | 6,823,909,746 | 7,757,112,884 | 3,796,762,746 | 59,128,426,847 | 57,569,628,970 | 143,162,786,496 | 84,034,359,650 | 41.3% |
| 2023 | 7,038,720,003 | 8,035,673,860 | 3,994,980,643 | 61,249,647,061 | 60,567,655,757 | 147,201,689,302 | 85,952,042,240 | 41.6% |
| 2024 | 7,275,612,900 | 8,318,521,544 | 4,203,234,100 | 63,727,981,213 | 63,727,981,213 | 151,258,656,487 | 87,530,675,274 | 42.1% |
| 2025 | 7,541,538,204 | 8,614,992,025 | 4,423,387,801 | 67,077,915,193 | 67,077,915,193 | 155,316,328,757 | 88,238,413,565 | 43.2% |
| 2026 | 7,800,815,154 | 8,919,426,030 | 4,656,302,683 | 70,615,607,000 | 70,615,607,000 | 159,361,969,607 | 88,746,362,606 | 44.3% |
| 2027 | 8,010,058,537 | 9,238,063,590 | 4,900,112,313 | 74,287,714,260 | 74,287,714,260 | 163,373,062,247 | 89,085,347,987 | 45.5% |
| 2028 | 8,202,070,971 | 9,566,035,926 | 5,152,401,225 | 78,076,150,530 | 78,076,150,530 | 167,331,148,998 | 89,254,998,468 | 46.7% |
| 2029 | 8,401,488,694 | 9,901,919,375 | 5,412,815,463 | 81,988,535,313 | 81,988,535,313 | 171,219,753,306 | 89,231,217,993 | 47.9% |
| 2030 | 8,592,175,389 | 10,247,994,328 | 5,681,243,809 | 86,013,960,182 | 86,013,960,182 | 175,018,711,038 | 89,004,750,856 | 49.1% |
| 2031 | 8,792,277,221 | 10,603,558,908 | 5,957,582,354 | 90,160,260,848 | 90,160,260,848 | 178,706,458,688 | 88,546,197,839 | 50.5% |
| 2032 | 9,011,175,387 | 10,967,291,059 | 6,242,754,211 | 94,446,899,388 | 94,446,899,388 | 182,260,044,092 | 87,813,144,704 | 51.8% |
| 2033 | 9,248,715,934 | 11,341,288,740 | 6,538,042,909 | 98,892,369,491 | 98,892,369,491 | 185,652,734,238 | 86,760,364,747 | 53.3% |
| 2034 | 10,199,149,905 | 11,717,777,513 | 6,869,313,898 | 104,243,055,781 | 104,243,055,781 | 188,864,751,140 | 84,621,695,359 | 55.2% |
| 2035 | 10,445,045,297 | 12,097,228,642 | 7,239,187,488 | 109,830,059,924 | 109,830,059,924 | 191,876,430,493 | 82,046,370,569 | 57.2% |
| 2036 | 10,700,568,607 | 12,471,658,741 | 7,626,116,040 | 115,685,085,830 | 115,685,085,830 | 194,677,297,507 | 78,992,211,677 | 59.4% |
| 2037 | 10,968,930,487 | 12,844,015,561 | 8,032,328,030 | 121,842,328,785 | 121,842,328,785 | 197,251,038,226 | 75,408,709,440 | 61.8% |
| 2038 | 11,247,083,574 | 13,221,549,397 | 8,459,856,711 | 128,327,719,673 | 128,327,719,673 | 199,569,095,958 | 71,241,376,285 | 64.3% |
| 2039 | 11,530,788,078 | 13,589,576,123 | 8,910,882,796 | 135,179,814,423 | 135,179,814,423 | 201,615,612,289 | 66,435,797,865 | 67.0% |
| 2040 | 11,823,499,751 | 13,946,896,956 | 9,388,268,107 | 142,444,685,326 | 142,444,685,326 | 203,379,105,591 | 60,934,420,265 | 70.0% |
| 2041 | 12,128,583,148 | 14,262,176,400 | 9,896,452,209 | 150,207,544,283 | 150,207,544,283 | 204,883,551,393 | 54,676,007,110 | 73.3% |
| 2042 | 12,447,595,932 | 14,568,767,407 | 10,440,287,098 | 158,526,659,906 | 158,526,659,906 | 206,125,504,525 | 47,598,844,619 | 76.9% |
| 2043 | 12,776,156,181 | 14,837,023,019 | 11,024,735,854 | 167,490,528,922 | 167,490,528,922 | 207,134,842,310 | 39,644,313,388 | 80.9% |
| 2044 | 13,114,152,869 | 15,054,170,719 | 11,656,436,400 | 177,206,947,472 | 177,206,947,472 | 207,960,496,887 | 30,753,549,415 | 85.2% |
| 2045 | 13,466,522,322 | 15,221,206,334 | 12,343,072,383 | 187,795,335,843 | 187,795,335,843 | 208,661,484,270 | 20,866,148,427 | 90.0% |
| 2046 | 3,194,532,397 | 15,336,155,338 | 12,720,716,706 | 188,374,429,608 | 188,374,429,608 | 209,304,921,787 | 20,930,492,179 | 90.0% |

# Table 5 – Projection of Funded Ratio to 2046 by Tier (Tier I Only)

| Year Ended June 30 | Contributions | Benefits and Expenses | Fair Value Asset Return | Actuarial Value of Assets | Fair Value of Assets | Actuarial Accrued Liability | Unfunded Actuarial Accrued Liability | AVA Funded Ratio |
|---|---|---|---|---|---|---|---|---|
| 2014 | | | | $42,060,460,784 | $45,726,207,620 | $103,665,420,423 | $61,604,959,639 | 40.6% |
| 2015 | $4,357,376,533 | $5,636,978,805 | $1,759,751,948 | 45,238,833,875 | 46,206,357,296 | 108,001,248,291 | 62,762,414,416 | 41.9% |
| 2016 | 4,761,135,081 | 5,938,766,822 | (43,878,630) | 46,944,396,204 | 44,984,846,925 | 118,449,453,398 | 71,505,057,193 | 39.6% |
| 2017 | 4,964,338,090 | 6,438,142,918 | 5,482,643,972 | 49,084,836,109 | 48,993,686,068 | 122,638,280,909 | 73,553,444,799 | 40.0% |
| 2018 | 4,994,858,498 | 6,547,670,601 | 4,013,422,755 | 51,218,006,139 | 51,454,296,720 | 126,627,563,072 | 75,409,556,933 | 40.4% |
| 2019 | 5,369,865,536 | 6,811,987,553 | 2,588,547,964 | 52,727,529,954 | 52,600,722,667 | 130,924,874,572 | 78,197,344,618 | 40.3% |
| 2020 | 5,723,556,341 | 7,086,035,686 | 271,835,207 | 54,044,893,615 | 51,510,078,528 | 134,899,448,680 | 80,854,555,064 | 40.1% |
| 2021 | 6,036,877,830 | 7,435,264,576 | 3,556,761,961 | 55,931,521,699 | 53,668,453,743 | 138,469,096,406 | 82,537,574,707 | 40.4% |
| 2022 | 6,575,515,492 | 7,707,018,190 | 3,717,189,168 | 57,777,318,943 | 56,254,140,214 | 142,042,567,464 | 84,265,248,521 | 40.7% |
| 2023 | 6,750,821,746 | 7,978,398,209 | 3,894,824,639 | 59,584,842,737 | 58,921,388,389 | 145,806,714,691 | 86,221,871,954 | 40.9% |
| 2024 | 6,946,566,474 | 8,254,284,660 | 4,078,727,051 | 61,692,397,254 | 61,692,397,254 | 149,539,751,364 | 87,847,354,110 | 41.3% |
| 2025 | 7,169,551,847 | 8,540,067,080 | 4,270,499,775 | 64,592,381,795 | 64,592,381,795 | 153,223,852,384 | 88,631,470,589 | 42.2% |
| 2026 | 7,384,624,651 | 8,836,824,420 | 4,470,639,734 | 67,610,821,760 | 67,610,821,760 | 156,837,167,454 | 89,226,345,694 | 43.1% |
| 2027 | 7,546,813,278 | 9,147,074,824 | 4,676,748,369 | 70,687,308,583 | 70,687,308,583 | 160,351,276,216 | 89,663,967,634 | 44.1% |
| 2028 | 7,688,310,402 | 9,465,983,633 | 4,885,893,038 | 73,795,528,390 | 73,795,528,390 | 163,740,510,248 | 89,944,981,858 | 45.1% |
| 2029 | 7,834,313,895 | 9,792,036,610 | 5,097,166,692 | 76,934,972,366 | 76,934,972,366 | 166,981,446,853 | 90,046,474,486 | 46.1% |
| 2030 | 7,968,759,377 | 10,125,624,129 | 5,309,957,799 | 80,088,065,413 | 80,088,065,413 | 170,048,204,563 | 89,960,139,150 | 47.1% |
| 2031 | 8,108,897,765 | 10,469,763,991 | 5,523,534,261 | 83,250,733,448 | 83,250,733,448 | 172,908,953,976 | 89,658,220,527 | 48.1% |
| 2032 | 8,264,660,068 | 10,821,345,346 | 5,738,067,357 | 86,432,115,527 | 86,432,115,527 | 175,531,707,721 | 89,099,592,195 | 49.2% |
| 2033 | 8,435,618,132 | 11,182,274,260 | 5,954,115,122 | 89,639,574,520 | 89,639,574,520 | 177,879,895,482 | 88,240,320,962 | 50.4% |
| 2034 | 9,315,766,994 | 11,544,204,864 | 6,196,774,891 | 93,607,911,541 | 93,607,911,541 | 179,924,027,263 | 86,316,115,722 | 52.0% |
| 2035 | 9,488,108,700 | 11,907,797,798 | 6,467,864,689 | 97,656,087,133 | 97,656,087,133 | 181,633,849,376 | 83,977,762,243 | 53.8% |
| 2036 | 9,666,821,481 | 12,264,774,699 | 6,744,997,737 | 101,803,131,652 | 101,803,131,652 | 182,987,975,421 | 81,184,843,769 | 55.6% |
| 2037 | 9,855,779,893 | 12,618,185,320 | 7,029,535,026 | 106,070,261,251 | 106,070,261,251 | 183,958,845,729 | 77,888,584,479 | 57.7% |
| 2038 | 10,051,129,252 | 12,974,952,953 | 7,322,584,458 | 110,469,022,008 | 110,469,022,008 | 184,505,697,972 | 74,036,675,964 | 59.9% |
| 2039 | 10,248,567,472 | 13,320,075,933 | 7,625,328,744 | 115,022,842,292 | 115,022,842,292 | 184,599,986,580 | 69,577,144,288 | 62.3% |
| 2040 | 10,453,029,454 | 13,653,409,196 | 7,939,585,669 | 119,762,048,219 | 119,762,048,219 | 184,215,288,181 | 64,453,239,963 | 65.0% |
| 2041 | 10,668,474,789 | 13,941,324,876 | 8,268,793,622 | 124,757,991,755 | 124,757,991,755 | 183,363,463,010 | 58,605,471,255 | 68.0% |
| 2042 | 10,898,146,507 | 14,219,556,461 | 8,616,810,074 | 130,053,391,875 | 130,053,391,875 | 182,026,441,808 | 51,973,049,933 | 71.4% |
| 2043 | 11,139,391,557 | 14,456,773,639 | 8,987,629,058 | 135,723,638,851 | 135,723,638,851 | 180,220,837,031 | 44,497,198,180 | 75.3% |
| 2044 | 11,392,906,445 | 14,639,721,010 | 9,387,016,210 | 141,863,840,495 | 141,863,840,495 | 177,982,491,552 | 36,118,651,056 | 79.7% |
| 2045 | 11,664,530,792 | 14,768,444,683 | 9,821,831,848 | 148,581,758,453 | 148,581,758,453 | 175,357,721,334 | 26,775,962,881 | 84.7% |
| 2046 | 1,317,843,760 | 14,838,471,487 | 9,927,501,121 | 144,988,631,847 | 144,988,631,847 | 172,405,242,515 | 27,416,610,668 | 84.1% |

## Table 5 – Projection of Funded Ratio to 2046 by Tier (Tier II Only)

| Year Ended June 30 | Contributions | Benefits and Expenses | Fair Value Asset Return | Actuarial Value of Assets | Fair Value of Assets | Actuarial Accrued Liability | Unfunded Actuarial Accrued Liability | AVA Funded Ratio |
|---|---|---|---|---|---|---|---|---|
| 2014 | | | | $90,304,477 | $98,174,894 | $74,956,844 | ($15,347,633) | 120.5% |
| 2015 | $100,531,046 | $8,945,228 | $10,797,585 | 196,358,770 | 200,558,297 | 120,576,880 | (75,781,890) | 162.8% |
| 2016 | 81,184,329 | 15,408,272 | (224,548) | 277,701,605 | 266,109,806 | 180,436,907 | (97,264,698) | 153.9% |
| 2017 | 100,651,351 | 22,591,737 | 37,809,030 | 382,689,100 | 381,978,450 | 265,753,359 | (116,935,740) | 144.0% |
| 2018 | 122,937,222 | 25,514,671 | 35,848,973 | 512,883,821 | 515,249,974 | 391,767,092 | (121,116,729) | 130.9% |
| 2019 | 148,642,057 | 31,108,699 | 29,283,368 | 663,662,779 | 662,066,700 | 532,094,381 | (131,568,398) | 124.7% |
| 2020 | 176,953,992 | 36,455,641 | 3,834,191 | 846,082,214 | 806,399,243 | 699,098,333 | (146,983,881) | 121.0% |
| 2021 | 210,237,771 | 41,379,386 | 62,357,990 | 1,081,369,342 | 1,037,615,619 | 889,664,802 | (191,704,540) | 121.5% |
| 2022 | 248,394,254 | 50,094,694 | 79,573,578 | 1,351,107,903 | 1,315,488,756 | 1,120,219,032 | (230,888,871) | 120.6% |
| 2023 | 287,898,257 | 57,275,650 | 100,156,004 | 1,664,804,325 | 1,646,267,368 | 1,394,974,611 | (269,829,714) | 119.3% |
| 2024 | 329,046,425 | 64,236,883 | 124,507,050 | 2,035,583,959 | 2,035,583,959 | 1,718,905,123 | (316,678,837) | 118.4% |
| 2025 | 371,986,357 | 74,924,944 | 152,888,027 | 2,485,533,398 | 2,485,533,398 | 2,092,476,373 | (393,057,024) | 118.8% |
| 2026 | 416,190,503 | 82,601,610 | 185,662,949 | 3,004,785,240 | 3,004,785,240 | 2,524,802,153 | (479,983,088) | 119.0% |
| 2027 | 463,245,259 | 90,988,766 | 223,363,944 | 3,600,405,678 | 3,600,405,678 | 3,021,786,031 | (578,619,647) | 119.1% |
| 2028 | 513,760,569 | 100,052,293 | 266,508,187 | 4,280,622,140 | 4,280,622,140 | 3,590,638,750 | (689,983,390) | 119.2% |
| 2029 | 567,174,800 | 109,882,765 | 315,648,771 | 5,053,562,947 | 5,053,562,947 | 4,238,306,453 | (815,256,493) | 119.2% |
| 2030 | 623,416,012 | 122,370,199 | 371,286,010 | 5,925,894,769 | 5,925,894,769 | 4,970,506,475 | (955,388,294) | 119.2% |
| 2031 | 683,379,456 | 133,794,918 | 434,048,093 | 6,909,527,400 | 6,909,527,400 | 5,797,504,712 | (1,112,022,688) | 119.2% |
| 2032 | 746,515,320 | 145,945,713 | 504,686,854 | 8,014,783,862 | 8,014,783,862 | 6,728,336,370 | (1,286,447,491) | 119.1% |
| 2033 | 813,097,803 | 159,014,480 | 583,927,787 | 9,252,794,971 | 9,252,794,971 | 7,772,838,756 | (1,479,956,215) | 119.0% |
| 2034 | 883,382,911 | 173,572,648 | 672,539,007 | 10,635,144,241 | 10,635,144,241 | 8,940,723,878 | (1,694,420,363) | 119.0% |
| 2035 | 956,936,597 | 189,430,844 | 771,322,798 | 12,173,972,791 | 12,173,972,791 | 10,242,581,117 | (1,931,391,674) | 118.9% |
| 2036 | 1,033,747,126 | 206,884,043 | 881,118,303 | 13,881,954,178 | 13,881,954,178 | 11,689,322,086 | (2,192,632,092) | 118.8% |
| 2037 | 1,113,150,593 | 225,830,241 | 1,002,793,005 | 15,772,067,535 | 15,772,067,535 | 13,292,192,496 | (2,479,875,038) | 118.7% |
| 2038 | 1,195,954,322 | 246,596,445 | 1,137,272,253 | 17,858,697,665 | 17,858,697,665 | 15,063,397,986 | (2,795,299,679) | 118.6% |
| 2039 | 1,282,220,606 | 269,500,191 | 1,285,554,051 | 20,156,972,132 | 20,156,972,132 | 17,015,625,709 | (3,141,346,423) | 118.5% |
| 2040 | 1,370,470,297 | 293,487,760 | 1,448,682,438 | 22,682,637,107 | 22,682,637,107 | 19,163,817,409 | (3,518,819,698) | 118.4% |
| 2041 | 1,460,108,359 | 320,851,525 | 1,627,658,587 | 25,449,552,528 | 25,449,552,528 | 21,520,088,383 | (3,929,464,145) | 118.3% |
| 2042 | 1,549,449,425 | 349,210,946 | 1,823,477,024 | 28,473,268,031 | 28,473,268,031 | 24,099,062,717 | (4,374,205,314) | 118.2% |
| 2043 | 1,636,764,625 | 380,249,380 | 2,037,106,796 | 31,766,890,071 | 31,766,890,071 | 26,914,005,279 | (4,852,884,792) | 118.0% |
| 2044 | 1,721,246,424 | 414,449,709 | 2,269,420,190 | 35,343,106,977 | 35,343,106,977 | 29,978,005,335 | (5,365,101,641) | 117.9% |
| 2045 | 1,801,991,530 | 452,761,651 | 2,521,240,534 | 39,213,577,390 | 39,213,577,390 | 33,303,762,936 | (5,909,814,454) | 117.7% |
| 2046 | 1,876,688,638 | 497,683,851 | 2,793,215,585 | 43,385,797,761 | 43,385,797,761 | 36,899,679,272 | (6,486,118,490) | 117.6% |

## Table 5 – Projection of Funded Ratio to 2046 by Tier *continued*

**Notes**

1) The projection of assets is based upon the assumption that the Employer maintains the funding policy under Public Act 94-0004 that begins with fiscal year 2006, as revised by Public Act 100-0023 effective with fiscal year 2018.
2) Projected amounts may not add to the dollar due to rounding.
3) Projected buyout amounts are excluded from both the contributions and benefit payments.
4) For 2001 to 2008, actuarial value of assets are equal to the fair value; for 2009 and after, assets are 5-year smoothed value.

## Table 6 – Projection of Actuarial Accrued Liability to 2046 by Member Group

| Year Ended June 30 | Tier I Current Active | Tier II Current Active | New Entrants | Inactive | Total Actuarial Accrued Liability |
|---|---|---|---|---|---|
| 2020 | $43,280,374,958 | $699,098,333 | - | $91,619,073,722 | $135,598,547,013 |
| 2021 | 48,173,998,854 | 859,780,719 | $29,884,083 | 90,295,097,552 | 139,358,761,207 |
| 2022 | 53,185,883,268 | 1,031,370,785 | 88,848,247 | 88,856,684,196 | 143,162,786,496 |
| 2023 | 58,318,309,009 | 1,218,584,930 | 176,389,680 | 87,488,405,682 | 147,201,689,302 |
| 2024 | 63,601,432,515 | 1,426,716,486 | 292,188,636 | 85,938,318,849 | 151,258,656,487 |
| 2025 | 69,020,076,979 | 1,656,699,939 | 435,776,434 | 84,203,775,405 | 155,316,328,757 |
| 2026 | 74,550,595,810 | 1,908,779,835 | 616,022,318 | 82,286,571,644 | 159,361,969,607 |
| 2027 | 80,160,013,649 | 2,185,278,936 | 836,507,095 | 80,191,262,567 | 163,373,062,247 |
| 2028 | 85,816,667,067 | 2,488,806,006 | 1,101,832,744 | 77,923,843,181 | 167,331,148,998 |
| 2029 | 91,492,285,406 | 2,821,763,044 | 1,416,543,410 | 75,489,161,447 | 171,219,753,306 |
| 2030 | 97,152,678,520 | 3,184,780,005 | 1,785,726,469 | 72,895,526,043 | 175,018,711,038 |
| 2031 | 102,756,244,879 | 3,579,229,712 | 2,218,275,000 | 70,152,709,097 | 178,706,458,688 |
| 2032 | 108,258,596,844 | 4,006,946,742 | 2,721,389,629 | 67,273,110,877 | 182,260,044,092 |
| 2033 | 113,610,403,995 | 4,469,861,388 | 3,302,977,368 | 64,269,491,487 | 185,652,734,238 |
| 2034 | 118,763,010,411 | 4,969,839,565 | 3,970,884,312 | 61,161,016,852 | 188,864,751,140 |
| 2035 | 123,669,071,137 | 5,508,389,729 | 4,734,191,388 | 57,964,778,239 | 191,876,430,493 |
| 2036 | 128,286,711,044 | 6,087,232,378 | 5,602,089,708 | 54,701,264,378 | 194,677,297,507 |
| 2037 | 132,567,624,953 | 6,707,708,551 | 6,584,483,945 | 51,391,220,776 | 197,251,038,226 |
| 2038 | 136,449,271,514 | 7,370,720,436 | 7,692,677,551 | 48,056,426,458 | 199,569,095,958 |
| 2039 | 139,880,352,142 | 8,077,747,827 | 8,937,877,882 | 44,719,634,438 | 201,615,612,289 |
| 2040 | 142,813,260,935 | 8,830,078,318 | 10,333,739,092 | 41,402,027,246 | 203,379,105,591 |
| 2041 | 145,216,547,636 | 9,628,688,752 | 11,891,399,631 | 38,146,915,374 | 204,883,551,393 |
| 2042 | 147,072,257,581 | 10,475,076,108 | 13,623,986,609 | 34,954,184,227 | 206,125,504,525 |
| 2043 | 148,375,445,146 | 11,368,762,330 | 15,545,242,950 | 31,845,391,884 | 207,134,842,310 |
| 2044 | 149,143,698,194 | 12,308,893,650 | 17,669,111,686 | 28,838,793,358 | 207,960,496,887 |
| 2045 | 149,408,729,091 | 13,291,701,693 | 20,012,061,243 | 25,948,992,243 | 208,661,484,270 |
| 2046 | 149,216,365,790 | 14,313,360,551 | 22,586,318,721 | 23,188,876,725 | 209,304,921,787 |

# Table 7 – Projection of Total Normal Cost to 2046 by Member Group

| Year Ended June 30 | Tier I Current Active | Tier II Current Active | New Entrants | Total Normal Cost |
|---|---|---|---|---|
| 2020 | $1,976,126,733 | $141,732,200 | - | $2,117,858,933 |
| 2021 | 1,968,325,127 | 141,744,603 | $30,073,271 | 2,140,143,001 |
| 2022 | 1,971,501,611 | 143,097,418 | 59,977,442 | 2,174,576,470 |
| 2023 | 1,980,054,540 | 145,916,656 | 89,925,405 | 2,215,896,600 |
| 2024 | 1,971,677,825 | 150,140,957 | 120,001,140 | 2,241,819,922 |
| 2025 | 1,958,131,177 | 155,153,547 | 150,069,547 | 2,263,354,271 |
| 2026 | 1,937,839,459 | 160,659,432 | 182,034,168 | 2,280,533,058 |
| 2027 | 1,908,469,572 | 166,434,593 | 216,059,948 | 2,290,964,113 |
| 2028 | 1,869,813,520 | 172,694,211 | 252,738,042 | 2,295,245,773 |
| 2029 | 1,824,194,966 | 179,225,193 | 291,650,306 | 2,295,070,466 |
| 2030 | 1,771,217,691 | 186,147,452 | 332,912,923 | 2,290,278,067 |
| 2031 | 1,709,920,074 | 193,509,547 | 376,730,551 | 2,280,160,173 |
| 2032 | 1,639,199,928 | 201,185,111 | 423,156,658 | 2,263,541,697 |
| 2033 | 1,558,705,838 | 209,197,537 | 472,513,181 | 2,240,416,556 |
| 2034 | 1,469,412,428 | 217,493,660 | 524,627,928 | 2,211,534,016 |
| 2035 | 1,373,193,373 | 225,968,064 | 579,625,010 | 2,178,786,447 |
| 2036 | 1,272,374,684 | 234,665,587 | 637,350,046 | 2,144,390,318 |
| 2037 | 1,165,443,058 | 243,425,949 | 697,471,869 | 2,106,340,877 |
| 2038 | 1,048,473,824 | 252,029,525 | 760,672,545 | 2,061,175,893 |
| 2039 | 921,048,564 | 260,588,851 | 826,794,283 | 2,008,431,698 |
| 2040 | 786,931,799 | 269,173,038 | 896,093,501 | 1,952,198,338 |
| 2041 | 651,234,867 | 277,593,854 | 967,331,317 | 1,896,160,038 |
| 2042 | 519,905,198 | 285,888,575 | 1,039,760,425 | 1,845,554,197 |
| 2043 | 396,303,120 | 293,656,601 | 1,113,230,310 | 1,803,190,032 |
| 2044 | 284,603,716 | 300,606,341 | 1,187,479,996 | 1,772,690,053 |
| 2045 | 192,501,836 | 306,320,776 | 1,262,650,369 | 1,761,472,980 |
| 2046 | 124,267,540 | 310,407,970 | 1,336,708,359 | 1,771,383,869 |

*Note: The normal cost in this table does not include administrative expenses.*

## Table 8 – Projection of Benefit Payments to 2046 by Member Group

| Year Ended June 30 | Tier I Current Active | Tier II Current Active | New Entrants | Inactive | Total Benefit Payments | Administrative Expenses | Total Benefits and Expenses |
|---|---|---|---|---|---|---|---|
| 2020 | $119,928,280 | $32,368,765 | - | $7,007,546,364 | $7,159,843,409 | $22,966,372 | $7,182,809,781 |
| 2021 | 273,449,220 | 33,615,842 | $1,165,370 | 7,136,973,982 | 7,445,204,414 | 31,439,548 | 7,476,643,962 |
| 2022 | 438,041,756 | 35,295,696 | 4,959,793 | 7,237,923,404 | 7,716,220,649 | 40,892,235 | 7,757,112,884 |
| 2023 | 616,037,675 | 34,621,106 | 11,250,536 | 7,331,639,041 | 7,993,548,358 | 42,125,501 | 8,035,673,859 |
| 2024 | 809,189,415 | 31,292,345 | 19,910,600 | 7,414,758,677 | 8,275,151,037 | 43,370,507 | 8,318,521,543 |
| 2025 | 1,022,032,837 | 29,262,789 | 30,927,313 | 7,488,140,832 | 8,570,363,771 | 44,628,252 | 8,614,992,023 |
| 2026 | 1,260,151,516 | 28,967,594 | 37,148,192 | 7,547,312,115 | 8,873,579,417 | 45,846,612 | 8,919,426,028 |
| 2027 | 1,528,629,042 | 28,191,597 | 44,447,448 | 7,589,728,589 | 9,190,996,676 | 47,066,912 | 9,238,063,589 |
| 2028 | 1,823,759,871 | 27,030,500 | 52,671,098 | 7,614,307,020 | 9,517,768,489 | 48,267,437 | 9,566,035,926 |
| 2029 | 2,142,445,483 | 25,647,663 | 61,768,602 | 7,622,561,117 | 9,852,422,865 | 49,496,510 | 9,901,919,375 |
| 2030 | 2,488,097,397 | 26,037,435 | 71,638,480 | 7,611,475,077 | 10,197,248,389 | 50,745,939 | 10,247,994,328 |
| 2031 | 2,864,603,474 | 27,573,181 | 79,152,226 | 7,580,196,879 | 10,551,525,760 | 52,033,148 | 10,603,558,908 |
| 2032 | 3,270,741,049 | 29,775,384 | 86,599,928 | 7,526,848,170 | 10,913,964,531 | 53,326,528 | 10,967,291,058 |
| 2033 | 3,707,932,682 | 32,699,010 | 94,107,654 | 7,451,919,953 | 11,286,659,299 | 54,629,441 | 11,341,288,740 |
| 2034 | 4,173,163,833 | 36,483,708 | 102,097,044 | 7,350,086,028 | 11,661,830,613 | 55,946,899 | 11,717,777,512 |
| 2035 | 4,663,748,663 | 41,495,751 | 110,029,644 | 7,224,647,142 | 12,039,921,200 | 57,307,441 | 12,097,228,642 |
| 2036 | 5,173,523,595 | 47,677,073 | 118,258,960 | 7,073,476,655 | 12,412,936,283 | 58,722,458 | 12,471,658,741 |
| 2037 | 5,704,357,526 | 55,350,568 | 126,386,393 | 6,897,712,181 | 12,783,806,668 | 60,208,893 | 12,844,015,561 |
| 2038 | 6,262,818,015 | 64,811,571 | 134,411,635 | 6,697,758,235 | 13,159,799,456 | 61,749,941 | 13,221,549,397 |
| 2039 | 6,833,394,697 | 75,675,434 | 143,034,403 | 6,474,146,736 | 13,526,251,270 | 63,324,853 | 13,589,576,123 |
| 2040 | 7,412,810,509 | 88,296,971 | 150,904,755 | 6,229,933,915 | 13,881,946,150 | 64,950,806 | 13,946,896,956 |
| 2041 | 7,987,341,900 | 102,875,491 | 160,139,325 | 5,945,172,734 | 14,195,529,450 | 66,646,950 | 14,262,176,400 |
| 2042 | 8,547,763,211 | 119,011,750 | 168,823,576 | 5,664,749,007 | 14,500,347,544 | 68,419,863 | 14,568,767,407 |
| 2043 | 9,083,647,478 | 138,315,095 | 177,100,002 | 5,367,715,207 | 14,766,777,782 | 70,245,238 | 14,837,023,019 |
| 2044 | 9,577,059,043 | 160,824,943 | 185,444,053 | 5,058,720,732 | 14,982,048,771 | 72,121,947 | 15,054,170,719 |
| 2045 | 10,023,226,605 | 188,883,054 | 192,499,470 | 4,742,528,165 | 15,147,137,294 | 74,069,040 | 15,221,206,334 |
| 2046 | 10,414,921,895 | 221,898,665 | 201,447,214 | 4,421,782,584 | 15,260,050,358 | 76,104,980 | 15,336,155,338 |

*Note: The projected benefit payments shown above do not include projected buyout amounts of $246,890,200 and $171,737,531 for the years ending June 30, 2021 and 2022, respectively.*

## Table 9 – Projection of Payroll to 2046 by Member Group

| Year Ended June 30 | Tier I Current Active | Tier II Current Active | New Entrants | Total Normal Cost |
|---|---|---|---|---|
| 2020 | $8,882,888,876 | $1,922,893,786 | - | $10,805,782,662 |
| 2021 | 8,794,681,602 | 1,921,510,133 | $414,465,105 | 11,130,656,840 |
| 2022 | 8,710,497,992 | 1,926,327,202 | 833,608,953 | 11,470,434,147 |
| 2023 | 8,617,500,622 | 1,939,831,346 | 1,259,038,178 | 11,816,370,146 |
| 2024 | 8,509,527,774 | 1,962,983,305 | 1,693,088,087 | 12,165,599,166 |
| 2025 | 8,385,219,920 | 1,999,006,293 | 2,134,175,446 | 12,518,401,659 |
| 2026 | 8,235,817,456 | 2,040,166,117 | 2,584,172,807 | 12,860,156,380 |
| 2027 | 8,055,286,005 | 2,082,726,502 | 3,064,443,047 | 13,202,455,554 |
| 2028 | 7,830,756,697 | 2,125,398,324 | 3,583,052,440 | 13,539,207,461 |
| 2029 | 7,582,025,064 | 2,168,459,490 | 4,133,482,729 | 13,883,967,283 |
| 2030 | 7,307,592,509 | 2,209,897,915 | 4,716,946,659 | 14,234,437,083 |
| 2031 | 7,002,399,431 | 2,250,732,916 | 5,342,372,149 | 14,595,504,496 |
| 2032 | 6,663,687,866 | 2,291,211,019 | 6,003,403,647 | 14,958,302,532 |
| 2033 | 6,289,354,836 | 2,329,002,696 | 6,705,417,332 | 15,323,774,864 |
| 2034 | 5,877,961,346 | 2,363,518,045 | 7,451,847,628 | 15,693,327,019 |
| 2035 | 5,442,335,735 | 2,394,510,552 | 8,238,118,299 | 16,074,964,586 |
| 2036 | 4,985,803,303 | 2,421,922,335 | 9,064,156,846 | 16,471,882,484 |
| 2037 | 4,520,493,388 | 2,445,503,575 | 9,922,836,349 | 16,888,833,312 |
| 2038 | 4,032,722,120 | 2,464,438,437 | 10,823,942,919 | 17,321,103,476 |
| 2039 | 3,515,976,775 | 2,476,233,230 | 11,770,662,393 | 17,762,872,398 |
| 2040 | 2,991,511,021 | 2,481,189,979 | 12,746,257,767 | 18,218,958,767 |
| 2041 | 2,471,307,646 | 2,481,835,035 | 13,741,591,174 | 18,694,733,855 |
| 2042 | 1,975,938,183 | 2,476,555,231 | 14,739,549,494 | 19,192,042,908 |
| 2043 | 1,517,794,149 | 2,464,214,539 | 15,722,059,067 | 19,704,067,755 |
| 2044 | 1,105,532,000 | 2,441,780,928 | 16,683,179,341 | 20,230,492,269 |
| 2045 | 754,531,403 | 2,409,754,233 | 17,612,373,874 | 20,776,659,510 |
| 2046 | 495,652,701 | 2,365,847,323 | 18,486,248,650 | 21,347,748,674 |

## Table 10 – Projection of Member Count to 2046 by Member Group

| Year Ended June 30 | Tier I Number Active | Tier I Number Retired and Inactive | Tier I Subtotal | Tier II Number Active | Tier II Number Retired and Inactive | Tier II Subtotal | Total Number Active | Total Number Retired and Inactive | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| 2020 | 109,400 | 233,027 | 342,427 | 53,675 | 23,844 | 77,519 | 163,075 | 256,871 | 419,946 |
| 2021 | 103,330 | 230,186 | 333,516 | 59,745 | 22,678 | 82,423 | 163,075 | 252,864 | 415,939 |
| 2022 | 97,717 | 227,186 | 324,903 | 65,358 | 21,528 | 86,886 | 163,075 | 248,714 | 411,789 |
| 2023 | 92,428 | 224,079 | 316,507 | 70,647 | 20,471 | 91,118 | 163,075 | 244,550 | 407,625 |
| 2024 | 87,420 | 220,856 | 308,276 | 75,655 | 19,520 | 95,175 | 163,075 | 240,375 | 403,450 |
| 2025 | 82,634 | 217,636 | 300,270 | 80,441 | 18,665 | 99,106 | 163,075 | 236,301 | 399,376 |
| 2026 | 77,921 | 214,214 | 292,135 | 85,154 | 17,871 | 103,025 | 163,075 | 232,086 | 395,161 |
| 2027 | 73,130 | 210,739 | 283,869 | 89,945 | 17,162 | 107,107 | 163,075 | 227,901 | 390,976 |
| 2028 | 68,394 | 207,069 | 275,463 | 94,681 | 16,541 | 111,222 | 163,075 | 223,610 | 386,685 |
| 2029 | 63,715 | 203,199 | 266,914 | 99,360 | 16,013 | 115,373 | 163,075 | 219,211 | 382,286 |
| 2030 | 59,026 | 199,194 | 258,220 | 104,049 | 15,767 | 119,816 | 163,075 | 214,961 | 378,036 |
| 2031 | 54,340 | 195,044 | 249,384 | 108,735 | 15,553 | 124,288 | 163,075 | 210,598 | 373,673 |
| 2032 | 49,665 | 190,749 | 240,414 | 113,410 | 15,441 | 128,851 | 163,075 | 206,190 | 369,265 |
| 2033 | 44,995 | 186,319 | 231,314 | 118,080 | 15,427 | 133,507 | 163,075 | 201,746 | 364,821 |
| 2034 | 40,403 | 181,694 | 222,097 | 122,672 | 15,530 | 138,202 | 163,075 | 197,223 | 360,298 |
| 2035 | 35,920 | 176,847 | 212,767 | 127,155 | 15,722 | 142,877 | 163,075 | 192,569 | 355,644 |
| 2036 | 31,616 | 171,720 | 203,336 | 131,459 | 16,004 | 147,463 | 163,075 | 187,725 | 350,800 |
| 2037 | 27,389 | 166,431 | 193,820 | 135,686 | 16,376 | 152,062 | 163,075 | 182,807 | 345,882 |
| 2038 | 23,209 | 161,018 | 184,227 | 139,866 | 16,854 | 156,720 | 163,075 | 177,872 | 340,947 |
| 2039 | 19,188 | 155,393 | 174,581 | 143,887 | 17,443 | 161,330 | 163,075 | 172,835 | 335,910 |
| 2040 | 15,399 | 149,491 | 164,890 | 147,676 | 18,089 | 165,765 | 163,075 | 167,580 | 330,655 |
| 2041 | 11,976 | 148,108 | 160,084 | 151,099 | 20,064 | 171,163 | 163,075 | 168,172 | 331,247 |
| 2042 | 8,956 | 146,318 | 155,274 | 154,119 | 22,137 | 176,256 | 163,075 | 168,455 | 331,530 |
| 2043 | 6,359 | 144,123 | 150,482 | 156,716 | 24,314 | 181,030 | 163,075 | 168,437 | 331,512 |
| 2044 | 4,233 | 141,491 | 145,724 | 158,842 | 26,599 | 185,441 | 163,075 | 168,090 | 331,165 |
| 2045 | 2,709 | 138,307 | 141,016 | 160,366 | 28,980 | 189,346 | 163,075 | 167,287 | 330,362 |
| 2046 | 1,675 | 134,696 | 136,371 | 161,400 | 31,533 | 192,933 | 163,075 | 166,229 | 329,304 |

# Table 11 – Projection of Employer Normal Cost to 2046 by Member Group

| Year Ended June 30 | Payroll: Tier I | Payroll: Tier II | Payroll: Total | Employer Normal Cost ($): Tier I | Employer Normal Cost ($): Tier II | Employer Normal Cost ($): Admin. Expenses | Employer Normal Cost ($): Total | Employer Normal Cost (% of Pay): Tier I (% of pay) | Employer Normal Cost (% of Pay): Tier II (% of pay) | Employer Normal Cost (% of Pay): Admin. Expenses (% of pay) | Employer Normal Cost (% of Pay): Total (% of pay) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2022 | $8,710,497,992 | $2,759,936,155 | $11,470,434,147 | $1,187,556,791 | ($45,319,394) | $40,892,235 | $1,183,129,632 | 13.63% | (1.64%) | 0.36% | 10.31% |
| 2023 | 8,617,500,622 | 3,198,869,524 | 11,816,370,146 | 1,204,479,484 | (52,056,197) | 42,125,501 | 1,194,548,788 | 13.98% | (1.63%) | 0.36% | 10.11% |
| 2024 | 8,509,527,774 | 3,656,071,392 | 12,165,599,166 | 1,205,820,325 | (58,904,328) | 43,370,507 | 1,190,286,503 | 14.17% | (1.61%) | 0.36% | 9.78% |
| 2025 | 8,385,219,920 | 4,133,181,739 | 12,518,401,659 | 1,203,461,385 | (66,763,263) | 44,628,252 | 1,181,326,374 | 14.35% | (1.62%) | 0.36% | 9.44% |
| 2026 | 8,235,817,456 | 4,624,338,924 | 12,860,156,380 | 1,196,615,888 | (73,496,904) | 45,846,612 | 1,168,965,596 | 14.53% | (1.59%) | 0.36% | 9.09% |
| 2027 | 8,055,286,005 | 5,147,169,549 | 13,202,455,554 | 1,183,493,832 | (80,750,718) | 47,066,912 | 1,149,810,026 | 14.69% | (1.57%) | 0.36% | 8.71% |
| 2028 | 7,830,756,697 | 5,708,450,764 | 13,539,207,461 | 1,165,045,417 | (88,328,316) | 48,267,437 | 1,124,984,538 | 14.88% | (1.55%) | 0.36% | 8.31% |
| 2029 | 7,582,025,064 | 6,301,942,219 | 13,883,967,283 | 1,141,812,711 | (96,299,301) | 49,496,510 | 1,095,009,920 | 15.06% | (1.53%) | 0.36% | 7.89% |
| 2030 | 7,307,592,509 | 6,926,844,574 | 14,234,437,083 | 1,113,534,366 | (104,355,636) | 50,745,939 | 1,059,924,668 | 15.24% | (1.51%) | 0.36% | 7.45% |
| 2031 | 7,002,399,431 | 7,593,105,065 | 14,595,504,496 | 1,079,704,125 | (113,139,357) | 52,033,148 | 1,018,597,917 | 15.42% | (1.49%) | 0.36% | 6.98% |
| 2032 | 6,663,687,866 | 8,294,614,666 | 14,958,302,532 | 1,039,468,020 | (122,173,550) | 53,326,528 | 970,620,997 | 15.60% | (1.47%) | 0.36% | 6.49% |
| 2033 | 6,289,354,836 | 9,034,420,028 | 15,323,774,864 | 992,663,903 | (131,387,085) | 54,629,441 | 915,906,259 | 15.78% | (1.45%) | 0.36% | 5.98% |
| 2034 | 5,877,961,346 | 9,815,365,673 | 15,693,327,019 | 940,395,907 | (141,261,322) | 55,946,899 | 855,081,484 | 16.00% | (1.44%) | 0.36% | 5.45% |
| 2035 | 5,442,335,735 | 10,632,628,851 | 16,074,964,586 | 883,383,157 | (151,343,523) | 57,307,441 | 789,347,075 | 16.23% | (1.42%) | 0.36% | 4.91% |
| 2036 | 4,985,803,303 | 11,486,079,181 | 16,471,882,484 | 823,652,387 | (161,731,493) | 58,722,458 | 720,643,352 | 16.52% | (1.41%) | 0.36% | 4.37% |
| 2037 | 4,520,493,388 | 12,368,339,924 | 16,888,833,312 | 758,598,653 | (172,252,775) | 60,208,893 | 646,554,772 | 16.78% | (1.39%) | 0.36% | 3.83% |
| 2038 | 4,032,722,120 | 13,288,381,356 | 17,321,103,476 | 685,528,833 | (183,252,252) | 61,749,941 | 564,026,522 | 17.00% | (1.38%) | 0.36% | 3.26% |
| 2039 | 3,515,976,775 | 14,246,895,623 | 17,762,872,398 | 604,610,654 | (194,837,472) | 63,324,853 | 473,098,035 | 17.20% | (1.37%) | 0.36% | 2.66% |
| 2040 | 2,991,511,021 | 15,227,447,746 | 18,218,958,767 | 517,695,807 | (205,203,758) | 64,950,806 | 377,442,855 | 17.31% | (1.35%) | 0.36% | 2.07% |
| 2041 | 2,471,307,646 | 16,223,426,209 | 18,694,733,855 | 428,817,179 | (215,183,188) | 66,646,950 | 280,280,941 | 17.35% | (1.33%) | 0.36% | 1.50% |
| 2042 | 1,975,938,183 | 17,216,104,725 | 19,192,042,908 | 342,070,762 | (223,800,426) | 68,419,863 | 186,690,199 | 17.31% | (1.30%) | 0.36% | 0.97% |
| 2043 | 1,517,794,149 | 18,186,273,606 | 19,704,067,755 | 259,701,646 | (229,877,713) | 70,245,238 | 100,069,171 | 17.11% | (1.26%) | 0.36% | 0.51% |
| 2044 | 1,105,532,000 | 19,124,960,269 | 20,230,492,269 | 185,105,836 | (233,160,087) | 72,121,947 | 24,067,697 | 16.74% | (1.22%) | 0.36% | 0.12% |
| 2045 | 754,531,403 | 20,022,128,107 | 20,776,659,510 | 124,594,010 | (233,020,385) | 74,069,040 | (34,357,336) | 16.51% | (1.16%) | 0.36% | (0.17%) |
| 2046 | 495,652,701 | 20,852,095,973 | 21,347,748,674 | 79,658,797 | (229,572,309) | 76,104,980 | (73,808,532) | 16.07% | (1.10%) | 0.36% | (0.35%) |

## Table 12 – Projection of Debt Service to 2033

| Fiscal Year | Debt Service |
|---|---|
| 2020 | $399,198,690 |
| 2021 | 422,197,518 |
| 2022 | 443,731,640 |
| 2023 | 463,801,058 |
| 2024 | 497,200,770 |
| 2025 | 528,003,960 |
| 2026 | 541,748,515 |
| 2027 | 553,983,980 |
| 2028 | 579,505,355 |
| 2029 | 602,763,095 |
| 2030 | 638,552,200 |
| 2031 | 671,323,125 |
| 2032 | 686,280,870 |
| 2033 | 684,179,980 |

# Section 6: GASB Information

## Exhibit 1 – Schedule of Employer Contributions

**($ in thousands)**

| Fiscal Year Ended June 30 | Actuarially Determined Contribution (ADC)* | Percentage Contributed |
|---|---|---|
| 2011 | $2,743,221 | 84.7% |
| 2012 | 3,429,945 | 74.6% |
| 2013 | 3,582,033 | 79.8% |
| 2014 | 4,091,978 | 87.8% |
| 2015 | 4,119,526 | 85.5% |
| 2016 | 4,582,530 | 84.9% |
| 2017 | 6,248,879 | 66.2% |
| 2018 | 7,080,756 | 59.0% |
| 2019 | 7,429,037 | 61.3% |
| 2020 | 7,988,612 | 60.8% |

** Prior to 2017, the ADC is the same as the GASB ARC determined under GASB 25. Beginning in FY 2017, the ADC is based on the Board's funding policy.*

The information presented above was determined as part of the actuarial valuation as of two years prior to the dates indicated (e.g., the contribution determined by the valuation completed as of June 30, 2018, was contributed in the fiscal year ended June 30, 2020).

# Exhibit 1 – Schedule of Employer Contributions *continued*

**($ in thousands)**

| Fiscal Year | Actuarially Determined Contributions | State Contributions | Federal and Employer Contributions | Total Non-Member Contributions | Contribution Deficiency | Covered Payroll | Total Non-Member Contributions as a Percentage of Covered Payroll |
|---|---|---|---|---|---|---|---|
| 2011 | $2,743,221 | $2,169,518 | $154,150 | $2,323,668 | $419,553 | $9,205,603 | 25.2% |
| 2012 | 3,429,945 | 2,405,172 | 153,409 | 2,558,581 | 871,364 | 9,321,098 | 27.4% |
| 2013 | 3,582,033 | 2,702,278 | 155,787 | 2,858,065 | 723,968 | 9,394,741 | 30.4% |
| 2014 | 4,091,978 | 3,437,478 | 157,228 | 3,594,706 | 497,272 | 9,512,810 | 37.8% |
| 2015 | 4,119,526 | 3,376,878 | 144,780 | 3,521,658 | 597,868 | 9,641,171 | 36.5% |
| 2016 | 4,582,530 | 3,741,802 | 147,408 | 3,889,210 | 693,320 | 9,811,614 | 39.6% |
| 2017 | 6,248,879* | 3,985,783 | 148,749 | 4,134,532 | 2,114,347 | 9,965,570 | 41.5% |
| 2018 | 7,080,756 | 4,094,616 | 84,034 | 4,178,650 | 2,902,106 | 10,163,980 | 41.1% |
| 2019 | 7,429,037 | 4,465,578 | 87,707 | 4,553,285 | 2,875,752 | 10,450,452 | 43.6% |
| 2020 | 7,988,612 | 4,763,078 | 92,038 | 4,855,116 | 3,133,496 | 10,827,439 | 44.8% |

* *Reflects implementation of the Board-Adopted Funding Policy*

# Exhibit 2 – Schedule of Funding Progress

**($ in thousands)**

| (1)<br>Valuation Date | (2)<br>Actuarial Value of Assets (AVA) | (3)<br>Actuarial Accrued Liability (AAL) | (4)<br>Unfunded Actuarial Accrued Liability (UAAL) (3) – (2) | (5)<br>Funded Ratio (2) / (3) | (6)<br>Covered Payroll | (7)<br>UAAL as a % of Payroll (4) / (6) |
|---|---|---|---|---|---|---|
| 6/30/2011 | $37,769,753 | $81,299,745 | $43,529,992 | 46.5% | $9,205,603 | 472.9% |
| 6/30/2012 | 37,945,397 | 90,024,945 | 52,079,548 | 42.1% | 9,321,098 | 558.7% |
| 6/30/2013 | 38,155,191 | 93,886,989 | 55,731,798 | 40.6% | 9,394,741 | 593.2% |
| 6/30/2014 | 42,150,765 | 103,740,377 | 61,589,612 | 40.6% | 9,512,810 | 647.4% |
| 6/30/2015 | 45,435,193 | 108,121,825 | 62,686,632 | 42.0% | 9,641,171 | 650.2% |
| 6/30/2016 | 47,222,098 | 118,629,890 | 71,407,792 | 39.8% | 9,811,614 | 727.8% |
| 6/30/2017 | 49,467,525 | 122,904,034 | 73,436,509 | 40.2% | 9,965,570 | 736.9% |
| 6/30/2018 | 51,730,890 | 127,019,330 | 75,288,440 | 40.7% | 10,163,980 | 740.7% |
| 6/30/2019 | 53,391,193 | 131,456,969 | 78,065,776 | 40.6% | 10,450,452 | 747.0% |
| 6/30/2020 | 54,890,976 | 135,598,547 | 80,707,571 | 40.5% | 10,827,439 | 745.4% |

## Exhibit 3 – Solvency Test

**($ in thousands)**

| | Actuarial Accrued Liability for: | | | | Portion of Actuarial Accrued Liability Covered by Valuation Assets | | |
|---|---|---|---|---|---|---|---|
| Valuation as of June 30 | (1) Active Member Contributions | (2) Retirees and Beneficiaries | (3) Active Member (Employer Financed Portion) | Valuation Assets | (1) | (2) | (3) |
| 2011 | $8,048,689 | $50,567,880 | $22,683,176 | $37,769,753 | 100% | 59% | 0% |
| 2012 | 8,270,073 | 58,734,636 | 23,020,236 | 37,945,397 | 100% | 51% | 0% |
| 2013 | 8,569,939 | 61,254,334 | 24,062,715 | 38,155,191 | 100% | 48% | 0% |
| 2014 | 8,890,558 | 65,614,627 | 29,235,192 | 42,150,765 | 100% | 51% | 0% |
| 2015 | 9,281,893 | 70,545,782 | 28,294,150 | 45,435,193 | 100% | 51% | 0% |
| 2016 | 9,629,934 | 77,688,075 | 31,311,881 | 47,222,098 | 100% | 48% | 0% |
| 2017 | 9,683,095 | 80,882,353 | 32,338,586 | 49,467,525 | 100% | 49% | 0% |
| 2018 | 10,057,427 | 82,968,465 | 33,993,438 | 51,730,890 | 100% | 50% | 0% |
| 2019 | 10,474,097 | 85,788,806 | 35,194,066 | 53,391,193 | 100% | 50% | 0% |
| 2020 | 10,902,747 | 88,185,983 | 36,509,817 | 54,890,976 | 100% | 50% | 0% |

# Exhibit 4 – Net Pension Liability

| | June 30, 2020 | June 30, 2019 |
|---|---|---|
| **The components of the net pension liability:** | | |
| Total pension liability | $138,531,733,887 | $134,370,954,628 |
| Plan fiduciary net position | (52,316,477,771) | (53,262,789,367) |
| Net pension liability | $86,215,256,116 | $81,108,165,261 |
| Plan fiduciary net position as a percentage of the total pension liability | 37.8% | 39.6% |

*Plan provisions*: The plan provisions used in the measurement of the net pension liability are the same as those used in the actuarial valuation as of June 30, 2020.

*Actuarial assumptions:* The total pension liability was determined by an actuarial valuation as of June 30, 2020, using the following actuarial assumptions, applied to all periods included in the measurement:

| | |
|---|---|
| Inflation | 2.50% |
| Salary increases | 9.50% at one year of service to 4.00% at 20 and more years of service |
| Investment rate of return | 7.00% |
| Cost-of-living adjustments | Tier I: 3% compounded<br>Tier II: 1.25% not compounded |

The assumed mortality rates are based on the Society of Actuaries RP-2014 White Collar mortality tables, with adjustments for TRS experience, with generational improvement based on Scale MP-2017.

The actuarial assumptions used were based on the results of an experience study dated September 18, 2018.

## Exhibit 4 – Net Pension Liability *continued*

*Discount rate:* The discount rate used to measure the total pension liability was 7.00% as of June 30, 2020. The projection of cash flows used to determine the discount rate assumes that member and employer contributions will be made at rates equal to those based on this June 30, 2020, Actuarial Valuation Report. For this purpose, only employer contributions that are intended to fund benefits of current plan members and their beneficiaries are included. Projected member and employer contributions for future plan members are included, to the extent that they exceed the service costs of future plan members.

Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments for current plan members as of June 30, 2020. Therefore, the long-term expected rate of return was applied to all periods of projected benefit payments to determine the total pension liability as of June 30, 2020.

*Sensitivity of the net pension liability to changes in the discount rate.* The following presents the net pension liability as of June 30, 2020, calculated using the discount rate of 7.00%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.00%) or 1-percentage-point higher (8.00%) than the current rate:

| | 1% Decrease (6.00%) | Current Discount Rate (7.00%) | 1% Increase (8.00%) |
|---|---|---|---|
| Net pension liability as of June 30, 2020 | $104,649,618,237 | $86,215,256,116 | $71,038,443,785 |

# Exhibit 5 – Schedules of Changes in Net Pension Liability

| Fiscal Year Ended June 30 | 2020 | 2019 | 2018 | 2017 | 2016 |
|---|---|---|---|---|---|
| **Total pension liability** | | | | | |
| Service cost | $1,991,622,987 | $1,947,627,286 | $1,838,002,948 | $1,877,570,053 | $1,681,242,232 |
| Interest | 9,296,897,060 | 8,991,684,121 | 8,703,519,454 | 8,390,352,464 | 8,264,257,311 |
| Change of benefit terms | 0 | 0 | (374,603,419) | 0 | 0 |
| Differences between expected and actual experience | (28,215,833) | 258,778,925 | 1,191,346,970 | 482,486,212 | 701,827,169 |
| Changes of assumptions | 0 | 77,241,572 | (666,054,719) | (2,725,599,755) | 7,553,894,504 |
| Benefit payments, including refunds of employee contributions | (7,099,524,955) | (6,818,760,572) | (6,551,634,376) | (6,438,005,920) | (5,931,207,177) |
| **Net change in total pension liability** | $4,160,779,259 | $4,456,571,332 | $4,140,576,858 | $1,586,803,054 | $12,270,014,039 |
| | | | | | |
| **Total pension liability – beginning** | 134,370,954,628 | 129,914,383,296 | 125,773,806,438 | 124,187,003,384 | 111,916,989,345 |
| **Total pension liability – ending (a)** | $138,531,733,887 | $134,370,954,628 | $129,914,383,296 | $125,773,806,438 | $124,187,003,384 |
| | | | | | |
| **Plan fiduciary net position** | | | | | |
| Contributions – employer | $92,658,238 | $88,514,781 | $84,633,117 | $149,495,577 | $148,040,767 |
| Contributions – nonemployer contributing entity | 4,813,451,679 | 4,466,020,692 | 4,095,125,358 | 3,986,363,699 | 3,742,469,245 |
| Contributions – member | 994,400,416 | 963,972,120 | 938,037,245 | 929,130,165 | 951,809,398 |
| Net investment income | 275,669,398 | 2,617,831,332 | 4,049,271,728 | 5,520,453,001 | (44,103,178) |
| Benefit payments, including refunds of employee contributions | (7,099,524,955) | (6,818,760,572) | (6,551,634,376) | (6,438,005,920) | (5,931,207,177) |
| Administrative expense | (22,966,372) | (24,335,680) | (21,550,896) | (22,728,735) | (22,967,917) |
| **Net change in plan fiduciary net position** | ($946,311,596) | $1,293,242,673 | $2,593,882,176 | $4,124,707,787 | ($1,155,958,862) |
| | | | | | |
| **Plan fiduciary net position – beginning** | 53,262,789,367 | 51,969,546,694 | 49,375,664,518 | 45,250,956,731 | 46,406,915,593 |
| **Plan fiduciary net position – ending (b)** | $52,316,477,771 | $53,262,789,367 | $51,969,546,694 | $49,375,664,518 | $45,250,956,731 |
| **Net pension liability – ending (a) – (b)** | $86,215,256,116 | $81,108,165,261 | $77,944,836,602 | $76,398,141,920 | $78,936,046,653 |
| | | | | | |
| **Plan fiduciary net position as a percentage of the total pension liability** | 37.8% | 39.6% | 40.0% | 39.3% | 36.4% |
| **Actual covered employee payroll** | $10,827,438,800 | $10,450,452,444 | $10,163,980,000 | $9,965,569,893 | $9,811,614,284 |
| **Plan net pension liability as percentage of covered employee payroll** | 796.3% | 776.1% | 766.9% | 766.6% | 804.5% |

# Exhibit 6 – Reconciliation of Collective Net Pension Liability

Changes in the collective net pension liability from the beginning of the year to the end of the year arise from the net difference between changes in the total pension liability and plan fiduciary net position that occurred during the year. Changes in net pension liability will be recognized immediately as pension expense, or reported as deferred outflows of resources related to pensions or deferred inflows of resources related to pensions, depending on the nature of the change.

Differences between actual and expected investment-related experience are recognized over a closed five-year period. Differences between actual and expected non-investment-related experience and changes of assumptions are recognized over the average of the expected remaining service lives of all members who are provided with pensions through the pension plan (active employees and inactive employees). The amounts below that are not included in pension expense for the current year are included in deferred outflows of resources or deferred inflows of resources related to pensions.

| | Increase/(Decrease) For Fiscal Year Ended June 30, 2020 | | |
|---|---|---|---|
| | Total Pension Liability (a) | Plan Fiduciary Net Position (b) | Net Pension Liability (a) – (b) |
| **Balances at beginning of year** | $134,370,954,628 | $53,262,789,367 | $81,108,165,261 |
| **Changes for the year** | | | |
| Service cost | 1,991,622,987 | | 1,991,622,987 |
| Interest | 9,296,897,060 | | 9,296,897,060 |
| Differences between expected and actual experience | (28,215,833) | | (28,215,833) |
| Contributions – employer | | 92,658,238 | (92,658,238) |
| Contributions – nonemployer contributing entity | | 4,813,451,679 | (4,813,451,679) |
| Contributions – member | | 994,400,416 | (994,400,416) |
| Net investment income | | 275,669,398 | (275,669,398) |
| Benefit payments, including refunds of employee contributions | (7,099,524,955) | (7,099,524,955) | 0 |
| Administrative expense | | (22,966,372) | 22,966,372 |
| Change of assumptions | 0 | 0 | 0 |
| Change of benefit terms | 0 | 0 | 0 |
| **Net changes** | 4,160,779,259 | (946,311,596) | 5,107,090,855 |
| **Balances at end of year** | $138,531,733,887 | $52,316,477,771 | $86,215,256,116 |

# Exhibit 7 – Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

| | Year Established | Original Balance | Original Amortization Period | Amortization Amount at June 30, 2020 | Outstanding Balance at June 30, 2020 |
|---|---|---|---|---|---|
| **Outflows** | | | | | |
| Demographic | 2016 | $701,827,169 | 5.21 | $134,707,710 | $28,288,619 |
| Investment | 2016 | 3,482,927,259 | 5.00 | 696,585,451 | - |
| Assumption | 2016 | 7,553,894,504 | 5.21 | 1,449,883,782 | 304,475,594 |
| Demographic | 2017 | 482,486,212 | 5.14 | 93,868,913 | 107,010,560 |
| Demographic | 2018 | 1,191,346,970 | 5.46 | 218,195,416 | 536,760,722 |
| Demographic | 2019 | 258,778,925 | 5.43 | 47,657,261 | 163,464,403 |
| Investment | 2019 | 973,676,334 | 5.00 | 194,735,267 | 584,205,800 |
| Assumption | 2019 | 77,241,572 | 5.43 | 14,224,967 | 48,791,638 |
| Investment | 2020 | 3,409,956,524 | 5.00 | 681,991,305 | 2,727,965,219 |
| **Total outflows** | | | | **$3,531,850,072** | **$4,500,962,555** |
| **Inflows** | | | | | |
| Investment | 2017 | $2,401,737,113 | 5.00 | $480,347,423 | $480,347,421 |
| Assumption | 2017 | 2,725,599,755 | 5.14 | 530,272,326 | 604,510,451 |
| Investment | 2018 | 643,913,847 | 5.00 | 128,782,769 | 257,565,540 |
| Assumption | 2018 | 666,054,719 | 5.46 | 121,988,044 | 300,090,587 |
| Demographic | 2020 | 28,215,833 | 5.42* | 5,205,873 | 23,009,960 |
| **Total inflows** | | | | **$1,266,596,435** | **$1,665,523,959** |

* *Equal to the total expected remaining service lives of 2,325,911 years, divided by total employees that are provided with pensions through the plan of 429,064 (as shown in the table below), rounded to two decimal places*

| | Expected Remaining Service | Counts | Average of the Expected Remaining Service |
|---|---|---|---|
| Actives Members | 2,325,911 | 163,075 | 14.26 |
| Inactive Members | - | 141,271 | - |
| Retirees and Beneficiaries | - | 124,718 | - |
| Total Employees | 2,325,911 | 429,064 | 5.42 |

# Exhibit 7 – Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions *continued*

| Fiscal Year Ended June 30 | 2020 | 2019 |
|---|---|---|
| **Deferred Outflows of Resources** | | |
| Difference between expected and actual experience in the Total Pension Liability | $835,524,304 | $1,329,953,604 |
| Changes of assumptions or other inputs | 353,267,232 | 1,817,375,981 |
| Net difference between projected and actual earnings on pension plan investments | 2,574,258,058 | 128,483,365 |
| Total Deferred Outflows of Resources | $3,763,049,594 | $3,275,812,950 |
| **Deferred Inflows of Resources** | | |
| Difference between expected and actual experience in the Total Pension Liability | $23,009,960 | $ - |
| Changes of assumptions or other inputs | 904,601,038 | 1,556,861,408 |
| Net difference between projected and actual earnings on pension plan investments | - | - |
| Total Deferred Inflows of Resources | $927,610,998 | $1,556,861,408 |
| **Net Deferred Outflows/(Inflows) of Resources** | **$2,835,438,596** | **$1,718,951,542** |
| Deferred outflows of resources and deferred inflows of resources related to pension will be recognized as follows: | | |
| Year Ended June 30: | | |
| 2020 | N/A | $1,588,468,205 |
| 2021 | $316,840,909 | (359,944,523) |
| 2022 | 839,731,050 | 162,945,618 |
| 2023 | 977,658,317 | 300,872,885 |
| 2024 | 703,394,788 | 26,609,357 |
| 2025 | (2,186,468) | - |
| Thereafter | - | - |

# Exhibit 8 – Collective Pension Expense

| | Fiscal Year Ended June 30, 2020 | Fiscal Year Ended June 30, 2019 |
|---|---|---|
| **Components of pension expense** | | |
| Service cost | $1,991,622,987 | $1,947,627,286 |
| Interest on the total pension liability | 9,296,897,060 | 8,991,684,121 |
| Projected earnings on plan investments | (3,685,625,922) | (3,591,507,666) |
| Contributions – member | (994,400,416) | (963,972,120) |
| Administrative expense | 22,966,372 | 24,335,680 |
| Current year recognition of: | | |
| Changes of assumptions | 811,848,379 | 1,026,230,333 |
| Difference between expected and actual experience | 489,223,427 | 478,372,958 |
| Difference between projected and actual earnings on pension plan investments | 964,181,831 | 606,536,234 |
| Change of benefit terms | - | - |
| **Total pension expense** | $8,896,713,718 | $8,519,306,826 |

## Exhibit 9 – Development of Blended Discount Rate

| Fiscal Year | Projected Beginning Fiduciary Net Position | Projected Total Contributions | Projected Benefit Payments | Projected Administrative Expense | Projected Investment Earnings | Projected Ending Fiduciary Net Position |
|---|---|---|---|---|---|---|
| 2021 | $52,316,477,771 | $6,239,557,102 | $7,445,204,414 | $30,377,261 | $3,618,892,584 | $54,699,345,782 |
| 2022 | 54,699,345,782 | 6,790,578,530 | 7,715,248,175 | 38,590,422 | 3,795,240,102 | 57,531,325,817 |
| 2023 | 57,531,325,817 | 6,972,268,024 | 7,989,500,729 | 38,799,772 | 3,990,231,671 | 60,465,525,011 |
| 2024 | 60,465,525,011 | 7,175,630,595 | 8,265,271,619 | 39,085,139 | 4,193,081,335 | 63,529,880,184 |
| 2025 | 63,529,880,184 | 7,407,534,990 | 8,552,036,637 | 39,424,361 | 4,405,654,203 | 66,751,608,378 |
| 2026 | 66,751,608,378 | 7,632,754,805 | 8,844,812,215 | 39,817,782 | 4,628,796,955 | 70,128,530,141 |
| 2027 | 70,128,530,141 | 7,806,214,245 | 9,151,922,316 | 40,249,070 | 4,860,488,610 | 73,603,061,610 |
| 2028 | 73,603,061,610 | 7,960,267,718 | 9,469,730,535 | 40,671,342 | 5,097,959,617 | 77,150,887,068 |
| 2029 | 77,150,887,068 | 8,117,436,017 | 9,793,928,868 | 41,047,944 | 5,340,448,167 | 80,773,794,439 |
| 2030 | 80,773,794,439 | 8,263,198,578 | 10,127,176,970 | 41,432,643 | 5,587,476,225 | 84,455,859,629 |
| 2031 | 84,455,859,629 | 8,415,325,697 | 10,469,413,246 | 41,816,227 | 5,838,553,542 | 88,198,509,396 |
| 2032 | 88,198,509,396 | 8,583,335,647 | 10,820,560,146 | 42,190,695 | 6,094,116,126 | 92,013,210,328 |
| 2033 | 92,013,210,328 | 8,766,709,123 | 11,183,090,407 | 42,534,947 | 6,354,862,655 | 95,909,156,751 |
| 2034 | 95,909,156,751 | 9,659,516,760 | 11,547,666,052 | 42,843,404 | 6,646,056,228 | 100,624,220,283 |
| 2035 | 100,624,220,283 | 9,843,262,593 | 11,914,498,852 | 43,118,531 | 6,969,693,002 | 105,479,558,495 |
| 2036 | 105,479,558,495 | 10,032,945,882 | 12,275,799,636 | 43,385,689 | 7,303,550,714 | 110,496,869,766 |
| 2037 | 110,496,869,766 | 10,231,609,451 | 12,634,195,885 | 43,656,622 | 7,649,162,377 | 115,699,789,086 |
| 2038 | 115,699,789,086 | 10,437,716,417 | 12,996,849,725 | 43,947,535 | 8,007,877,407 | 121,104,585,650 |
| 2039 | 121,104,585,650 | 10,646,384,312 | 13,349,227,859 | 44,231,403 | 8,381,173,372 | 126,738,684,072 |
| 2040 | 126,738,684,072 | 10,858,698,898 | 13,689,827,864 | 44,486,464 | 8,771,061,345 | 132,634,129,986 |
| 2041 | 132,634,129,986 | 11,080,049,438 | 13,987,302,299 | 44,732,792 | 9,181,069,601 | 138,863,213,934 |
| 2042 | 138,863,213,934 | 11,312,428,828 | 14,274,159,820 | 44,995,448 | 9,615,189,550 | 145,471,677,045 |
| 2043 | 145,471,677,045 | 11,552,757,924 | 14,520,264,167 | 45,281,830 | 10,077,569,811 | 152,536,458,783 |
| 2044 | 152,536,458,783 | 11,801,697,035 | 14,713,747,670 | 45,581,589 | 10,574,034,987 | 160,152,861,546 |
| 2045 | 160,152,861,546 | 12,063,713,350 | 14,855,527,705 | 45,894,561 | 11,111,380,496 | 168,426,533,126 |
| 2046 | 168,426,533,126 | 1,697,665,957 | 14,944,191,950 | 46,226,815 | 11,324,610,971 | 166,458,391,289 |
| 2047 | 166,458,391,289 | 1,645,430,989 | 14,989,406,530 | 46,609,887 | 11,183,416,900 | 164,251,222,761 |
| 2048 | 164,251,222,761 | 1,606,125,392 | 14,996,035,564 | 46,975,113 | 11,027,294,608 | 161,841,632,084 |
| 2049 | 161,841,632,084 | 1,595,335,200 | 14,978,227,578 | 47,294,360 | 10,858,857,710 | 159,270,303,056 |
| 2050 | 159,270,303,056 | 1,605,693,101 | 14,946,974,498 | 47,537,865 | 10,680,312,540 | 156,561,796,334 |
| 2051 | 156,561,796,334 | 1,617,708,495 | 14,941,432,477 | 47,682,462 | 10,491,326,518 | 153,681,716,409 |
| 2052 | 153,681,716,409 | 1,629,737,745 | 14,955,186,927 | 47,455,412 | 10,289,668,488 | 150,598,480,303 |
| 2053 | 150,598,480,303 | 1,640,764,805 | 14,973,316,564 | 47,177,577 | 10,073,603,094 | 147,292,354,060 |
| 2054 | 147,292,354,060 | 1,650,243,254 | 14,993,645,502 | 46,849,863 | 9,841,805,960 | 143,743,907,909 |
| 2055 | 143,743,907,909 | 1,659,103,495 | 15,007,587,598 | 46,473,334 | 9,593,250,043 | 139,942,200,515 |
| 2056 | 139,942,200,515 | 1,667,984,514 | 15,060,719,775 | 46,049,205 | 9,325,596,580 | 135,829,012,630 |
| 2057 | 135,829,012,630 | 1,677,188,511 | 15,101,067,937 | 45,578,838 | 9,036,599,845 | 131,396,154,211 |

## Exhibit 9 – Development of Blended Discount Rate *continued*

| Fiscal Year | Projected Beginning Fiduciary Net Position | Projected Total Contributions | Projected Benefit Payments | Projected Administrative Expense | Projected Investment Earnings | Projected Ending Fiduciary Net Position |
|---|---|---|---|---|---|---|
| 2058 | $131,396,154,211 | $1,686,592,301 | $15,095,287,536 | $45,063,734 | $8,726,849,231 | $126,669,244,474 |
| 2059 | 126,669,244,474 | 1,696,881,606 | 15,046,138,540 | 44,505,523 | 8,398,065,427 | 121,673,547,444 |
| 2060 | 121,673,547,444 | 1,709,558,399 | 14,945,673,089 | 43,905,957 | 8,052,347,598 | 116,445,874,395 |
| 2061 | 116,445,874,395 | 1,725,380,008 | 14,855,583,007 | 43,266,901 | 7,690,139,761 | 110,962,544,256 |
| 2062 | 110,962,544,256 | 1,744,662,211 | 14,719,443,137 | 42,590,325 | 7,311,770,104 | 105,256,943,110 |
| 2063 | 105,256,943,110 | 1,766,757,121 | 14,511,890,542 | 41,878,287 | 6,920,440,608 | 99,390,372,010 |
| 2064 | 99,390,372,010 | 1,791,326,114 | 14,256,586,170 | 41,132,933 | 6,519,602,286 | 93,403,581,306 |
| 2065 | 93,403,581,306 | 1,818,032,471 | 13,951,964,849 | 40,356,478 | 6,112,150,581 | 87,341,443,031 |
| 2066 | 87,341,443,031 | 1,846,759,433 | 13,613,571,266 | 39,551,198 | 5,700,678,306 | 81,235,758,305 |
| 2067 | 81,235,758,305 | 1,877,289,992 | 13,240,032,315 | 38,719,420 | 5,287,451,920 | 75,121,748,482 |
| 2068 | 75,121,748,482 | 1,908,728,671 | 12,820,373,943 | 37,863,508 | 4,875,289,586 | 69,047,529,289 |
| 2069 | 69,047,529,289 | 1,940,930,822 | 12,364,858,469 | 36,985,854 | 4,467,195,078 | 63,053,810,865 |
| 2070 | 63,053,810,865 | 1,973,804,439 | 11,873,850,260 | 36,088,869 | 4,066,002,046 | 57,183,678,222 |
| 2071 | 57,183,678,222 | 2,007,202,692 | 11,351,313,364 | 35,174,967 | 3,674,582,478 | 51,478,975,062 |
| 2072 | 51,478,975,062 | 2,041,125,838 | 10,802,507,805 | 34,246,558 | 3,295,681,256 | 45,979,027,792 |
| 2073 | 45,979,027,792 | 2,075,580,557 | 10,230,280,892 | 33,306,038 | 2,931,951,722 | 40,722,973,141 |
| 2074 | 40,722,973,141 | 2,110,574,036 | 9,638,748,121 | 32,355,776 | 2,585,989,575 | 35,748,432,855 |
| 2075 | 35,748,432,855 | 2,146,113,796 | 9,019,733,256 | 31,398,108 | 2,260,714,685 | 31,104,129,972 |
| 2076 | 31,104,129,972 | 2,182,207,488 | 8,381,021,290 | 30,435,324 | 1,959,265,379 | 26,834,146,225 |
| 2077 | 26,834,146,225 | 2,218,862,883 | 7,741,937,544 | 29,469,666 | 1,684,051,184 | 22,965,653,082 |
| 2078 | 22,965,653,082 | 2,256,087,871 | 7,110,052,708 | 28,503,309 | 1,436,709,331 | 19,519,894,266 |
| 2079 | 19,519,894,266 | 2,293,890,469 | 6,488,072,275 | 27,538,366 | 1,218,632,393 | 16,516,806,487 |
| 2080 | 16,516,806,487 | 2,332,278,820 | 5,874,442,901 | 26,576,872 | 1,031,270,521 | 13,979,336,056 |
| 2081 | 13,979,336,056 | 2,371,261,201 | 5,286,731,240 | 25,620,781 | 875,615,345 | 11,913,860,580 |
| 2082 | 11,913,860,580 | 2,410,846,023 | 4,731,461,257 | 24,671,962 | 751,885,189 | 10,320,458,573 |
| 2083 | 10,320,458,573 | 2,451,041,834 | 4,204,175,996 | 23,732,189 | 660,241,778 | 9,203,834,000 |
| 2084 | 9,203,834,000 | 2,491,857,328 | 3,708,154,804 | 22,803,144 | 600,899,858 | 8,565,633,238 |
| 2085 | 8,565,633,238 | 2,533,301,342 | 3,245,346,477 | 21,886,406 | 573,906,723 | 8,405,608,420 |
| 2086 | 8,405,608,420 | 2,575,382,866 | 2,817,801,512 | 20,983,455 | 579,173,516 | 8,721,379,834 |
| 2087 | 8,721,379,834 | 2,618,111,041 | 2,426,871,989 | 20,095,663 | 616,486,607 | 9,509,009,829 |
| 2088 | 9,509,009,829 | 2,661,495,168 | 2,073,159,027 | 19,224,299 | 685,549,603 | 10,763,671,274 |
| 2089 | 10,763,671,274 | 2,705,544,710 | 1,756,458,607 | 18,370,521 | 786,032,035 | 12,480,418,891 |
| 2090 | 12,480,418,891 | 2,750,269,297 | 1,475,788,628 | 17,535,382 | 917,622,407 | 14,654,986,585 |
| 2091 | 14,654,986,585 | 2,795,678,730 | 1,229,473,028 | 16,719,829 | 1,080,081,067 | 17,284,553,526 |
| 2092 | 17,284,553,526 | 2,841,782,983 | 1,015,385,622 | 15,924,698 | 1,273,285,290 | 20,368,311,478 |

## Exhibit 9 – Development of Blended Discount Rate *continued*

| Fiscal Year | Projected Beginning Fiduciary Net Position | Projected Total Contributions | Projected Benefit Payments | Projected Administrative Expense | Projected Investment Earnings | Projected Ending Fiduciary Net Position |
|---|---|---|---|---|---|---|
| 2093 | $20,368,311,478 | $2,888,592,214 | $831,093,038 | $15,150,725 | $1,497,263,999 | $23,907,923,927 |
| 2094 | 23,907,923,927 | 2,936,116,761 | 674,009,845 | 14,398,538 | 1,752,224,468 | 27,907,856,773 |
| 2095 | 27,907,856,773 | 2,984,367,155 | 541,477,420 | 13,668,669 | 2,038,572,711 | 32,375,650,549 |
| 2096 | 32,375,650,549 | 3,033,354,118 | 430,698,900 | 12,961,547 | 2,356,934,817 | 37,322,279,037 |
| 2097 | 37,322,279,037 | 3,083,111,800 | 338,962,310 | 12,277,509 | 2,708,175,052 | 42,762,326,070 |
| 2098 | 42,762,326,070 | 3,133,690,059 | 263,761,216 | 11,617,816 | 3,093,403,711 | 48,714,040,808 |
| 2099 | 48,714,040,808 | 3,185,102,483 | 202,768,950 | 10,984,004 | 3,513,980,090 | 55,199,370,427 |
| 2100 | 55,199,370,427 | 3,237,362,885 | 153,946,839 | 10,375,734 | 3,971,512,341 | 62,243,923,079 |
| 2101 | 62,243,923,079 | 3,290,485,309 | 115,346,956 | 9,792,622 | 4,467,861,716 | 69,877,130,526 |
| 2102 | 69,877,130,526 | 3,344,484,033 | 85,232,383 | 9,234,238 | 5,005,149,746 | 78,132,297,684 |
| 2103 | 78,132,297,684 | 3,399,373,570 | 62,122,627 | 8,700,118 | 5,585,760,117 | 87,046,608,627 |
| 2104 | 87,046,608,627 | 3,455,168,676 | 44,635,220 | 8,189,760 | 6,212,344,633 | 96,661,296,955 |
| 2105 | 96,661,296,955 | 3,511,884,351 | 31,664,101 | 7,702,633 | 6,887,828,903 | 107,021,643,476 |
| 2106 | 107,021,643,476 | 3,569,535,845 | 22,215,835 | 7,238,177 | 7,615,417,907 | 118,177,143,215 |
| 2107 | 118,177,143,215 | 3,628,138,661 | 15,470,797 | 6,795,809 | 8,398,605,547 | 130,181,620,817 |
| 2108 | 130,181,620,817 | 3,687,708,560 | 10,744,380 | 6,374,925 | 9,241,184,081 | 143,093,394,153 |
| 2109 | 143,093,394,153 | 3,748,261,563 | 7,413,387 | 5,974,905 | 10,147,258,155 | 156,975,525,580 |
| 2110 | 156,975,525,580 | 3,809,813,961 | 5,116,548 | 5,595,113 | 11,121,255,371 | 171,895,883,250 |
| 2111 | 171,895,883,250 | 3,872,382,312 | 3,580,391 | 5,234,904 | 12,167,936,673 | 187,927,386,941 |
| 2112 | 187,927,386,941 | 3,935,983,452 | 2,545,057 | 4,893,623 | 13,292,416,153 | 205,148,347,866 |
| 2113 | 205,148,347,866 | 4,000,634,495 | 1,842,033 | 4,570,612 | 14,500,182,115 | 223,642,751,831 |
| 2114 | 223,642,751,831 | 4,066,352,840 | 1,180,620 | 4,265,207 | 15,797,124,374 | 243,500,783,218 |
| 2115 | 243,500,783,218 | 4,133,156,175 | 746,910 | 3,976,745 | 17,189,549,963 | 264,818,765,701 |
| 2116 | 264,818,765,701 | 4,201,062,482 | 516,981 | 3,704,567 | 18,684,203,032 | 287,699,809,667 |
| 2117 | 287,699,809,667 | 4,270,090,044 | 384,128 | 3,448,015 | 20,288,305,703 | 312,254,373,271 |
| 2118 | 312,254,373,271 | 4,340,257,444 | 347,247 | 3,206,438 | 22,009,590,761 | 338,600,667,791 |
| 2119 | 338,600,667,791 | 4,411,583,577 | 124,955 | 2,979,191 | 23,856,343,525 | 366,865,490,746 |
| 2120 | 366,865,490,746 | 4,484,087,651 | 6,363 | 2,765,642 | 25,837,430,400 | 397,184,236,791 |
| 2121 | 397,184,236,791 | 4,557,789,193 | 3,135 | 2,565,166 | 27,962,329,307 | 429,701,786,989 |
| 2122 | 429,701,786,989 | 4,632,708,055 | 1,397 | 2,377,153 | 30,241,186,622 | 464,573,303,117 |
| 2123 | 464,573,303,117 | 4,708,864,420 | 304 | 2,201,003 | 32,684,864,427 | 501,964,830,657 |
| 2124 | 501,964,830,657 | 4,786,278,806 | 0 | 2,036,133 | 35,304,986,640 | 542,054,059,970 |

# Exhibit 9 – Development of Blended Discount Rate *continued*

| Fiscal Year | Projected Beginning Fiduciary Net Position | Projected Benefit Payments | "Funded" Portion of Benefit | "Unfunded" Portion of Benefit | Present Value of "Funded" Benefit Payments at 7.00% | Present Value of "Unfunded" Benefit Payments at 2.21%* | Present Value of Benefit Payments at 7.00% |
|---|---|---|---|---|---|---|---|
| 2021 | $52,316,477,771 | $7,445,204,414 | $7,445,204,414 | $0 | $7,197,550,775 | $0 | $7,197,550,775 |
| 2022 | 54,699,345,782 | 7,715,248,175 | 7,715,248,175 | 0 | 6,970,665,358 | 0 | 6,970,665,358 |
| 2023 | 57,531,325,817 | 7,989,500,729 | 7,989,500,729 | 0 | 6,746,215,288 | 0 | 6,746,215,288 |
| 2024 | 60,465,525,011 | 8,265,271,619 | 8,265,271,619 | 0 | 6,522,497,305 | 0 | 6,522,497,305 |
| 2025 | 63,529,880,184 | 8,552,036,637 | 8,552,036,637 | 0 | 6,307,286,420 | 0 | 6,307,286,420 |
| 2026 | 66,751,608,378 | 8,844,812,215 | 8,844,812,215 | 0 | 6,096,461,557 | 0 | 6,096,461,557 |
| 2027 | 70,128,530,141 | 9,151,922,316 | 9,151,922,316 | 0 | 5,895,460,991 | 0 | 5,895,460,991 |
| 2028 | 73,603,061,610 | 9,469,730,535 | 9,469,730,535 | 0 | 5,701,108,267 | 0 | 5,701,108,267 |
| 2029 | 77,150,887,068 | 9,793,928,868 | 9,793,928,868 | 0 | 5,510,548,577 | 0 | 5,510,548,577 |
| 2030 | 80,773,794,439 | 10,127,176,970 | 10,127,176,970 | 0 | 5,325,280,779 | 0 | 5,325,280,779 |
| 2031 | 84,455,859,629 | 10,469,413,246 | 10,469,413,246 | 0 | 5,145,086,455 | 0 | 5,145,086,455 |
| 2032 | 88,198,509,396 | 10,820,560,146 | 10,820,560,146 | 0 | 4,969,770,113 | 0 | 4,969,770,113 |
| 2033 | 92,013,210,328 | 11,183,090,407 | 11,183,090,407 | 0 | 4,800,258,384 | 0 | 4,800,258,384 |
| 2034 | 95,909,156,751 | 11,547,666,052 | 11,547,666,052 | 0 | 4,632,476,419 | 0 | 4,632,476,419 |
| 2035 | 100,624,220,283 | 11,914,498,852 | 11,914,498,852 | 0 | 4,466,949,095 | 0 | 4,466,949,095 |
| 2036 | 105,479,558,495 | 12,275,799,636 | 12,275,799,636 | 0 | 4,301,314,887 | 0 | 4,301,314,887 |
| 2037 | 110,496,869,766 | 12,634,195,885 | 12,634,195,885 | 0 | 4,137,283,434 | 0 | 4,137,283,434 |
| 2038 | 115,699,789,086 | 12,996,849,725 | 12,996,849,725 | 0 | 3,977,608,069 | 0 | 3,977,608,069 |
| 2039 | 121,104,585,650 | 13,349,227,859 | 13,349,227,859 | 0 | 3,818,178,774 | 0 | 3,818,178,774 |
| 2040 | 126,738,684,072 | 13,689,827,864 | 13,689,827,864 | 0 | 3,659,437,401 | 0 | 3,659,437,402 |
| 2041 | 132,634,129,986 | 13,987,302,299 | 13,987,302,299 | 0 | 3,494,350,934 | 0 | 3,494,350,934 |
| 2042 | 138,863,213,934 | 14,274,159,820 | 14,274,159,820 | 0 | 3,332,723,891 | 0 | 3,332,723,891 |
| 2043 | 145,471,677,045 | 14,520,264,167 | 14,520,264,167 | 0 | 3,168,396,462 | 0 | 3,168,396,462 |
| 2044 | 152,536,458,783 | 14,713,747,670 | 14,713,747,670 | 0 | 3,000,575,289 | 0 | 3,000,575,289 |
| 2045 | 160,152,861,546 | 14,855,527,705 | 14,855,527,705 | 0 | 2,831,297,662 | 0 | 2,831,297,662 |
| 2046 | 168,426,533,126 | 14,944,191,950 | 14,944,191,950 | 0 | 2,661,865,492 | 0 | 2,661,865,492 |
| 2047 | 166,458,391,289 | 14,989,406,530 | 14,989,406,530 | 0 | 2,495,251,525 | 0 | 2,495,251,525 |
| 2048 | 164,251,222,761 | 14,996,035,564 | 14,996,035,564 | 0 | 2,333,042,098 | 0 | 2,333,042,098 |
| 2049 | 161,841,632,084 | 14,978,227,578 | 14,978,227,578 | 0 | 2,177,823,907 | 0 | 2,177,823,907 |
| 2050 | 159,270,303,056 | 14,946,974,498 | 14,946,974,498 | 0 | 2,031,102,552 | 0 | 2,031,102,552 |
| 2051 | 156,561,796,334 | 14,941,432,477 | 14,941,432,477 | 0 | 1,897,522,862 | 0 | 1,897,522,862 |
| 2052 | 153,681,716,409 | 14,955,186,927 | 14,955,186,927 | 0 | 1,775,018,356 | 0 | 1,775,018,356 |
| 2053 | 150,598,480,303 | 14,973,316,564 | 14,973,316,564 | 0 | 1,660,906,680 | 0 | 1,660,906,680 |
| 2054 | 147,292,354,060 | 14,993,645,502 | 14,993,645,502 | 0 | 1,554,356,688 | 0 | 1,554,356,688 |
| 2055 | 143,743,907,909 | 15,007,587,598 | 15,007,587,598 | 0 | 1,454,020,591 | 0 | 1,454,020,591 |
| 2056 | 139,942,200,515 | 15,060,719,775 | 15,060,719,775 | 0 | 1,363,708,728 | 0 | 1,363,708,728 |

* *Bond Buyer's 20-Bond GO index*

## Exhibit 9 – Development of Blended Discount Rate *continued*

| Fiscal Year | Projected Beginning Fiduciary Net Position | Projected Benefit Payments | "Funded" Portion of Benefit | "Unfunded" Portion of Benefit | Present Value of "Funded" Benefit Payments at 7.00% | Present Value of "Unfunded" Benefit Payments at 2.21%* | Present Value of Benefit Payments at 7.00% |
|---|---|---|---|---|---|---|---|
| 2057 | $135,829,012,630 | $15,101,067,937 | $15,101,067,937 | $0 | $1,277,908,550 | $0 | $1,277,908,550 |
| 2058 | 131,396,154,211 | 15,095,287,536 | 15,095,287,536 | 0 | 1,193,849,898 | 0 | 1,193,849,898 |
| 2059 | 126,669,244,474 | 15,046,138,540 | 15,046,138,540 | 0 | 1,112,114,787 | 0 | 1,112,114,787 |
| 2060 | 121,673,547,444 | 14,945,673,089 | 14,945,673,089 | 0 | 1,032,419,646 | 0 | 1,032,419,646 |
| 2061 | 116,445,874,395 | 14,855,583,007 | 14,855,583,007 | 0 | 959,062,045 | 0 | 959,062,045 |
| 2062 | 110,962,544,256 | 14,719,443,137 | 14,719,443,137 | 0 | 888,105,595 | 0 | 888,105,595 |
| 2063 | 105,256,943,110 | 14,511,890,542 | 14,511,890,542 | 0 | 818,301,679 | 0 | 818,301,679 |
| 2064 | 99,390,372,010 | 14,256,586,170 | 14,256,586,170 | 0 | 751,313,537 | 0 | 751,313,537 |
| 2065 | 93,403,581,306 | 13,951,964,849 | 13,951,964,849 | 0 | 687,159,043 | 0 | 687,159,043 |
| 2066 | 87,341,443,031 | 13,613,571,266 | 13,613,571,266 | 0 | 626,628,559 | 0 | 626,628,559 |
| 2067 | 81,235,758,305 | 13,240,032,315 | 13,240,032,315 | 0 | 569,565,117 | 0 | 569,565,117 |
| 2068 | 75,121,748,482 | 12,820,373,943 | 12,820,373,943 | 0 | 515,431,852 | 0 | 515,431,852 |
| 2069 | 69,047,529,289 | 12,364,858,469 | 12,364,858,469 | 0 | 464,596,498 | 0 | 464,596,498 |
| 2070 | 63,053,810,865 | 11,873,850,260 | 11,873,850,260 | 0 | 416,960,171 | 0 | 416,960,171 |
| 2071 | 57,183,678,222 | 11,351,313,364 | 11,351,313,364 | 0 | 372,533,506 | 0 | 372,533,506 |
| 2072 | 51,478,975,062 | 10,802,507,805 | 10,802,507,805 | 0 | 331,329,449 | 0 | 331,329,449 |
| 2073 | 45,979,027,792 | 10,230,280,892 | 10,230,280,892 | 0 | 293,250,816 | 0 | 293,250,816 |
| 2074 | 40,722,973,141 | 9,638,748,121 | 9,638,748,121 | 0 | 258,219,196 | 0 | 258,219,196 |
| 2075 | 35,748,432,855 | 9,019,733,256 | 9,019,733,256 | 0 | 225,828,011 | 0 | 225,828,011 |
| 2076 | 31,104,129,972 | 8,381,021,290 | 8,381,021,290 | 0 | 196,108,890 | 0 | 196,108,890 |
| 2077 | 26,834,146,225 | 7,741,937,544 | 7,741,937,544 | 0 | 169,303,612 | 0 | 169,303,612 |
| 2078 | 22,965,653,082 | 7,110,052,708 | 7,110,052,708 | 0 | 145,313,380 | 0 | 145,313,380 |
| 2079 | 19,519,894,266 | 6,488,072,275 | 6,488,072,275 | 0 | 123,926,643 | 0 | 123,926,643 |
| 2080 | 16,516,806,487 | 5,874,442,901 | 5,874,442,901 | 0 | 104,865,327 | 0 | 104,865,327 |
| 2081 | 13,979,336,056 | 5,286,731,240 | 5,286,731,240 | 0 | 88,200,020 | 0 | 88,200,020 |
| 2082 | 11,913,860,580 | 4,731,461,257 | 4,731,461,257 | 0 | 73,772,238 | 0 | 73,772,238 |
| 2083 | 10,320,458,573 | 4,204,175,996 | 4,204,175,996 | 0 | 61,262,510 | 0 | 61,262,510 |
| 2084 | 9,203,834,000 | 3,708,154,804 | 3,708,154,804 | 0 | 50,499,604 | 0 | 50,499,604 |
| 2085 | 8,565,633,238 | 3,245,346,477 | 3,245,346,477 | 0 | 41,305,455 | 0 | 41,305,455 |
| 2086 | 8,405,608,420 | 2,817,801,512 | 2,817,801,512 | 0 | 33,517,604 | 0 | 33,517,604 |
| 2087 | 8,721,379,834 | 2,426,871,989 | 2,426,871,989 | 0 | 26,978,988 | 0 | 26,978,988 |
| 2088 | 9,509,009,829 | 2,073,159,027 | 2,073,159,027 | 0 | 21,539,104 | 0 | 21,539,104 |
| 2089 | 10,763,671,274 | 1,756,458,607 | 1,756,458,607 | 0 | 17,054,899 | 0 | 17,054,899 |
| 2090 | 12,480,418,891 | 1,475,788,628 | 1,475,788,628 | 0 | 13,392,190 | 0 | 13,392,190 |
| 2091 | 14,654,986,585 | 1,229,473,028 | 1,229,473,028 | 0 | 10,427,079 | 0 | 10,427,079 |

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## Exhibit 9 – Development of Blended Discount Rate *continued*

| Fiscal Year | Projected Beginning Fiduciary Net Position | Projected Benefit Payments | "Funded" Portion of Benefit | "Unfunded" Portion of Benefit | Present Value of "Funded" Benefit Payments at 7.00% | Present Value of "Unfunded" Benefit Payments at 2.21%* | Present Value of Benefit Payments at 7.00% |
|---|---|---|---|---|---|---|---|
| 2092 | $17,284,553,526 | $1,015,385,622 | $1,015,385,622 | $0 | $8,048,054 | $0 | $8,048,054 |
| 2093 | 20,368,311,478 | 831,093,038 | 831,093,038 | 0 | 6,156,385 | 0 | 6,156,385 |
| 2094 | 23,907,923,927 | 674,009,845 | 674,009,845 | 0 | 4,666,149 | 0 | 4,666,149 |
| 2095 | 27,907,856,773 | 541,477,420 | 541,477,420 | 0 | 3,503,393 | 0 | 3,503,393 |
| 2096 | 32,375,650,549 | 430,698,900 | 430,698,900 | 0 | 2,604,345 | 0 | 2,604,345 |
| 2097 | 37,322,279,037 | 338,962,310 | 338,962,310 | 0 | 1,915,545 | 0 | 1,915,545 |
| 2098 | 42,762,326,070 | 263,761,216 | 263,761,216 | 0 | 1,393,055 | 0 | 1,393,055 |
| 2099 | 48,714,040,808 | 202,768,950 | 202,768,950 | 0 | 1,000,864 | 0 | 1,000,864 |
| 2100 | 55,199,370,427 | 153,946,839 | 153,946,839 | 0 | 710,167 | 0 | 710,167 |
| 2101 | 62,243,923,079 | 115,346,956 | 115,346,956 | 0 | 497,293 | 0 | 497,293 |
| 2102 | 69,877,130,526 | 85,232,383 | 85,232,383 | 0 | 343,421 | 0 | 343,421 |
| 2103 | 78,132,297,684 | 62,122,627 | 62,122,627 | 0 | 233,931 | 0 | 233,931 |
| 2104 | 87,046,608,627 | 44,635,220 | 44,635,220 | 0 | 157,084 | 0 | 157,084 |
| 2105 | 96,661,296,955 | 31,664,101 | 31,664,101 | 0 | 104,145 | 0 | 104,145 |
| 2106 | 107,021,643,476 | 22,215,835 | 22,215,835 | 0 | 68,289 | 0 | 68,289 |
| 2107 | 118,177,143,215 | 15,470,797 | 15,470,797 | 0 | 44,444 | 0 | 44,444 |
| 2108 | 130,181,620,817 | 10,744,380 | 10,744,380 | 0 | 28,847 | 0 | 28,847 |
| 2109 | 143,093,394,153 | 7,413,387 | 7,413,387 | 0 | 18,602 | 0 | 18,602 |
| 2110 | 156,975,525,580 | 5,116,548 | 5,116,548 | 0 | 11,999 | 0 | 11,999 |
| 2111 | 171,895,883,250 | 3,580,391 | 3,580,391 | 0 | 7,847 | 0 | 7,847 |
| 2112 | 187,927,386,941 | 2,545,057 | 2,545,057 | 0 | 5,213 | 0 | 5,213 |
| 2113 | 205,148,347,866 | 1,842,033 | 1,842,033 | 0 | 3,526 | 0 | 3,526 |
| 2114 | 223,642,751,831 | 1,180,620 | 1,180,620 | 0 | 2,112 | 0 | 2,112 |
| 2115 | 243,500,783,218 | 746,910 | 746,910 | 0 | 1,249 | 0 | 1,249 |
| 2116 | 264,818,765,701 | 516,981 | 516,981 | 0 | 808 | 0 | 808 |
| 2117 | 287,699,809,667 | 384,128 | 384,128 | 0 | 561 | 0 | 561 |
| 2118 | 312,254,373,271 | 347,247 | 347,247 | 0 | 474 | 0 | 474 |
| 2119 | 338,600,667,791 | 124,955 | 124,955 | 0 | 159 | 0 | 159 |
| 2120 | 366,865,490,746 | 6,363 | 6,363 | 0 | 8 | 0 | 8 |
| 2121 | 397,184,236,791 | 3,135 | 3,135 | 0 | 3 | 0 | 3 |
| 2122 | 429,701,786,989 | 1,397 | 1,397 | 0 | 1 | 0 | 1 |
| 2123 | 464,573,303,117 | 304 | 304 | 0 | 0 | 0 | 0 |
| 2124 | 501,964,830,657 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | | | | | **$157,416,975,537** | **$0** | **$157,416,975,537** |

* *Bond Buyer's 20-Bond GO index*

## Exhibit 10 – Assumed Rate of Investment Return

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of June 30, 2020 are summarized in the following table:

| Asset Classes | Expected Arithmetic Returns Over 20 Years* | Target Allocation** |
|---|---|---|
| US Equities Large Cap | 6.05% | 16.5% |
| US Equities Small/Mid Cap | 7.23 | 2.3 |
| International Equities Developed | 7.01 | 12.2 |
| Emerging Markets Equities | 9.38 | 3.0 |
| US Bonds Code | 2.17 | 7.0 |
| US Bonds High Yield | 4.09 | 2.5 |
| International Debt Developed | 1.52 | 3.1 |
| Emerging International Debt | 4.47 | 3.2 |
| Real Estate | 5.65 | 16.0 |
| Hedge Funds (Absolute Return) | 4.32 | 10.0 |
| Infrastructure | 6.17 | 4.0 |
| Private Equity | 10.53 | 15.0 |
| Private Debt | 6.28 | 5.2 |
| Total | | 100.0% |

* *Based on the Horizon Survey of Capital Market Assumptions 2019 Edition*

** *Breakout determined with assistance from TRS staff*

# Section 7: Assumptions, Benefit Provisions, and Definitions

## Summary of Assumptions and Methods

| | |
|---|---|
| **Rationale for Assumptions:** | The information and analysis used in supporting each assumption that has a significant effect on this actuarial valuation is shown in the demographic and economic experience review dated September 18, 2018.<br><br>All assumptions were adopted by the Board effective June 30, 2018, unless otherwise noted. |
| **Interest Rate:** | 7.00% per annum, compounded annually and net of investment expenses. The interest rate assumption is composed of an inflation assumption of 2.50% and real return of 4.50%. (Adopted effective June 30, 2016.) |
| **Mortality Rates:** | |
| ***Healthy Post-Retirement:*** | RP-2014 White Collar Annuitant Tables projected generationally with Scale MP-2017, with female rates multiplied by 70% for ages under 78 and 110% for ages 78 to 114 and male rates multiplied by 94% for ages under 81 and 110% for ages 81 to 114. (Adopted effective June 30, 2018.) |
| ***Disabled Post-Retirement:*** | RP-2014 Disabled Retiree Tables projected generationally with Scale MP-2017, with female and male rates multiplied by 117% for ages 45 to 99. (Adopted effective June 30, 2018.) |
| ***Beneficiary Post-Retirement:*** | RP-2014 Annuitant Tables projected generationally with Scale MP-2017, with female and male rates multiplied by 96% and 116%, respectively, for ages 50 to 114. (Adopted effective June 30, 2018.) |
| ***Pre-retirement:*** | RP-2014 White Collar Employee Tables projected generationally with Scale MP-2017, with female and male rates multiplied by 104% for all ages. (Adopted effective June 30, 2018.) |

## Summary of Assumptions and Methods *continued*

**Salary Increase Rates:**

The components include 2.50% inflation, plus merit and seniority increases. (Adopted effective June 30, 2018.) Salary increase rates are shown below for selected years of service.

| Service | Rate |
|---|---|
| 1 | 9.50% |
| 2 | 7.50% |
| 3 | 7.00% |
| 4 | 6.75% |
| 5 | 6.50% |
| 10 | 5.50% |
| 15 | 4.75% |
| 20 and above | 4.00% |

For a member who works 34 years, the assumed average salary increase over their career is 4.94% per year.

The actual average salary increase for teachers who were in full-time or regular part-time status at both June 30, 2018 and June 30, 2019 is 5.67%.

**Disability Rates:**

Shown below for selected ages (Adopted effective June 30, 2018.)

| Age | Male | Female |
|---|---|---|
| 25 | 0.01% | 0.03% |
| 30 | 0.01% | 0.04% |
| 35 | 0.02% | 0.06% |
| 40 | 0.03% | 0.07% |
| 45 | 0.05% | 0.10% |
| 50 | 0.10% | 0.18% |
| 55 | 0.14% | 0.20% |
| 60 | 0.18% | 0.27% |
| 65 | 0.25% | 0.30% |

## Summary of Assumptions and Methods *continued*

**Termination: Rates:**

Termination rates based on service, for causes other than death, disability, or retirement (Adopted effective June 30, 2018.)

| | Under 5 Years of Service | | 5 or More Years of Service | |
|---|---|---|---|---|
| Age | Male | Female | Male | Female |
| 25 | 7.0% | 6.5% | 3.0% | 5.0% |
| 30 | 6.5% | 7.0% | 3.0% | 4.8% |
| 35 | 8.0% | 7.5% | 1.5% | 3.0% |
| 40 | 10.0% | 8.0% | 1.8% | 1.5% |
| 45 | 11.0% | 8.0% | 1.3% | 1.3% |
| 50 | 12.0% | 8.0% | 1.3% | 1.5% |
| 55 | 11.5% | 11.8% | 2.0% | 2.0% |
| 60 | 15.0% | 14.0% | 3.0% | 2.5% |
| 65 | 30.0% | 30.0% | 3.0% | 3.0% |

**Retirement Rates:**

The following rates of retirement are assumed for active members hired before January 1, 2011 (Adopted effective June 30, 2018.):

| | Service | | | | |
|---|---|---|---|---|---|
| Age | 5 – 18 | 19 – 29 | 30 – 31 | 32 – 33 | 34+ |
| 54 | 0% | 7% | 8% | 40% | 45% |
| 55 | 0% | 7% | 8% | 40% | 45% |
| 56 | 0% | 7% | 8% | 40% | 45% |
| 57 | 0% | 7% | 10% | 40% | 45% |
| 58 | 0% | 7% | 10% | 40% | 40% |
| 59 | 0% | 30% | 35% | 60% | 40% |
| 60 | 20% | 30% | 40% | 60% | 40% |
| 61 | 17% | 30% | 40% | 50% | 40% |
| 62 | 15% | 30% | 40% | 50% | 40% |
| 63 | 15% | 30% | 40% | 50% | 40% |
| 64 | 22% | 40% | 45% | 50% | 40% |
| 65 | 25% | 40% | 45% | 50% | 40% |
| 66 | 25% | 40% | 45% | 50% | 40% |
| 67 | 20% | 40% | 45% | 50% | 45% |
| 68 | 20% | 40% | 40% | 50% | 45% |
| 69 | 25% | 40% | 40% | 50% | 45% |
| 70 | 100% | 100% | 100% | 50% | 30% |
| 71 | 100% | 100% | 100% | 50% | 30% |
| 72 | 100% | 100% | 100% | 50% | 30% |
| 73 | 100% | 100% | 100% | 50% | 30% |
| 74 | 100% | 100% | 100% | 100% | 30% |
| 75 | 100% | 100% | 100% | 100% | 100% |

## Summary of Assumptions and Methods *continued*

**Retirement Rates (continued):**

The following rates of retirement are assumed for active members hired on or after January 1, 2011:

| | Service | | | | |
|---|---|---|---|---|---|
| **Age** | **9 – 18** | **19 – 30** | **31** | **32 – 33** | **34+** |
| 61 and younger | 0% | 0% | 0% | 0% | 0% |
| 62 | 13% | 15% | 20% | 25% | 25% |
| 63 | 8% | 10% | 15% | 20% | 20% |
| 64 | 8% | 10% | 15% | 20% | 20% |
| 65 | 8% | 10% | 15% | 20% | 20% |
| 66 | 20% | 10% | 15% | 20% | 20% |
| 67 | 20% | 40% | 70% | 70% | 70% |
| 68 | 20% | 40% | 40% | 40% | 40% |
| 69 | 20% | 40% | 40% | 40% | 40% |
| 70 | 100% | 100% | 100% | 100% | 100% |

Inactive members with deferred vested benefits are assumed to retire upon reaching Normal Retirement age.

**Percent Married:**

For valuation purposes, 85% of members are assumed to be married. Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses.

**Inactive Vested Buyout:**

22% of eligible inactive vested members are assumed to receive a lump sum buyout now in lieu of an annuity at retirement. This is consistent with the assumptions used by the Illinois legislation and may be revised in the future as experience emerges.

**Automatic Annual Increase Buyout:**

15% of eligible retiring Tier I members are assumed to receive a lump sum buyout and a retirement annuity with automatic annual increases of 1.5% of the originally granted retirement benefit starting at the later of January 1 following age 67 and the first anniversary of retirement.

**Buyout Period:**

Buyouts are assumed to be paid through fiscal year 2022, at which point the total expected buyout amounts are projected to reach the assumed $650 million share apportioned for TRS.  No additional buyout payments are expected to be made once this limit is reached.

**Severance Pay:**

20% of retirees are assumed to receive severance pay and the average severance payment will be 10.0% of other pensionable earnings in the last year of employment. Other pensionable earnings may include payment for unused vacation days, unused sick or personal leave, retirement incentives, 403(b) or 457(b) contributions, and bonuses for performance, good attendance, longevity, etc. (Adopted effective June 30, 2018.)

## Summary of Assumptions and Methods *continued*

**Optional Service Purchases:**

The liability for retirement benefits for active members who have not previously purchased optional service is increased to cover the employer cost of out-of-system service purchased in the last two years prior to retirement. The amount purchased varies by the amount of regular service at retirement. Representative amounts purchased at retirement, and other assumptions used, are as follows (Adopted effective June 30, 2018.):

| Service | Maximum Service Purchase |
|---|---|
| 10 years | 0.107 years |
| 20 years | 0.445 years |
| 25 years | 0.752 years |
| 30 years | 0.841 years |
| 34 or more | None |

a. Actual optional service credit for each current member is provided by TRS;
b. No additional service purchases will be assumed for members who currently have optional service credit;
c. Members will not purchase service if it does not improve their pension benefit; and
d. When optional service is purchased within the last two years prior to retirement, 25% of the cost is covered by member payments and the remaining cost is the responsibility of the employer.

**Sick Leave Service Credit:**

The assumed unused and uncompensated sick leave service credit at retirement varies by the amount of regular service at retirement. Representative assumed amounts of unused and uncompensated sick leave service are as follows (Adopted effective June 30, 2018.):

| Service | Sick Leave Service Credit |
|---|---|
| 20 years | 0.953 years |
| 25 years | 1.137 years |
| 30 years | 1.376 years |
| 34 years | 1.387 years |
| 35 or more | None |

## Summary of Assumptions and Methods *continued*

**Future Normal Costs:**

Projected Normal Cost is based on an open group forecast with the number of active participants assumed to remain level for both full-time and substitute/hourly groups. The new entrants are assumed to enter the plan with the following demographic mix, based on previous plan experience, with new entrant salaries assumed to increase by 3.25% per annum:

Full-Time and regular part-time:

| | Male | | Female | |
|---|---|---|---|---|
| **Age** | **Salary** | **Proportion** | **Salary** | **Proportion** |
| 22 | $44,325 | 5.5% | $43,761 | 29.1% |
| 27 | 47,547 | 7.0 | 48,537 | 28.4 |
| 32 | 52,014 | 3.3 | 51,597 | 10.6 |
| 37 | 56,648 | 1.8 | 52,552 | 5.0 |
| 42 | 59,139 | 1.0 | 52,230 | 2.8 |
| 47 | 59,346 | 0.6 | 53,400 | 1.9 |
| 52 | 61,768 | 0.4 | 55,336 | 1.2 |
| 57 | 62,246 | 0.2 | 56,264 | 0.6 |
| 62 | 55,628 | 0.1 | 56,851 | 0.3 |
| 67 | 67,291 | 0.1 | 60,818 | 0.1 |

Substitutes, part-time, and hourly-paid:

| | Male | | Female | |
|---|---|---|---|---|
| **Age** | **Salary** | **Proportion** | **Salary** | **Proportion** |
| 22 | $19,204 | 6.5% | $20,383 | 17.8% |
| 27 | 20,653 | 7.7 | 19,622 | 15.2 |
| 32 | 20,360 | 3.5 | 18,189 | 8.5 |
| 37 | 21,661 | 1.6 | 16,151 | 7.7 |
| 42 | 19,964 | 1.3 | 16,031 | 8.0 |
| 47 | 18,330 | 1.4 | 15,773 | 6.7 |
| 52 | 18,143 | 1.2 | 15,799 | 4.1 |
| 57 | 16,778 | 1.2 | 16,459 | 2.4 |
| 62 | 16,480 | 1.2 | 16,881 | 1.5 |
| 67 | 15,836 | 1.0 | 15,891 | 0.9 |
| 70 | 15,554 | 0.4 | 15,175 | 0.2 |

## Summary of Assumptions and Methods *continued*

| | |
|---|---|
| **2.2 Updated Assumption:** | For those active members who have already made a payment to upgrade past service prior to June 30, 1998, their benefits are based on their upgrading at the valuation date. For all other active members, they are assumed to upgrade at retirement. |
| **Tier II Pay Cap Increase:** | 1.25% per annum (Adopted effective June 30, 2016.) |
| **Tier II COLA Increase:** | 1.25% per annum (Adopted effective June 30, 2016.) |
| **Census and Assets:** | The current actuarial valuation was based on the latest membership data available, which was submitted by the System for active, inactive and retired members as of the prior valuation date. The valuation assumptions were used to project results to account for the one-year difference in the census date and the valuation date. Any change in liability due to changes in census between the collection date of the census information and the valuation date is captured in the next actuarial valuation. |
| **Administrative Expenses:** | $31,439,548 of administrative expenses is expected to be paid for the year beginning July 1, 2020. $40,892,235 of administrative expenses is expected to be paid for the year beginning July 1, 2021 and each year thereafter, increased by the rate at which payroll is expected to increase |
| **Asset Valuation Method:** | The actuarial value of assets for funding and to determine the Actuarially Determined Contribution is based on the fair value of assets with a five-year phase-in of actual investment return in excess of (or less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the actuarial value of assets (adjusted for receipts and disbursements during the year). The actual investment return for this purpose is determined net of all investment and administrative expenses. For GASB 67 and 68, the fair value of assets is used. |
| **Actuarial Cost Method:** | Projected Unit Credit (adopted by statute June 30, 1989) is used for funding purposes. Under this method, the projected benefits of each individual included in the valuation are allocated by a consistent formula to valuation years. The actuarial present value of benefits allocated to a valuation year is called the normal cost. The actuarial present value of benefits allocated to all periods prior to a valuation year is called the accrued liability.<br><br>Entry Age Normal is used for GASB 67 and 68 purposes and to determine the Actuarially Determined Contribution ("Board-Adopted Actuarial Funding Policy"), based upon the funding policy adopted by the Board. Under this method, a normal cost is calculated for each employee that is the level annual contribution as a percent of pay required to be made from the employee's date of hire for as long as he/she remains active so that sufficient assets will be accumulated to provide his/her benefit. The accrued liability is the difference between the present value of all future benefits and the present value of all future normal costs. |

## Summary of Assumptions and Methods *continued*

| | |
|---|---|
| **Amortization Period and Method:** | For funding purposes under the Illinois Pension Code, the unfunded liability is not explicitly amortized. The employer contribution is the amount which, as a level percentage of member payroll, will result in the System being 90% funded by June 30, 2045. For the Board-Adopted Actuarial Funding Policy, the amortization of the unfunded accrued liability is a closed 20-year period effective June 30, 2015, and declines by one year in each subsequent valuation. Sources of unfunded actuarial accrued liability that emerge in subsequent valuations are amortized over 20-year closed periods. Contributions toward the unfunded actuarial accrued liability increase by 2% each year, the estimate of increase in future State revenue growth. |

## Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

| | |
|---|---|
| **Membership:** | Employers of the System include:<br>• The Illinois public common school districts outside of Chicago,<br>• Certain state agencies employing certified teachers, and<br>• The State Board of Education, Illinois School Board Association, statewide and national teacher organizations, educational cooperatives and the retirement system.<br>Employees covered under the System include:<br>• Any educational, administrative, professional or other staff employed in the public common schools outside the City of Chicago in a position requiring certification under the teacher certification law, including substitute teachers, part-time teachers, and hourly paid teachers who are on a flexible work schedule;<br>• Any position requiring teacher certification in certain state agencies;<br>• Any regional superintendent of schools, assistant regional superintendent of schools, State Superintendent of Education; any person employed by the State Board of Education as an executive; any executive of the boards engaged in the service of public common school education in school districts covered under this system of which the State Superintendent of Education is an ex-officio member;<br>• Any employee of a school board association who is certificated under the teacher certification law;<br>• Any person employed by the retirement system who was an employee of and a member in the system on August 17, 2001 or becomes an employee of the system on or after August 17, 2001;<br>• Any educational, administrative, professional or other staff employed by and under the supervision and control of a regional superintendent of schools, provided such employment position requires the person to be certificated under the teacher certification law;<br>• Any educational, administrative, professional or other staff in a certificated position employed by a program serving two or more school districts in accordance with a joint agreement authorized by the School Code or by federal legislation;<br>• Any officer or employee of a statewide teacher organization or officer of a national teacher organization who is certified under the teacher certification law, provided the member had previously established creditable service under TRS and files an irrevocable election for TRS membership before January 5, 2012, and does not receive credit under any other article of the pension code; and |

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Membership (continued):** | • Any educational, administrative, professional, or other staff employed in a charter school that is certificated under the teacher certification law.<br><br>Employment on a full-time basis covers only teachers whose normal employment schedule consist of working at least four clock hours daily, five days per week. Employment on a part-time basis covers teachers who are employed less than four clock hours daily or less than five days per week. A substitute teacher is employed on temporary basis to replace another teacher.<br><br>Creditable service rendered as an employee for a regular school year in any district, in accordance with the provisions of the Pension Code, is equal to one year of service, and time less than a legal year is counted as such portion of a year as the number of days taught bears to 170 days. Additionally, members may purchase various types of optional service credit.<br><br>"Tier II" means a member, or a benefit provision, that applies to a member who first contributed to TRS on or after January 1, 2011, and has no preexisting creditable service with a reciprocal pension system prior to January 1, 2011. "Tier I" means all other members and applicable benefit provisions.<br><br>For determining both member benefits and contribution amounts, salary for Tier II is capped at a limit that is tied to the Consumer Price Index. The initial limit was $106,800 as of January 1, 2011. The limit increases in each subsequent year by an amount equal to the then current limit times the lesser of 3% or one-half the percentage increase in CPI-U as of the preceding September.<br><br>"Final average salary" means for Tier I the average salary for the highest four consecutive years within the last 10 years of creditable service, as determined under the rules of the Board. For Tier II, final average salary is for the highest eight consecutive years within the last 10 years. |
| **Normal Retirement:** | All members of the Fund are required to contribute 9% of salary to the Fund as follows: 7% for the retirement pension, 1% for the spouse's pension, and 1% for the automatic increases in the retirement pension. In addition, employees are required to contribute $3.60 per month toward the cost of the single sum death benefit. |
| **Tiers:** | Tier I: First hired before January 1, 2011.<br>Tier II: First hired on or after January 1, 2011. |

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Retirement Pension:** | |
| ***Eligibility:*** | *Tier I:* Age 60 with 10 years of service, or age 62 with 5 years of service<br>*Tier II:* Age 67 with 10 years of service |
| ***Amount:*** | *Tier I:* For members who first became a teacher before July 1, 2005, the annual benefit amount is the greatest of (i), (ii) and (iii) below. For members who first became a teacher on or after July 1, 2005, the annual benefit amount is the greater of (i) and (ii) below.<br>*Tier II:* The annual benefit is the amount under (i) below.<br>(i) For service earned before July 1, 1998, 1.67% of final average salary for each of the first 10 years of creditable service, plus 1.90% of final average salary for each year in excess of 10 but not exceeding 20, plus 2.10% of final average salary for each year in excess of 20 but not exceeding 30, and 2.30% of final average salary for each year in excess of 30. For all other service, 2.2% of final average salary.*<br>(ii) 1½% of final average salary for each year of creditable service, plus $7.50 per year for each of the first 20 years of creditable service.<br>(iii) An actuarially equivalent life annuity, resulting from the member's contributions and State-matching contributions (1.4 times member contributions) plus compound interest on both.<br>Maximum amount under (i) and (ii) above is 75% of final average salary. |
| **Early Retirement:** | |
| ***Eligibility:*** | *Tier I:* Age 55 with 20 years of service<br>*Tier II:* Age 62 with 10 years of service |
| ***Amount:*** | *Tier I:* Equal to the amount computed under normal retirement, reduced by 6% for each year the member is under age 60. There is no reduction for a member who retires prior to age 60 with 35 years of credited service.<br>*Tier II:* Equal to the amount computed under normal retirement, reduced by 6% for each year the member is under age 67. |

* Service earned before July 1, 1998 can be upgraded to 2.2% through additional member contributions of 1% of the member's highest salary within the last four years for each year of prior service. Maximum payment is 20% of salary, but all years are upgraded. The number of years to be upgraded is reduced by one for each three full years worked under the 2.2% formula. The 2.2% formula upgrade cost is reduced on a sliding scale for members who have more than 34 years of service credit.

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Rule of 85 for State Employees:** | A Tier I employee of a state agency retiring on or after January 1, 2001 is entitled to a non-discounted annuity if his or her attained age at retirement and total creditable service equal at least 85, provided he or she has (i) earned during the period immediately preceding the last day of service at least one year of contributing creditable service as a state employee and (ii) has earned at least 5 years of contributing creditable service as a state employee. |
| **Single Sum Benefit:** | |
| ***Eligibility:*** | Age 65 with fewer than 5 years of creditable service after July 1, 1947 |
| ***Amount:*** | Lump sum payment actuarially equivalent to a life annuity consisting of 1.67% of final average salary for each year of service. |
| **Temporary Disability Benefit:** | |
| ***Eligibility:*** | 3 years of credited service |
| ***Amount:*** | Equal to 40% of the member's most recent annual contract salary at time of disablement. The benefit is payable beginning with the 31st day after disablement and ending at the earlier of (1) cessation of disability, (2) when the member requests termination of the benefit, (3) when the period for which payments have been made equals one-fourth the period of creditable service, or (4) the member is gainfully employed or able to be gainfully employed. |
| **Disability Retirement Benefit:** | |
| ***Eligibility:*** | Termination of temporary disability benefit, provided member remains disabled |
| ***Amount:*** | The greater of:<br>(a) 35% of the member's most recent annual contract salary, or<br>(b) the benefit payable for normal retirement, but reduced by 1/2% for each month by which the member is less than age 60, or age 55 if the member has 20 years of service.<br>Other formulas may be applicable if disability retirement occurred prior to July 1, 1971. |
| **Occupational Disability:** | |
| ***Eligibility:*** | Totally and immediately incapacitated for the performance of duty |
| ***Amount:*** | Equal to 60% of salary, if disability is duty-connected or occupational adjudicated by the Illinois Industrial Commission as compensable under either the Workers' Compensation or Occupational Diseases Act. Any amounts payable under these Acts shall be applied as an offset to any occupational disability benefits payable by the Teachers' Retirement System. In general, benefits are payable throughout the period of disability. |

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Deferred Vested Benefits:** | |
| ***Eligibility:*** | *Tier I:* 5 years of service<br>*Tier II:* 10 years of service |
| ***Amount:*** | *Tier I:* Equal to the amount computed under normal retirement deferred to age 62, if the member has less than 10 years of service. With 10 or more years of service, the annuity is payable at age 60.<br>*Tier II:* Equal to the amount computed under normal retirement, payable at age 67, or in a reduced amount as early as age 62. The reduction is 6% for each year the member is under age 67. |
| **Reversionary Retirement Annuity:** | Any member entitled to a retirement annuity for age may elect to receive a reduced annuity with the remainder determined on an actuarial basis to become, upon the member's death, an annuity for life to any designated person dependent upon the member at the time of the member's retirement, provided such payment shall not be less than $10 nor more than the amount of reduced age retirement monthly annuity to which the member is entitled. |
| **Refund of Contributions:** | A member who ceases to be a member for any reason other than death or retirement, shall be entitled to a refund of all retirement contributions and payments made into the System by the member which have not previously been refunded, without interest thereon. |
| **Death Benefit:** | Refund of the deceased member’s accumulated contributions are paid to survivors or to the member’s estate. Additional lump sum death benefits are also payable: |

| | Types of Beneficiaries | |
|---|---|---|
| **Time of Death** | **Dependents** | **Non-dependents** |
| While employed | Lump sum up to last salary **or** $1,000 and a monthly benefit generally not less than $400* or $600 with minor children** | Lump sum up to last salary |
| Inactive within 12 months of last day of credit | Lump sum up to last salary **or** $1,000 and a monthly benefit generally not less than $400* or $600 with minor children** | Lump sum up to last salary |
| Inactive with 20 or more years of service | Lump sum of $3,000 or 1/6 of last salary*** **or** $1,000 and a monthly benefit generally ½ for Tier I and 2/3 for Tier II of member’s earned benefit at time of death | Lump sum of $3,000 or 1/6 of last salary*** |
| Annuitant | Lump sum of $3,000 or 1/6 of last salary*** **or** $1,000 and a monthly benefit generally ½ for Tier I and 2/3 for Tier II of annuitant’s earned benefit at time of death | Lump sum of $3,000 or 1/6 of last salary*** |

* *Certain circumstances might provide a monthly annuity less than $400 per month for an active member.*

** *TRS will pay 50 percent of the member’s earned retirement annuity at death if it is greater than the above amounts.*

*** *Certain lump sums may be greater if the annuitant or inactive member has been in retirement or out of service for less than five years.*

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Automatic Postretirement Benefit Cost-of-Living Adjustment:** | |
| ***Eligibility:*** | Member contributed for at least an equivalent period of one full year of creditable service after July 1, 1969 |
| ***Amount:*** | For Tier I, initial increase of 1½% of base annuity for periods prior to January 1, 1972, 2% for periods from and after January 1, 1972 and prior to January 1, 1978, and 3% for periods thereafter (such periods to exclude any period of retirement that precedes attainment of age 55). Initial increase payable effective with the later of: January 1 following first anniversary of retirement; or January 1 following attainment of age 61.<br><br>Following the initial increase, automatic annual increases payable on each January 1 thereafter. Prior to January 1, 1990, annual increases were determined as a percentage of the original retirement annuity. Effective on and after January 1, 1990, automatic annual increases granted to eligible annuitants equal 3% of the total annuity being received, including previous increases granted.<br><br>For Tier II retirement and deferred vested benefits, the annual increase is equal to the original granted annuity benefit times the lesser of 3% or one-half the increase in the CPI-U as of the preceding September. The initial increase is effective January 1 after the later of attaining age 67 or the first anniversary of the annuity starting date.<br><br>For Tier I and Tier II disability benefits, the initial increase is generally 7% effective January 1 following the fourth anniversary of the initial payment and 3% annually thereafter of the then current benefit amount.<br><br>For Tier I and Tier II survivor benefits, the initial increase is effective January 1 following the first anniversary of the initial survivor payment, or after the survivor benefit has been granted benefits for survivors of annuitants, and annually thereafter. The Tier I increase is 3% of the then current benefit. The increase for Tier II is the lesser of 3% or one-half the percentage increase in CPI-U as of the preceding September of the original benefit amount. |

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Member Contributions:** | Beginning July 1, 1998, contributions for creditable service are made at the rate of 8% (exclusive of the 1% Survivor Benefit Contribution) of salary which is comprised of a rate of 7½% of salary towards the cost of the retirement annuity plus ½% of salary toward the cost of the automatic annual increase in retirement annuity.<br><br>Beginning July 24, 1959, each member contributes an additional 1% of salary toward Survivor's Benefits. These contributions are subject to refund if there is no dependent beneficiary at retirement, provided the member elects such refund.<br><br>Beginning July 1, 1995, each member not employed by a State agency contributes to the Teachers' Health Insurance Security Fund, administered by the Department of Central Management Services. These contributions are not refundable and do not become part of the System's assets.<br><br>Additional contributions as are necessary to receive credit for service during which contributions were not made, such as military service or service outside the System. |
| **Net Benefit Increases:** | The term "new benefit increase" means an increase in the amount of any benefit provided by the statute, or the expansion of the eligibility requirements for any benefit provided by the statute, resulting from an amendment that takes place on or after June 1, 2005.<br><br>Every new benefit increase must have an identified funding source whose adequacy is verified and periodically confirmed by the Commission on Government Forecasting and Accountability (CGFA).<br><br>Every new benefit increase will automatically expire at the earlier of (i) five years after its effective date; (ii) at an earlier time specified in the amendment creating the benefit; or (iii) at the end of the fiscal year in which CGFA certifies that the identified funding source is inadequate; except that any new benefit increase will continue to apply to persons who applied for and qualified for the increase while it was in effect, and except that any new benefit increase may be extended or recreated by the General Assembly (subject to the adequacy of the funding source). |
| **Sick Leave Service Accruals:** | Any unused and uncompensated accumulated sick leave is counted as creditable service provided that each former employer certifies to the System the number of unused and uncompensated accumulated sick leave days upon termination of the member. The service granted is the ratio of the number of unused and uncompensated accumulated sick leave days to 170 days, subject to a maximum of two years of service credit. The period of sick leave shall not be considered in determining the effective date of retirement. |

## Summary of Plan Provisions *continued*

| | |
|---|---|
| **Guaranteed Minimum Benefit:** | For members who make a small qualifying contribution, a minimum benefit of $25 per month per year of service, up to a maximum of $750 per month with 30 years of service, is paid. An alternate minimum retirement annuity of $200 per month, applicable to members with at least 10 years of service, is described under 40 ILCS 5/16-136.3. The minimum benefit is payable to the extent that funds are available under the Minimum Retirement Annuity Reserve established under 40 ILCS 5/16-186.3. The Minimum Retirement Annuity Reserve is credited with qualifying contributions made by annuitants, amounts contributed by the state that are sufficient to assure payment, and interest. The reserve is charged with the minimum benefit payments.<br><br>The portion of the retiree's benefit that is below the minimum is paid from the Benefit Trust Reserve. Only the difference between that amount and the minimum is paid from the Minimum Retirement Annuity Reserve. |
| **Inactive Vested Buyout:** | Provides inactive vested members an option to receive an immediate lump sum in exchange for their annuity at retirement. The lump sum would be equal to 60% of the present value of future benefits. Effective for fiscal year ended June 30, 2019 to fiscal year ending June 30, 2021, subsequently extended to fiscal year ending June 30, 2024 by PA 101-0010 (SB 1814) – Budget Implementation Bill. |
| **Automatic Annual Increase Buyout:** | The automatic annual increase buyout provision gives Tier I members the option to receive a lump sum at retirement in exchange for having their automatic annual increase based on 1.5% of the originally granted annuity effective at the later of January 1 following age 67 or the first anniversary of retirement. The lump sum would be equal to 70% of the difference between the present value of benefits based on the Tier I automatic annual increase and the 1.5% automatic annual increase of the originally granted annuity. Effective for fiscal year ended June 30, 2019 to fiscal year ending June 30, 2021, subsequently extended to fiscal year ending June 30, 2024 by PA 101-0010 (SB 1814) – Budget Implementation Bill. |

## Definitions of Terms

The following list defines certain technical terms for the convenience of the reader:

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| **Actuarial Accrued Liability for Actives:** | The equivalent of the accumulated normal costs allocated to the years before the valuation date. |
| **Actuarial Accrued Liability for Pensioners:** | The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits. |
| **Actuarial Cost Method:** | A procedure 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 that are used to determine the Actuarially Determined Contribution. |
| **Actuarial Gain or 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., TRS's assets earn more than projected, salary increases are less than assumed, participants 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 yield in actuarial liabilities that 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. |
| **Actuarially Equivalent:** | Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions. |
| **Board-Adopted Actuarial Funding Policy:** | The term given to the Board's funding policy. The contribution determined under the Board-Adopted Actuarial Funding Policy is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability. The amortization of the unfunded accrued liability is a closed 20-year period effective June 30, 2015, and will decline by one year in each subsequent valuation. Sources of unfunded actuarial accrued liability that emerge in subsequent valuations are amortized over 20-year closed periods. Contributions toward the unfunded actuarial accrued liability increase by 2% each year, the estimate of increase in future State revenue growth. The actuarial cost method is the entry age method. The minimum contribution is the normal cost. |

## Definitions of Terms *continued*

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| **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. Each such amount or series of amounts is:<br>a. Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)<br>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<br>c. Discounted according to an assumed rate (or rates) of return to reflect the time value of money. |
| **Actuarial Present Value of Future Plan Benefits(APV):** | The Actuarial Present Value of benefit amounts 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, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active participant, retired participants, beneficiaries receiving benefits, and inactive participants entitled to either 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. |
| **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 Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL). |
| **Actuarial Value of Assets:** | The value of the System'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 plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC. |
| **Actuarially Determined:** | Values that 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. |
| **Actuarially Determined Contribution (ADC):** | The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Board's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment. |

## Definitions of Terms *continued*

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| **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 participants will increase. |
| **Amortization Payment:** | The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability. |
| **Assumptions or Actuarial Assumptions:** | The estimates on which the cost of the System is calculated including:<br>(a) Investment return — the rate of investment yield that the System will earn over the long-term future;<br>(b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;<br>(c) Retirement rates — the rate or probability of retirement at a given age;<br>(d) Turnover rates — the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement;<br>(e) Salary increase rates — the rates of salary increase due to inflation and productivity growth. |
| **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 Open Amortization Period. |
| **Decrements:** | Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination. |
| **Defined Benefit Plan:** | A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service. |
| **Defined Contribution Plan:** | A 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, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance. |
| **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. |

## Definitions of Terms *continued*

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| **Experience Study:** | A periodic review and analysis of the actual experience of the System that 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. |
| **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 fair value of assets (FVA), rather than the AVA, as another measure of the Plan's health. |
| **GASB 25 and GASB 27:** | Governmental Accounting Standards Board Statements No. 25 and No. 27. 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. 27 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 25 sets the rules for the systems themselves. |
| **GASB 67 and GASB 68:** | Governmental Accounting Standards Board Statements No. 67 and No. 68 are the successor statements to GASB Statements No. 25 and No. 27. |
| **Investment Return:** | The rate of earnings of the System from its investments, including interest, dividends, and capital gain and loss adjustments, computed as a percentage of the average value of the System. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next. |
| **Net Pension Liability (NPL):** | The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position. |
| **Normal Cost:** | That portion of the Actuarial Present Value of plan benefits and expenses 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 that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. |
| **Open Amortization Period:** | An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. 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, if the actuarial assumptions are realized. |
| **Plan Fiduciary Net Position:** | Fair value of assets. |

## Definitions of Terms *continued*

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| **Total Pension Liability (TPL):** | The actuarially accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68. |
| **Unfunded Actuarial Accrued Liability (UAAL):** | 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. |
| **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. |

## History of Legislative Changes

The following list defines certain technical terms for the convenience of the reader:

The actuarial cost method utilized is the projected unit credit cost method, which became effective with the June 30, 1989 valuation. Administrative expenses have been a component of the normal cost rate since the June 30, 1994 valuation. The financing objective under Article 16 of the Illinois Pension Code is to meet the cost of maintaining and administering the system on a 90% funded basis by June 30, 2045. Following is a brief summary of the changes in funding requirements.

- Public Act 88-0593, enacted in 1994, established a fifty-year funding plan for fiscal years 1996 through 2045. It required a fifteen-year ramp period of gradually increasing State contributions followed by a 35-year period of State contributions at a level percent of pay.
- Public Act 90-0448, enacted in 1997, required the System's assets to be valued at fair value instead of book value.
- Public Act 90-0582, enacted in 1998, changed the defined benefit formula and added minimum state contribution rates in fiscal year 1999 that remained in effect through fiscal year 2004.
- Public Act 93-0002, enacted in 2003, provided pension obligation bond proceeds and placed upper limits on State contributions beginning with the State contribution due for fiscal year 2005.
- Public Act 94-0004, enacted in 2005, removed the money purchase formula for new hires, added new employer contributions for excess salary increases and sick leave, specified the level of state contributions for fiscal years 2006 and 2007, and required a return to the statutory funding plan in fiscal year 2008.
- Public Act 94-1057, enacted in 2006, contained exemptions from some of the new employer contribution requirements enacted in 2005.
- Public Act 96-0043, enacted in 2009, required the use of a smoothed actuarial value of assets beginning with the June 30, 2009 valuation.
- Public Act 96-0889, enacted in 2010, established Tier II provisions.
- Public Act 96-1511, enacted in 2011, required the state retirement systems to recertify their fiscal year 2011 state funding requirements and assume the Tier II benefits of Public Act 96-0889 were in effect on June 30, 2009.
- Public Act 97-0694, enacted in 2012, required the auditor general to hire an actuary to serve as the State Actuary.
- Public Act 98-0042, enacted in 2013, provided that the Early Retirement Option terminate on June 30, 2016. Due to the expiration of the program, active members become eligible for refunds of their early retirement contributions during fiscal year 2017.
- Public Act 98-0674, enacted in 2014 as part of the budget implementation bill, requires the state and federal contribution rates to TRS to be the same.

## History of Legislative Changes *continued*

- Public Act 99-0232, enacted in 2015, requires the actuaries of the state-funded retirement systems to conduct experience analyses every three years instead of every five years.
- Public Act 100-0023, enacted in 2017 as part of the budget implementation bill, creates a Tier III hybrid benefit plan.
- Public Act 100-0340, enacted in 2017, requires employer contributions from Federal funds to be based on the total employer normal cost rate instead of the State contribution rate, beginning July 1, 2017.
- Public Act 100-0587, enacted in 2018, creates two new buyout provisions for TRS members, an inactive vested buyout and an automatic annual increase buyout, which will exist until June 30, 2021.
- Public Act 101-0010, enacted in 2019, extends the Automatic Annual Increase and Inactive Vested buyouts through fiscal year ending June 30, 2024, in addition to repealing the 3% "FAS Cap" threshold (reverting back to 6% threshold).

A more complete history of legislative changes can be found at the following link:
**https://www.trsil.org/sites/default/files/documents/history.pdf**

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