Teachers' Retirement System of the State of Illinois

Actuarial Valuation and Review of Pension Benefits as of June 30, 2019

January 10, 2020

Segal Consulting

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

Ladies and Gentlemen:

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, 2019, 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 June 2019 Board meeting. Based upon recent experience and the expectation that the funds available for the automatic annual increase and inactive buyouts are limited to $650 million, the buyout assumptions used for this valuation have been modified. 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 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 ending June 30, 2019, the actuarial experience of TRS was unfavorable, generating a net actuarial loss of $942 million (0.7% of the actuarial accrued liability). This loss is the net result of a $590 million loss due to unfavorable investment return experience and a $352 million net loss due to demographic experience for fiscal 2019.

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 Consulting, a Member of the Segal Group

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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, 2019, there were 990 employers, comprised of 851 local school districts, 127 special districts, and 12 state agencies. The membership totaled over 423,000 members as of June 30, 2018. Of the 423,000 members, 123,000 are retirees and survivors to whom TRS paid over $6.8 billion during the fiscal year ending June 30, 2019. As of June 30, 2019, the assets of TRS amounted to $53.3 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 2019 by the State, as required by the Illinois Pension Code, was insufficient to reduce the unfunded actuarial accrued liability.

2. Public Act 100-0587, enacted on June 4, 2018, created two new buyout provisions for TRS members: an inactive vested buyout and an automatic annual increase buyout, which were to exist until June 30, 2021. PA 101-0010 (SB 1814) – Budget Implementation Bill extended both buyout programs to June 30, 2024. The remaining pension obligation bond proceeds that fund the buyouts are limited to $1 billion for all Systems ($650 million of which is TRS' assumed share) and the programs are assumed to end when the buyouts reach this amount.

   The inactive vested buyout provision gives 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.

   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.

   Using the same assumptions as the Illinois legislation, initially, 22% of eligible inactive vested members and 25% of eligible retiring Tier 1 members were assumed to elect the inactive vested buyout and automatic annual increase buyout, respectively. Based upon actual experience to date and future expectation, the percentage of eligible retiring Tier 1 members who are assumed to elect the automatic annual increase buyout was reduced from 25% to 15% effective for this valuation. These assumptions may be revised in the future as experience continues to emerge.

   This valuation assumes these buyout programs are effective through fiscal year 2022, at which point the total expected buyout amounts is projected to reach the assumed $650 million share apportioned for TRS.

3. Public Act 100-0587 also revised the so-called "FAS Cap" threshold from 6% to 3%. That is, if a teacher's salary increases by more than 3% and that salary is used to determine final average salary, the employer must now pay for the cost of benefits due to the salary increase above 3% (previously above 6%). PA 101-0010 (SB 1814) – Budget Implementation Bill repealed the 3% "FAS Cap" threshold. This valuation reflects the 6% "FAS Cap" threshold.

4. The total projected employer contribution for 2021, including State, Federal, and School Districts, is $5.24 billion. Of this amount, $1.17 billion, or about 22%, is for the employer portion of the normal cost and $4.07 billion, or about 78%, is for unfunded actuarial accrued liability. The required State contribution for 2021 is $5.14 billion, an increase from $4.81 billion for 2020.

5. The funded ratio based on the actuarial value of assets over the actuarial accrued liability as of June 30, 2019, was 40.6%, compared to 40.7% as of June 30, 2018. This ratio is a measure of funded status, and its history is a measure of funding progress.

6. For the year ended June 30, 2019, Segal has estimated that the asset return on a fair value basis was 5.10%. After gradual recognition of previous investment gains and losses under the actuarial smoothing method, the actuarial rate of return was 5.84%. This represents an experience loss when compared to the assumed rate of 7.00%. As of June 30, 2019, the actuarial value of assets ($53.4 billion) represented 100.2% of the fair value ($53.3 billion).

7. The investment loss on the actuarial value of assets for the year ended June 30, 2019, was $590 million. The demographic and liability experience resulted in a $352 million loss (0.3% of actuarial accrued liability), largely due to unfavorable retirement experience.

8. As page 22 of this report indicates, the total investment loss not yet recognized as of June 30, 2019, is $129 million. 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.

9. As mentioned above, the current method used to determine the actuarial value of assets yields an amount that is 100.2% of the fair value of assets as of June 30, 2019. 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.

10. The System's cash flow (contributions minus benefit payments, refunds, and expenses) as a percentage of the fair value of assets was -2.5% as of June 30, 2019, compared to -2.8% from the prior year. Negative cash flow drains the assets of the System without investment income and may cause suboptimal investment strategies.

11. This actuarial valuation report as of June 30, 2019, is based on financial data as of that date. Changes in the value of assets subsequent to that date are not reflected.

12. 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 $77.9 billion as of June 30, 2018, to $81.1 billion as of June 30, 2019. 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, 2019	June 30, 2018
Present Value of Future Benefits:		
1. Active members	$64,201,943,307	$62,948,473,760
2. Retired members and beneficiaries receiving benefits	85,788,805,976	82,968,464,565
3. Inactive members with deferred benefits	3,537,804,681	3,161,375,282
4. Total: (1) + (2) + (3)	$153,528,553,964	$149,078,313,607
Actuarial Accrued Liability:		
1. Active members	$42,130,358,296	$40,889,490,317
2. Retired members and beneficiaries receiving benefits	85,788,805,976	82,968,464,565
3. Inactive members with deferred benefits	3,537,804,681	3,161,375,282
4. Total: (1) + (2) + (3)	$131,456,968,953	$127,019,330,164
Funded Status:		
1. Actuarial accrued liability	$131,456,968,953	$127,019,330,164
2. Actuarial value of assets (AVA)	53,391,192,733	51,730,889,960
3. Unfunded actuarial accrued liability (AVA basis): (1) – (2)	$78,065,776,220	$75,288,440,204
4. Funded ratio (AVA basis): (2) / (1)	40.6%	40.7%
5. Fair value of assets (FVA)	$53,262,789,367	$51,969,546,694
6. Unfunded actuarial accrued liability (FVA basis): (1) – (5)	78,194,179,586	75,049,783,470
7. Funded ratio (FVA basis): (5) / (1)	40.5%	40.9%
Summary of State Contributions for Fiscal Year:	**2021**	**2020**
1. Based on Statutory Funding Plan	$5,140,736,721	$4,813,577,696
2. Based on Board-Adopted Actuarial Funding Policy	8,344,196,301	7,878,670,709
3. Difference between Board-Adopted Actuarial Funding Policy and Statutory Funding: (2) – (1)	$3,203,459,580	$3,065,093,013
4. Normal cost rate based on Statutory Funding Plan		
(a) Total (including administrative expenses)	19.41%	19.66%
(b) Member rate	9.00%	9.00%
(c) Employer: (4a) – (4b)	10.41%	10.66%

Summary of Key Valuation Results (continued)

	June 30, 2019	June 30, 2018
Summary of State Contributions for Fiscal Year (continued):	**2021**	**2020**
5. Total normal cost based on Statutory Funding Plan		
(a) Total	$2,145,060,808	$2,124,293,223
(b) Administrative expenses	31,439,548	28,833,052
(c) Expected member contributions	1,009,317,615	985,912,521
(d) Total employer normal cost: (5a) + (5b) – (5c)	$1,167,182,741	$1,167,213,754
GASB information:		
1. Long-term expected rate of return	7.00%	7.00%
2. Municipal bond index*	3.50%	3.87%
3. Single equivalent discount rate	7.00%	7.00%
4. Total pension liability	$134,370,954,628	$129,914,383,296
5. Plan fiduciary net position	53,262,789,367	51,969,546,694
6. Net pension liability: (4) – (5)	$81,108,165,261	$77,944,836,602
7. Plan fiduciary net position as a percentage of total pension liability: (5) / (4)	39.6%	40.0%
Demographic data used for valuation as of June 30:**	**2018**	**2017**
1. Number of active member		
(a) Full-time and regular part-time	134,160	133,761
(b) Substitute, part-time, and hourly paid	26,592	26,664
(c) Total	160,752	160,425
2. Number of inactive member		
(a) Eligible for deferred annuities	19,726	19,531
(b) Eligible for refunds or single sum benefits only	119,833	119,738
3. Number of annuitants	122,895	120,453
4. Total membership: (1c) + (2a) + (2b) + (3)	423,206	420,147
5. Annual salaries		
(a) Full-time and regular part-time	$9,807,965,387	$9,610,001,605
(b) Substitute, part-time, and hourly paid	154,944,377	152,390,955
(c) Total	$9,962,909,764	$9,762,392,560
6. Annual annuities	$6,639,967,327	$6,336,471,817

* *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% 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.**

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

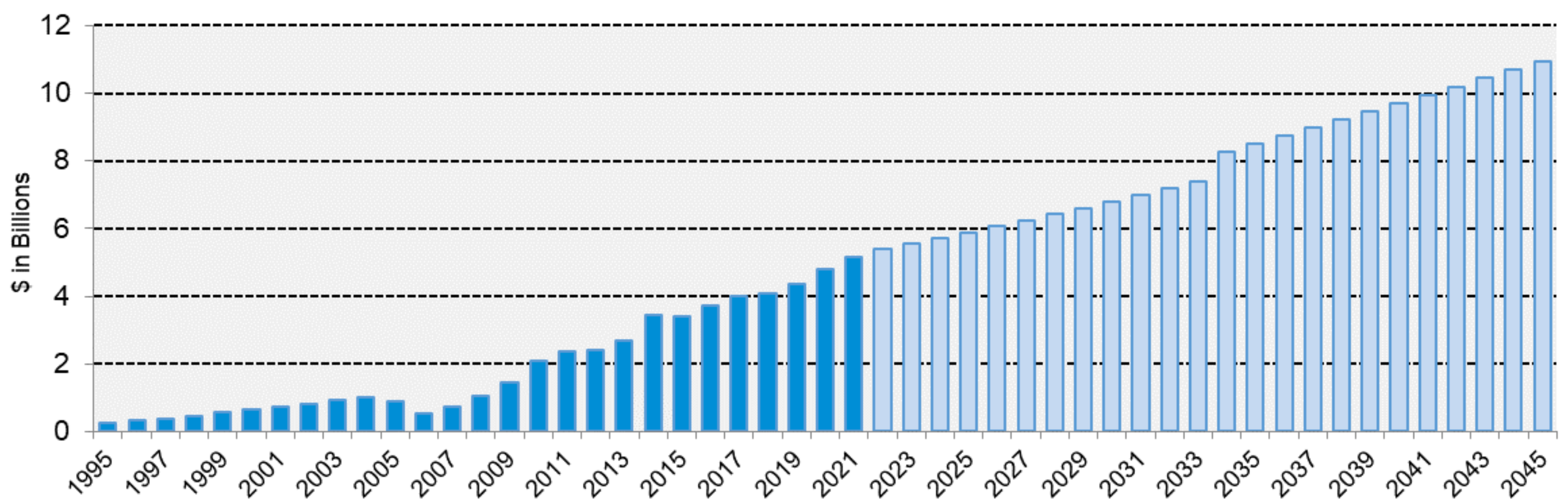
- Establishing a 50-year period in 1994, over which to amortize the Unfunded Actuarial Accrued Liability
- Back loading the 50-year period by requiring a 15-year period to ramp up to full contributions as determined under the Illinois funding policy
- Setting a funding target of 90% of the actuarial 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
- 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.

CHART A

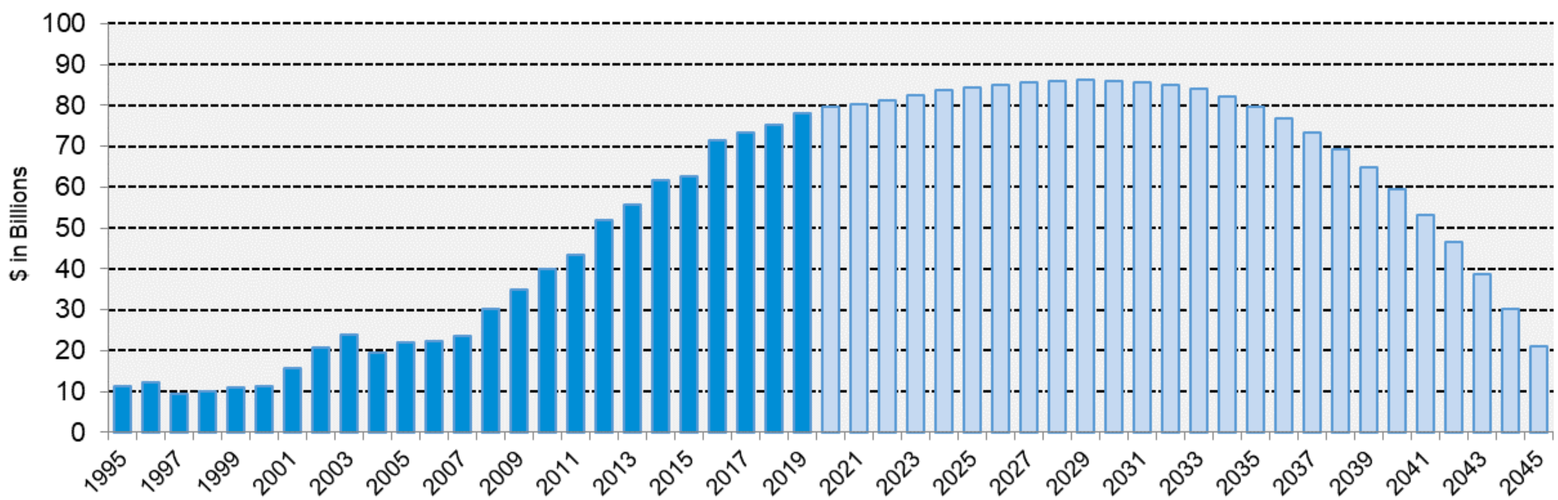
State Required Contribution for Fiscal Year Ending June 30



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

CHART B

Unfunded Actuarial Accrued Liability as of Fiscal Year Ending June 30



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

- *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 will bring TRS to full funding by decreasing the UAAL every year. **We strongly recommend an actuarial funding method that targets 100% funding where payments at least 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 contributions are the same as Tier I member contributions, 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.

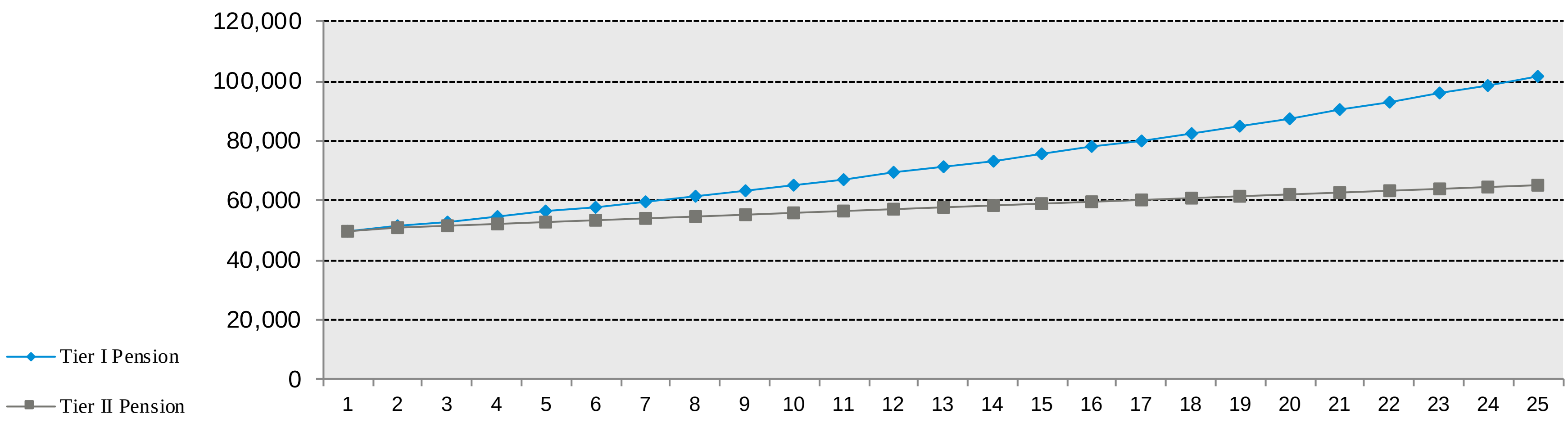
- The Tier II wage cap, which applies to benefits and contributions, was established in 2011 at $106,800. The wage cap increases each fiscal year by the lesser of 3% or one-half of the CPI-U as of the preceding September. For the fiscal year ended June 30, 2019, the limit is $114,952. Based upon the current actuarial assumptions, it is projected that the wage cap will affect the majority of full career Tier II members' final average salary.

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. Chart C below shows the comparison of a $50,000 pension under the Tier I and Tier II COLA provisions.

CHART C

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



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 the fiscal year 2021 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. 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.

CHART D

Allocation of Member Contribution Rate

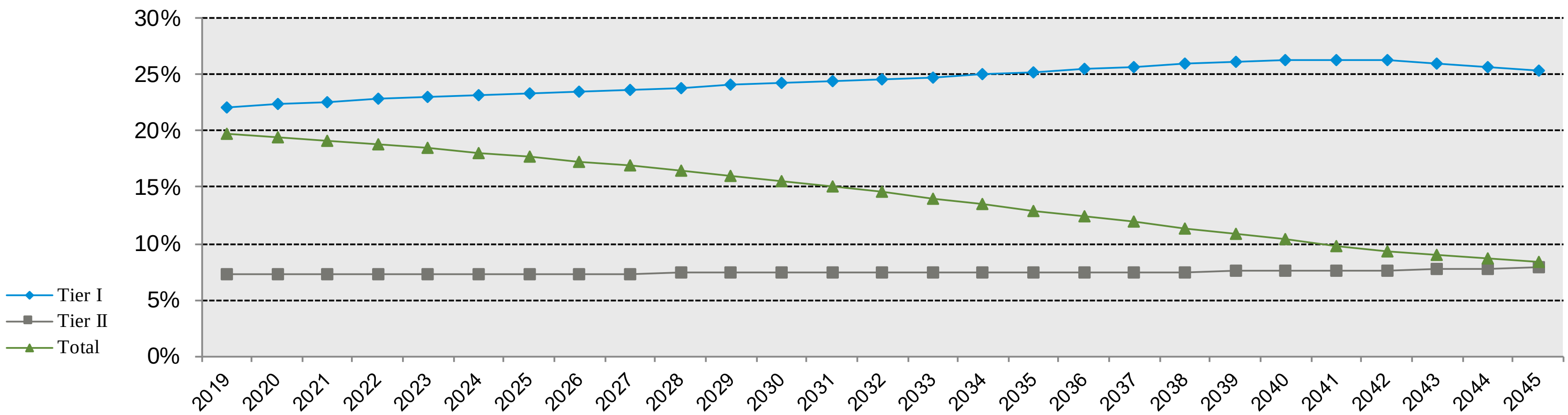
	For Fiscal Year 2021		
	Tier I	**Tier II**	**Total**
1. Total normal cost rate, including administrative expenses	22.85%	7.57%	19.41%
2. Less: member contribution rate	(9.00%)	(9.00%)	(9.00%)
3. Employer normal cost rate	13.85%	(1.43%)	10.41%
4. Allocation of member contribution rate			
a. Normal cost rate	9.00%	7.57%	9.00%
b. Unfunded actuarial accrued liability	0.00%	1.43%	0.00%
c. Total	9.00%	9.00%	9.00%

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.

CHART E

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

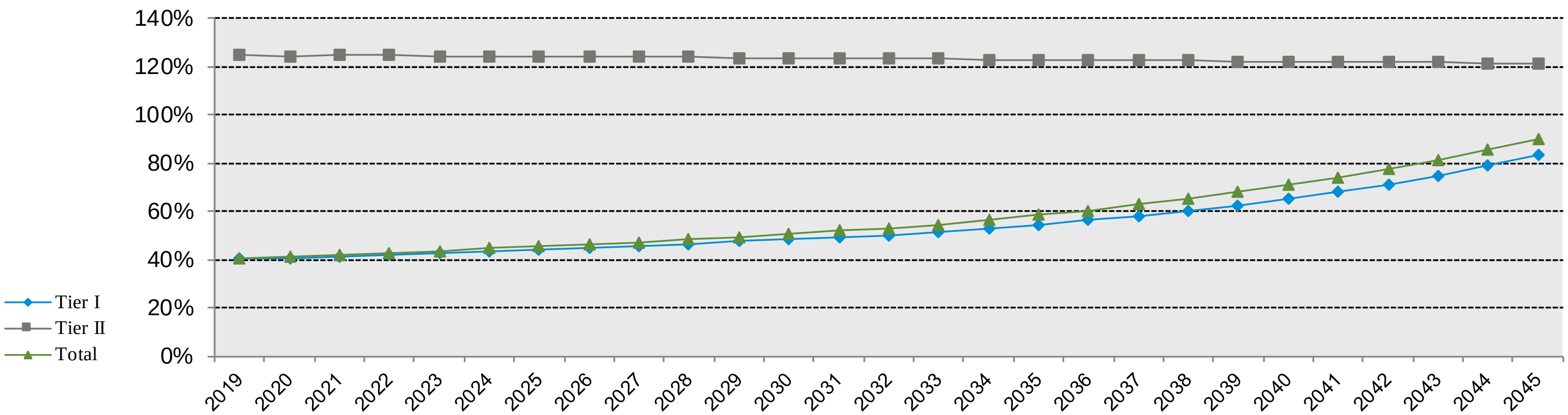


Tier II Contribution Toward Unfunded Actuarial Accrued Liability

- 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 125% as of June 30, 2019, decreasing slightly over time to a funded ratio of 121% as of June 30, 2045. In contrast, the Tier I funded ratio is 40% as of June 30, 2019, increasing to 84% as of June 30, 2045. For the total System, the funded ratio is 41% as of June 30, 2019, 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.

CHART F

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. Charts G and H show projections of 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, 2020:

- Scenario 1 assumes a 0% investment return for the year ending June 30, 2020
- Scenario 2 assumes a 14% investment return for the year ending June 30, 2020

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.

CHART G

Projection of Funded Ratio for Fiscal Year Ending June 30

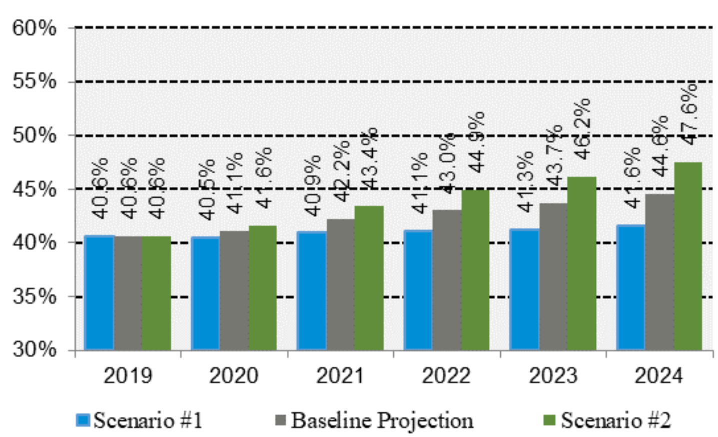


CHART H

Projection of State Contribution for Fiscal Year Ending June 30

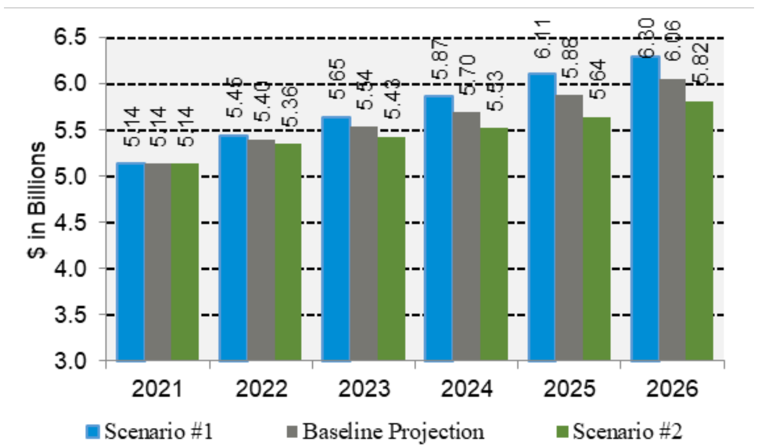
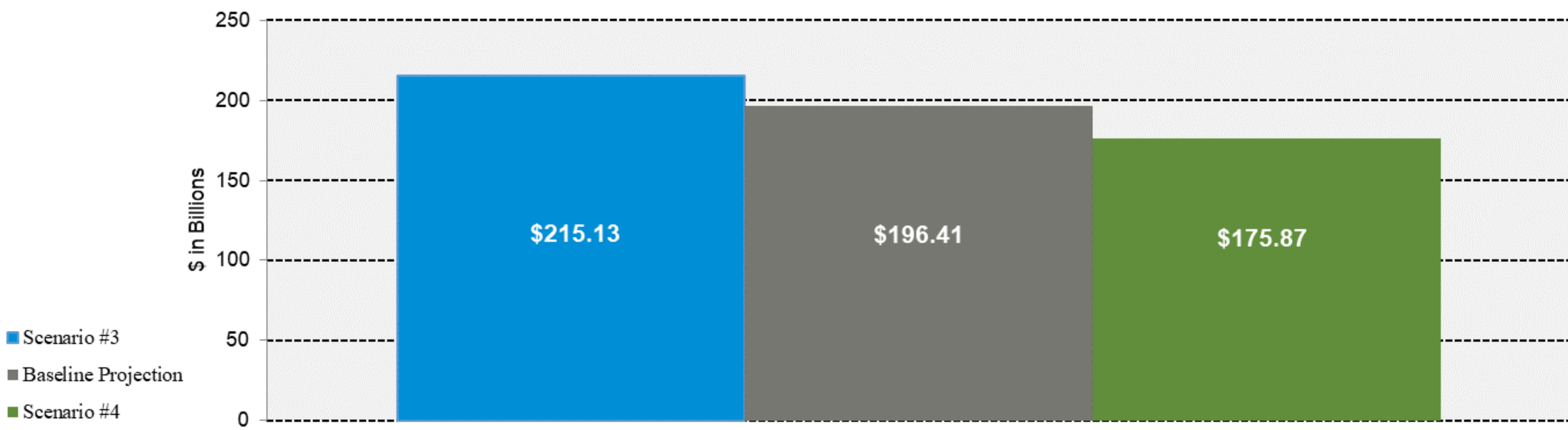


Chart I shows the total State contributions for the fiscal years June 30, 2021, through June 30, 2045, based on the current actuarial assumptions and assuming that all actuarial assumptions are realized with the exception of the investment returns as follows:

- Scenario 3 assumes investment returns of 6.00% for each year beginning with the year ending June 30, 2020, through June 30, 2045
- Scenario 4 assumes investment returns of 8.00% for each year beginning with the year ending June 30, 2020, through June 30, 2045

CHART I

Total State Contribution from Year Ending June 30, 2021, Through June 30, 2045



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 benefits and expenses paid and the actual investment experience of the System will determine the actual long-term cost of the plan.

In order to prepare a valuation, Segal Consulting ("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.

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.

A. MEMBER DATA

This actuarial valuation considers the number and demographic characteristics of covered participants, including active members, retirees, and beneficiaries.

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

A historical perspective of how the population has changed over past valuations can be seen in this chart.

CHART 1

Member Population: 2009 – 2018*

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
2009	138,180	30,993	16,370	95,488	97,796	1.41
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

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

Active Members

Plan costs are affected by the age, years of service, and compensation of active members. As of June 30, 2018 (the date as of which census data is collected for the June 30, 2019, valuation), there were 134,160 full-time and regular part-time active members with an average age of 42.0 and 13.1 average years of service. The 133,761 full-time and regular part-time active members in the prior valuation had an average age of 41.9 and 12.9 average years of service. In addition, as of June 30, 2018, there were 26,592 active members who were substitutes, part-time, and hourly paid on either a flexible or limited work schedule.

Inactive Members

As of June 30, 2018 (the date at which census data is collected for the June 30, 2019, valuation), there were 19,695 participants and 31 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 119,833 participants entitled to a return of their employee contributions.

These charts show a distribution of active participants based on years of service

CHART 2

Distribution of Full-Time and Regular Part-Time Active Participants by Age as of June 30, 2018*

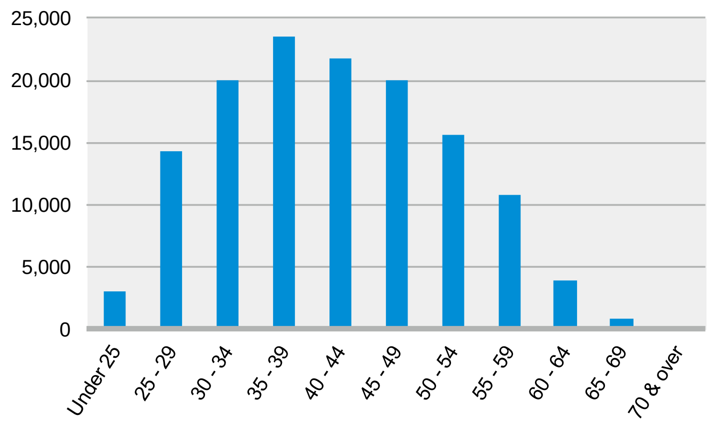
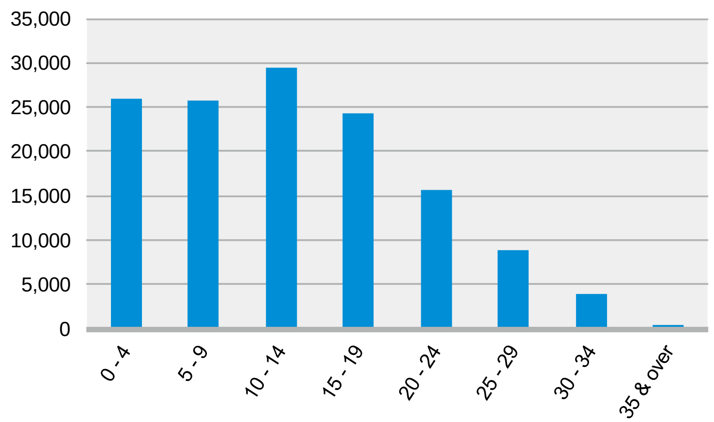


CHART 3

Distribution of Full-Time and Regular Part-Time Active Participants by Years of Service as of June 30, 2018*



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

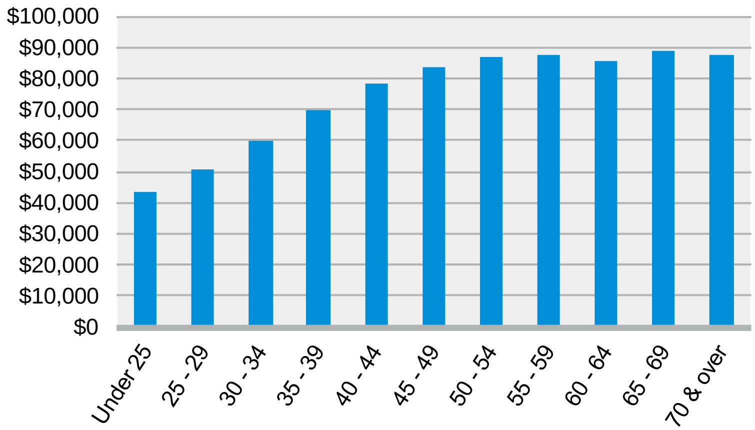
Distribution of Full-Time and Regular Part-Time Active Members by Age and Average Compensation

As of June 30, 2018 (the date as of which census data is collected for the June 30, 2019, valuation), there were 134,160 full-time and regular part-time active members with an average compensation of $73,106. The 133,761 active members used in the prior valuation had an average compensation of $71,845.

These charts show a distribution of active members by age and by average compensation.

CHART 4

Distribution of Full-Time and Regular Part-Time Active Members by Age and Average Compensation as of June 30, 2018*



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

Annuitants and Survivor Annuitants

As of June 30, 2018 (the date as of which census data is collected for the June 30, 2019, valuation), 111,559 annuitants and 11,336 survivor annuitants were receiving total annual benefits of $6,639,967,327. For comparison, in the previous valuation, there were 109,453 annuitants and 11,000 survivor annuitants were receiving total annual benefits of $6,336,471,817.

These charts show the distribution of the current annuitants and survivor annuitants based on their age and annual benefit, by type of pension.

CHART 5

Distribution of Annuitants and Survivor Annuitants by Annual Benefit as of June 30, 2018*

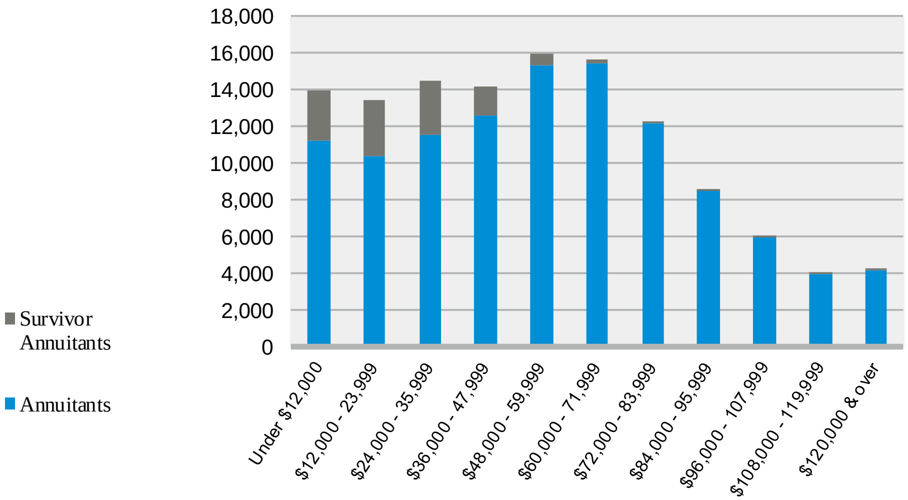
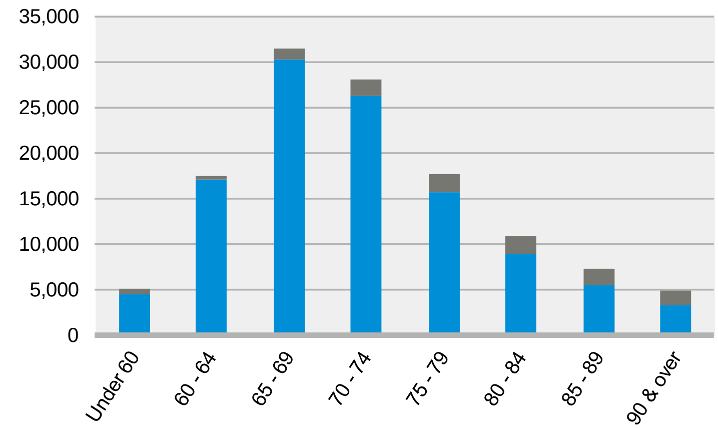


CHART 6

Distribution of Annuitants and Survivor Annuitants by Age as of June 30, 2018*



** Member data used for 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.

This chart shows the determination of the actuarial value of assets with POB as of the valuation date.

CHART 7

Determination of Actuarial Value of Assets and Projected Actuarial Value of Assets with POB for June 30, 2019 and June 30, 2018 Actuarial Valuations

				2019		2018
1.	Fair value of assets with POB available for benefits			$53,262,389,367*		$51,969,546,694
2.	Calculation of unrecognized return**	Original Amount***	% Not Recognized		% Not Recognized	
	(a) Year ended June 30, 2019	($974,076,334)	80%	($779,261,067)		
	(b) Year ended June 30, 2018	643,913,847	60%	386,348,308	80%	$515,131,078
	(c) Year ended June 30, 2017	2,401,737,113	40%	960,694,845	60%	1,441,042,268
	(d) Year ended June 30, 2016	(3,482,927,259)	20%	(696,585,452)	40%	(1,393,170,904)
	(e) Year ended June 30, 2015	(1,621,728,539)		0	20%	(324,345,708)
	(f) Total unrecognized return			($128,803,366)		$238,656,734
3.	Actuarial value of assets with POB (Current Assets): (1) – (2f)			$53,391,192,733		$51,730,889,960
4.	Actuarial value as a percent of fair value: (3) ÷ (1)			100.2%		99.5%
5.	Projected actuarial value of assets					
	(a) Assumed contributions			$5,893,184,063		$5,401,080,673
	(b) Assumed distributions			7,176,323,805		6,871,992,949
	(c) Expected return at 7.00%			3,692,473,600		3,569,680,368
	(d) Projected actuarial value of assets: (3) + (5a) – (5b) + (5c)			$55,800,526,591		$53,829,658,052

* *Does not reflect $400,000 AAI buyout receivable*

** *Recognition at 20% per year over 5 years*

*** *Total return minus expected return on fair value*

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.

This chart shows the determination of the actuarial value of assets without POB as of the valuation date.

CHART 8

Determination of Actuarial Value of Assets and Projected Actuarial Value of Assets without POB for June 30, 2019 and June 30, 2018 Actuarial Valuations

			2019		2018	
1.	Estimated fair value of assets without POB available for benefits			$48,321,312,518		$46,902,662,455
2.	Calculation of unrecognized return*	Original Amount**	% Not Recognized		% Not Recognized	
	(a) Year ended June 30, 2019	($881,437,935)	80%	($705,150,348)		
	(b) Year ended June 30, 2018	579,778,319	60%	347,866,991	80%	$463,822,655
	(c) Year ended June 30, 2017	2,152,156,362	40%	860,862,545	60%	1,291,293,817
	(d) Year ended June 30, 2016	(3,104,582,596)	20%	(620,916,519)	40%	(1,241,833,038)
	(e) Year ended June 30, 2015	(1,438,100,040)		0	20%	(287,620,008)
	(f) Total unrecognized return			($117,337,331)		$225,663,426
3.	Actuarial value of assets without POB (Current Assets): (1) – (2f)			$48,438,649,849		$46,676,999,029
4.	Actuarial value as a percent of fair value: (3) ÷ (1)			100.2%		99.5%
5.	Projected actuarial value of assets					
	(a) Assumed contributions			$6,292,382,753		$5,775,815,831
	(b) Assumed distributions			7,176,323,805		6,871,992,949
	(c) Expected return at 7.00%			3,359,767,553		3,229,023,733
	(d) Projected actuarial value of assets: (3) + (5a) – (5b) + (5c)			$50,914,476,350		$48,809,845,644

* *Recognition at 20% per year over 5 years*

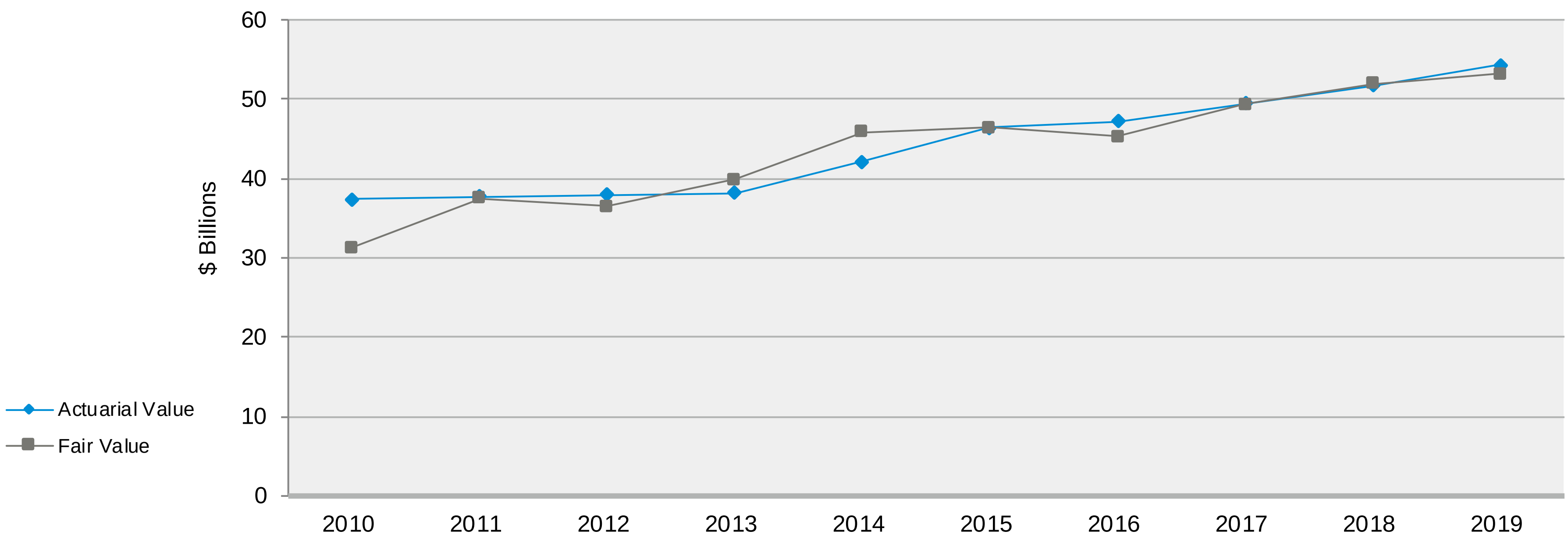
** *Total return minus expected return on fair value*

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.

This chart shows the change in the actuarial value of assets versus the fair value over the past ten years.

CHART 9

Actuarial Value of Assets vs. Fair Value of Assets as of June 30, 2010 – 2019 (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 experience 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 $941,925,998; $589,910,262 from investment losses and $325,015,736 in losses from all other sources. The net experience variation from individual sources other than investments was approximately 0.3% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience during the past year.

CHART 10

Actuarial Experience for Year Ended June 30, 2019

1.	Net loss from investments*	($589,910,262)
2.	Net loss from other experience**	(352,015,736)
3.	Net experience loss: (1) + (2)	($941,925,998)

* *Details in Chart 11*

** *Details in Chart 14*

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 7.00%. The actual rate of return on an actuarial basis for the year ended June 30, 2019, was 5.84%.

Since the actual return for the year was less than the assumed return, TRS experienced an actuarial loss during the year ended June 30, 2019, with regard to its investments.

This chart shows the portion of the gain/(loss) due to investment experience.

CHART 11

Investment Experience for the Year Ended June 30, 2019

	Fair Value With POB	Fair Value Without POB	Actuarial Value With POB
1. Value of assets as of June 30, 2018	$51,969,546,694	$46,902,662,455	$51,730,889,960
2. Contributions during fiscal year ended June 30, 2019	5,518,507,593	5,893,242,751*	5,518,507,593
3. Benefits and expenses during fiscal year ended June 30, 2019	6,843,096,252	6,843,096,252	6,843,096,252
4. Value of assets as of June 30, 2019	53,262,389,367**	48,321,312,518	53,391,192,733
5. Total investment income: (4) – (1) – (2) + (3)	2,617,431,332	2,368,503,564	2,984,891,432
6. Average value of assets: (1) + ((2) – (3)) ÷ 2	51,307,252,365	46,427,735,705	51,068,595,631
7. Actual rate of return: (5) ÷ (6)	5.10%	5.10%	5.84%
8. Assumed rate of return	7.00%	7.00%	7.00%
9. Expected return: (6) x (8)	$3,591,507,666	$3,249,941,499	$3,574,801,694
10. Actuarial loss: (5) – (9)	($974,076,334)	($881,437,935)	($589,910,262)

** Includes POB debt service*
*** Does not reflect $400,000 AAI buyout receivable*

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.

CHART 12
Investment Return

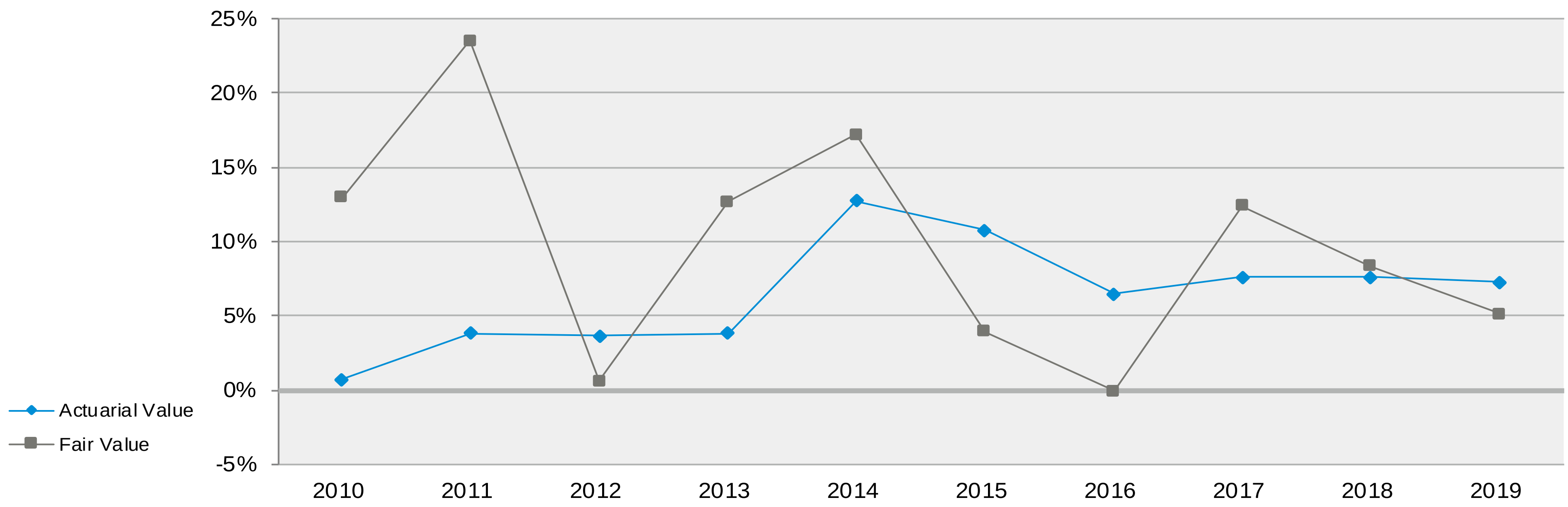
Year Ended June 30	Fair Value	Actuarial Value
2000	10.53%	10.53%
2001	(4.16)	(4.16)
2002	(3.12)	(3.12)
2003	4.78	4.78
2004	16.46	16.46
2005	10.69	10.69
2006	11.98	11.98
2007	19.07	19.07
2008	(4.89)	(4.89)
2009	(22.89)	2.22
2010	12.97	0.71
2011	23.50	3.84
2012	0.61	3.64
2013	12.70	3.83
2014	17.19	12.75
2015	3.91	10.76
2016	(0.10)	6.46
2017	12.39	7.83
2018	8.32	7.63
2019	5.10	5.84
Average Returns		
Last 5 years:	5.8%	7.8%
Last 10 years:	9.4%	6.3%
Last 15 years:	6.8%	6.7%
Last 20 years:	6.2%	6.2%

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. Chart 13 illustrates the effect that the asset returns on a fair value basis are more volatile than asset returns on an actuarial basis.

This chart illustrates how this leveling effect has actually worked over the 10 year period.

CHART 13

Fair Value and Actuarial Rates of Return for Years Ended June 30, 2010 – 2019



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, and
- the extent of turnover among the participants,
- mortality (more or fewer deaths than expected) and,
- new entrants

The loss from this other experience for the year ended June 30, 2019, amounted to $352,015,736, which is approximately 0.3% of the actuarial accrual liability. This is largely due to net unfavorable retirement experience. A five-year history of the demographic gain/(loss) experience is shown in the chart below.

This chart shows a five-year history of the elements of experience gain/(loss).

CHART 14

Experience Due to Changes in Demographics for Years Ended June 30, 2015 to June 30, 2019

	Year Ended June 30				
	2019	**2018**	**2017**	**2016**	**2015**
1. Salary increases	$84,011,865	$40,293,935	($29,518,579)	$65,504,184	$468,541,235
2. Retirement experience	(324,388,173)	(341,957,544)	(365,965,251)	(237,492,448)	(302,761,415)
3. Disability experience	17,840,394	24,275,853	23,361,862	16,091,632	13,393,193
4. Termination experience	(60,351,523)	(19,458,838)	(25,597,354)	(15,147,793)	(56,862,195)
5. Mortality experience	(10,977,383)	(42,624,422)	(24,539,086)	(49,779,799)	45,647,175
6. Rehires	(39,508,399)	(36,264,543)	(32,789,033)	(23,266,945)	(13,630,966)
7. New entrants	10,851,490	16,845,581	16,627,360	17,516,646	(5,168,927)
8. Other	(29,494,007)	(983,112,072)*	(165,896,422)	(737,480,200)**	(21,988,860)
9. Total	($352,015,736)	($1,342,002,050)	($604,316,503)	($964,054,723)	$127,169,240

** 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 CONTRIBUTIONS

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 2021, 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 0.04% 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.

Chart 15 shows the development of employer contributions under Statutory Funding and the Board-Adopted Actuarial Funding Policy.

This chart shows a comparison of the employer contributions based on the Statutory Funding Plan to the actuarially determined contribution (Board-Adopted Actuarial Funding Policy)

CHART 15

Employer Contributions

	Fiscal Year Ending June 30	
	2021	**2020**
Based on Statutory Funding Plan		
1. Benefit Trust Reserve:		
a. Employer's cost as percentage of membership payroll	47.12%	46.01%
b. Total employer contribution: (1a) x (8)	$5,284,597,987	$5,040,022,842
c. School Districts contributions under Sec. 16-158*	(74,112,385)	(87,086,402)
d. Federal Funds contribution	(23,348,881)	(23,355,172)
e. Phase-in of the effect of assumption changes	(46,800,000)	(116,503,572)
f. State Contribution: (1b) + (1c) + (1d) + (1e)	$5,140,336,721	$4,813,077,696
2. Guaranteed Minimum Annuity Reserve	400,000	500,000
3. Total State Contribution: (1f) + (2)	$5,140,736,721	$4,813,577,696
Based on Board-Adopted Actuarial Funding Policy (Actuarially Determined Contribution)		
4. Benefit Trust Reserve:		
a. Normal cost plus amortization of UAAL	$8,441,257,567	$7,988,612,283
b. School Districts contributions under Sec. 16-158*	(74,112,385)	(87,086,402)
c. Federal Funds contribution	(23,348,881)	(23,355,172)
d. State Contribution: (4a) + (4b) + (4c)	$8,343,796,301	$7,878,170,709
5. Guaranteed Minimum Annuity Reserve	400,000	500,000
6. Total State Contribution: (4d) + (5)	$8,344,196,301	$7,878,670,709
Difference Between Board-Adopted Actuarial Funding Policy and Statutory Funding		
7. Shortfall/(Excess): (6) – (3)	$3,203,459,580	$3,065,093,013
Expected Membership Payroll		
8. Total membership payroll	$11,214,640,162	$10,954,583,571

* *Reflects 6% "FAS Cap" threshold for fiscal year 2021 and phase-in of 3% "FAS Cap" threshold for fiscal year 2020*

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 0.7%, 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 9.4%. However, looking over a longer historical period of 20 years, the fair value rate of return has an average of 6.2%.

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 amounts.

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.

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 $2,929 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 48.4% since 2010.

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 $1,300 million less than benefits paid. As the Plan continues to mature, more cash will be needed from the investment portfolio to meet benefit payments.

EXHIBIT A
Summary of Membership Data

Category	Valuation as of June 30* 2019	Valuation as of June 30* 2018	Change From Prior Year
Active members:			
1. Number			
a. Full-time and regular part-time			
Tier I	106,275	109,845	-3.25%
Tier II	27,885	23,916	16.60%
Total	134,160	133,761	0.30%
b. Substitutes, part-time, and hourly paid			
Tier I	13,297	14,088	-5.61%
Tier II	13,295	12,576	5.72%
Total	26,592	26,664	-0.27%
c. Total number of active members			
Tier I	119,572	123,933	-3.52%
Tier II	41,180	36,492	12.85%
Total	160,752	160,425	0.20%
2. Annual salaries			
a. Full-time and regular part-time			
Tier I	$8,370,721,244	$8,422,128,884	-0.61%
Tier II	1,437,244,143	1,187,872,721	20.99%
Total	$9,807,965,387	$9,610,001,605	2.06%
b. Substitutes, part-time, and hourly paid			
Tier I	$84,574,824	$85,978,798	-1.63%
Tier II	70,369,553	66,412,157	5.96%
Total	$154,944,377	$152,390,955	1.68%
c. Total annual salaries			
Tier I	$8,455,296,068	$8,508,107,682	-0.62%
Tier II	1,507,613,696	1,254,284,878	20.20%
Total	$9,962,909,764	$9,762,392,560	2.05%

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

EXHIBIT A (*continued*)
Summary of Membership Data

Category	Valuation as of June 30* 2019	Valuation as of June 30* 2018	Change From Prior Year
Active members (continued):			
3. Average age			
a. Full-time and regular part-time	42.0	41.9	N/A
b. Substitutes, part-time, and hourly paid	45.5	45.0	N/A
c. Total	42.6	42.4	N/A
4. Average service			
a. Full-time and regular part-time	13.1	12.9	N/A
b. Substitutes, part-time, and hourly paid	2.4	2.4	N/A
c. Total	11.3	11.2	N/A
Inactive members:			
Eligible for deferred annuities	19,726	19,531	1.00%
Eligible for refunds or single sum benefits	119,833	119,738	0.08%
Total	139,559	139,269	0.21%
Service retirees:			
1. Number			
a. Regular	77,628	74,709	3.91%
b. ERI	8,720	9,043	-3.57%
c. ERO	24,108	24,604	-2.02%
d. Total	110,456	108,356	1.94%
2. Annual annuities			
a. Regular	$4,065,125,791	$3,804,718,835	6.84%
b. ERI	535,961,733	539,813,275	-0.71%
c. ERO	1,715,171,725	1,691,159,333	1.42%
d. Total	$6,316,259,249	$6,035,691,443	4.65%
3. Average age	71.9	71.6	N/A
4. Average monthly benefit	$4,765	$4,642	2.66%

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

EXHIBIT A (*continued*)
Summary of Membership Data

Category	Valuation as of June 30* 2019	Valuation as of June 30* 2018	Change From Prior Year
Disability annuitants:			
1. Number			
a. Retirement Allowance	816	802	1.75%
b. Occupational	8	4	100.00%
c. Temporary	279	291	-4.12%
d. Total	1,103	1,097	0.55%
2. Annual annuities			
a. Retirement Allowance	$23,163,914	$22,135,006	4.65%
b. Occupational	323,779	195,608	65.52%
c. Temporary	8,673,612	8,830,086	-1.77%
d. Total	$32,161,305	$31,160,700	3.21%
3. Average age	59.9	59.6	N/A
4. Average monthly benefit	$2,430	$2,367	2.65%
Survivor annuitants:			
1. Number			
a. Children	75	76	-1.32%
b. Survivors	11,058	10,722	3.13%
c. Reversionary	203	202	0.50%
d. Total	11,336	11,000	3.05%
2. Annual annuities			
a. Children	$901,176	$925,767	-2.66%
b. Survivors	282,235,640	260,695,638	8.26%
c. Reversionary	8,409,957	7,998,269	5.15%
d. Total	$291,546,773	$269,619,674	8.13%
3. Average age	78.2	78.0	N/A
4. Average monthly benefit	$2,143	$2,043	4.89%
Total number of participants	423,206	420,147	0.73%

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

EXHIBIT B

Active Membership Data as of June 30, 2018 used in June 30, 2019 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	3,076	3,075	1	--	--	--	--	--	--	--
	$43,489	$43,487	$49,788	--	--	--	--	--	--	--
25 - 29	14,385	10,096	4,289	--	--	--	--	--	--	--
	$50,650	$48,845	$54,900	--	--	--	--	--	--	--
30 - 34	20,053	4,788	10,554	4,711	--	--	--	--	--	--
	$59,961	$52,488	$59,514	$68,559	--	--	--	--	--	--
35 - 39	23,481	2,830	4,373	12,097	4,180	1	--	--	--	--
	$70,007	$54,736	$61,809	$72,451	$81,846	$97,992	--	--	--	--
40 - 44	21,726	2,094	2,455	4,708	9,778	2,691	--	--	--	--
	$78,034	$53,758	$61,301	$74,183	$85,304	$92,509	--	--	--	--
45 - 49	20,064	1,438	1,870	3,282	4,352	7,111	2,011	--	--	--
	$83,548	$56,091	$62,019	$72,980	$85,263	$94,504	$97,994	--	--	--
50 - 54	15,601	835	1,230	2,220	2,579	2,975	4,284	1,478	--	--
	$86,864	$54,230	$61,344	$70,597	$83,707	$93,996	$99,653	$105,058	--	--
55 - 59	10,867	484	697	1,615	2,112	1,857	1,820	2,174	108	--
	$87,457	$56,552	$62,749	$71,619	$81,393	$90,563	$99,891	$105,817	$108,315	--
60 - 64	3,913	211	291	656	1,003	759	533	278	143	39
	$85,444	$57,415	$62,830	$74,640	$83,042	$92,429	$98,761	$103,771	$108,519	$116,142
65 - 69	864	57	54	118	222	168	120	54	23	48
	$88,500	$56,643	$63,200	$79,856	$87,996	$91,102	$99,045	$100,540	$118,059	$115,199
70 & older	135	12	6	19	30	23	16	11	9	9
	$87,462	$63,293	$57,373	$73,770	$91,173	$89,150	$85,327	$106,458	$99,703	$120,299
Total	134,160	25,920	25,820	29,426	24,254	15,582	8,784	3,995	283	96
	$73,106	$50,735	$59,706	$72,058	$84,129	$93,444	$99,234	$105,324	$108,936	$116,061

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	Percentage Change in Average Salary
2009	138,180	1.4%	$9,147,433,000	$66,199	3.5%
2010	137,711	(0.3%)	9,412,873,000	68,352	3.3%
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%

Substitutes, Part-Time and Hourly-Paid

Census Date June 30	Number	Percentage Change in Membership	Total Salaries	Average Annual Salary	Percentage Change in Average Salary
2009	30,993	6.3%	$154,121,000	$4,973	(3.0%)
2010	32,479	4.8%	161,461,000	4,971	0.0%
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%

EXHIBIT D

History of Active Membership Data by Tier

Tier I

Census Date June 30	Number	Percentage Change in Membership	Total Salaries	Average Annual Salary	Percentage 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%

Tier II

Census Date June 30	Number	Percentage Change in Membership	Total Salaries	Average Annual Salary	Percentage 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%

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	Percentage Change in Allowances	Average Annual Annuity
2009	97,796	3.6%	$4,107,592,000	7.7%	42,002
2010	101,352	3.6%	4,418,017,000	7.6%	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

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
2020	$466,961	2045	$10,443
2021	412,108	2046	8,632
2022	360,415	2047	7,080
2023	313,179	2048	5,715
2024	271,356	2049	4,590
2025	234,733	2050	3,645
2026	202,883	2051	2,858
2027	175,339	2052	2,208
2028	151,464	2053	1,680
2029	130,815	2054	1,257
2030	113,049	2055	924
2031	97,704	2056	667
2032	84,411	2057	472
2033	72,885	2058	329
2034	62,869	2059	225
2035	54,167	2060	139
2036	46,585	2061	89
2037	39,981	2062	55
2038	34,228	2063	33
2039	29,223	2064	19
2040	24,875	2065	11
2041	21,090	2066	6
2042	17,823	2067	3
2043	14,997	2068	2
2044	12,547	2069	1

EXHIBIT G
Reconciliation of Member Data

	Active Members	Inactive Member Eligible for Allowance	Inactive Member Eligible for Refund	Service Retirees	Disabled Retirees	Beneficiaries	Deferred Beneficiaries	Total
A. Number as of June 30, 2017	160,425	19,503	119,738	108,356	1,097	11,000	28	420,147
B. New members	10,795	N/A	N/A	N/A	N/A	N/A	N/A	10,795
C. Participant movement								
1. Retirements	(3,493)	(758)	(194)	4,445	0	0	0	0
2. Disabilities	(120)	(3)	0	0	123	0	0	0
3. Conversion from disability to service pension	N/A	N/A	N/A	37	(37)	N/A	N/A	0
4. Died with beneficiary	(47)	(2)	0	(855)	(19)	1,024	2	103*
5. Died without beneficiary	(53)	(27)	(278)	(1,541)	(26)	(676)	0	(2,601)
6. Terminations – with vested rights	(2,321)	2,321	0	0	0	0	0	0
7. Terminations – without vested rights	(8,082)	0	8,082	0	0	0	0	0
8. Refunds	(658)	(334)	(4,291)	N/A	N/A	N/A	0	(5,283)
9. Rehired as active	4,306	(1,019)	(3,258)	(3)	(26)	0	0	0
10. Temporary annuity expired	N/A	N/A	NA	N/A	N/A	(11)	N/A	(11)
D. Data adjustment	0	14	34	17	(9)	(1)	1	56
E. Number as of June 30, 2018	160,752	19,695	119,833	110,456	1,103	11,336	31	423,206

* *Includes multiple beneficiaries*

EXHIBIT H
Summary Statement of Income and Expenses on a Fair Value Basis

	Year Ended June 30, 2019		Year Ended June 30, 2018	
Net assets at fair value at the beginning of the year		$51,969,546,694		$49,375,664,518
Contribution income:				
Members	$963,972,120		$938,037,245	
State of Illinois	4,466,020,692		4,095,125,358	
Employers:				
Early retirement	32,449		0	
Federal funds	18,472,267		20,041,292	
2.2 Benefit formula	62,744,266		59,837,569	
Excess salary/sick leave	7,265,799		4,754,256	
Total contribution income		$5,518,507,593		$5,117,795,720
Investment income:				
Net appreciation (depreciation)	$1,491,025,634		$3,124,845,615	
Alternative	975,251,437		946,974,692	
Interest and dividends	924,617,550		806,299,291	
Other	35,183,396		1,692,247	
Securities lending	11,541,157		14,237,647	
Less alternatives expense	(470,341,524)		(458,566,901)	
Less direct investment expense	(348,753,860)		(385,356,613)	
Less securities lending management fees	(692,458)		(854,250)	
Net investment income		2,617,831,332		4,049,271,728
Total income available for benefits		$8,136,338,925		$9,167,067,448
Less benefit payments and administrative expenses:				
Retirement benefits	($6,405,907,842)		($6,140,877,388)	
Survivor benefits	(306,502,713)		(285,067,712)	
Disability benefits	(33,133,627)		(32,764,545)	
Refund of contributions	(73,216,390)		(92,924,731)	
Administrative expenses	(24,335,680)		(21,550,896)	
Net benefit payments and administrative expenses		($6,843,096,252)		($6,573,185,272)
Net assets at fair value at the end of the year		$53,262,789,367		$51,969,546,694

EXHIBIT I

Summary Statement of System Assets

	Year Ended June 30, 2019		Year Ended June 30, 2018	
Cash equivalents		$27,358,430		$32,034,294
Accounts receivable and prepaid expenses:				
Member contributions	$55,256,930		$55,935,950	
Employer contributions	8,215,327		8,098,383	
State of Illinois	558,757,463		422,893,664	
Investment income	344,551,118		113,336,497	
Investments sold	6,195,921,852		5,253,629,488	
Other receivables	0		204,836	
Prepaid expenses	2,171,724		2,659,193	
Total accounts receivable and prepaid expenses		$7,164,874,414		$5,856,758,011
Investments at fair value:				
Fixed income	13,725,761,411		12,138,093,138	
Public equities	17,823,681,423		18,207,596,005	
Alternative investments	19,635,394,819		20,343,876,329	
Derivatives	(55,888,377)		32,220,547	
Short-term investments	1,601,845,805		1,280,712,915	
Foreign currency	95,012,450		68,446,828	
Total investments		$52,825,807,531		$52,070,945,762
Invested securities lending collateral		2,540,713,046		2,323,876,849
Capital assets, net of accumulated depreciation		2,856,794		2,851,122
Total assets		$62,561,610,215		$60,286,466,038
Less accounts payable:				
Benefits and refunds payable	($6,844,767)		($6,180,128)	
Administrative and investment expenses payable	(44,756,293)		(61,859,989)	
Pending investment purchases	(6,706,535,186)		(5,925,019,878)	
Securities lending collateral	(2,540,684,602)		(2,323,859,349)	
Total accounts payable		($9,298,820,848)		($8,316,919,344)
Net assets at fair value		$53,262,789,367		$51,969,546,694

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*
2010	$28,531,312,242	$899,401,027	$2,252,149,605	$3,679,642,960	$16,950,679	$3,988,188,142	$31,323,784,214	12.9%
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%

* *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 Ending June 30			
	2019		2018	
1. Unfunded actuarial accrued liability at beginning of year		$75,288,440,204		$73,436,509,059
2. Total normal cost at beginning of year		2,051,272,978		1,929,676,002
3. Total member and employer contributions*		5,517,256,877		5,116,687,815
4. Interest on:				
(a) Unfunded actuarial accrued liability and normal cost	5,413,779,923		5,275,632,954	
(b) Total contributions	193,103,991		179,084,074	
(c) Total interest: (4a) – (4b)		5,220,675,932		5,096,548,880
5. Expected unfunded actuarial accrued liability: (1) + (2) – (3) + (4c)		$77,043,132,237**		$75,346,046,126
6. Changes due to (gain)/loss from:				
(a) Investments	589,910,262		(306,966,173)	
(b) Demographics	352,015,736		1,342,002,050	
(c) Total changes due to (gain)/loss: (6a) + (6b)		941,925,998		1,035,035,877
7. Change due to new buyout provisions		0		(380,955,376)
8. Change in actuarial assumptions		80,717,984		(711,686,423)
9. Unfunded actuarial accrued liability at end of year: (5) + (6c) + (7) + (8)		$78,065,776,220		$75,288,440,204

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

** *The unfunded actuarial accrued liability increased $1,754,692,033 during the year ended June 30, 2019 due to total contributions being less than total normal cost plus interest on the unfunded actuarial accrued liability.*

EXHIBIT I

Derivation of Employer Contributions under Illinois Pension Code

		June 30, 2021	As Percentage of Total Payroll
1. Assumed Payroll:			
	a. Total payroll	$11,214,640,162	
	b. Less Federal Funds payroll	(224,292,803)	
	c. State payroll	$10,990,347,359	
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	$5,706,795,505	50.89%
	b. Less School Districts' contributions under Sec. 16-158	(74,112,385)	(0.66%)
	c. Less Federal Funds contribution	(23,348,881)	(0.21%)*
	d. Less State debt service for TRS portion of all funds provided under Sec 7.2 of General Obligation Bond Act	(422,197,518)	(3.77%)
	e. Maximum State contribution under PA 94-0004	$5,187,136,721	46.25%
3. Employer contribution recognizing all system assets, before limiting State contribution			
	a. Employer's cost	$5,400,451,610	48.16%
	b. Less School Districts' contributions under Sec. 16-158	(74,112,385)	(0.66%)
	c. Less Federal Funds contribution	(23,348,881)	(0.21%)*
	d. State contribution	$5,302,990,344	47.29%
4. State contribution under PA 100-0023			
	a. Lesser of amounts under (2) and (3)	$5,187,136,721	46.25%
	b. Less phase-in of the effect of assumption changes	(46,800,000)	(0.41%)
	c. State contribution	$5,140,336,721**	45.84%
5. Employer contributions			
	a. State contribution	$5,140,336,721	45.84%
	b. Plus School Districts' contributions under Sec. 16-158	74,112,385	0.66%
	c. Plus Federal Funds contribution	23,348,881	0.21%*
	d. Total employer contribution	$5,237,797,987	46.71%

* *Federal Funds contribution is equal to 10.41% of assumed Federal Funds payroll.*

** *The Benefit Trust Reserve State Contribution does not include the Guaranteed Minimum Annuity Reserve contribution. See page 31 for more details.*

Notes about employer contributions:

1) **Assumed Payrolls**
TRS staff estimated that Federal Funds payroll for the fiscal year ending June 30, 2021 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 2021, the expected School Districts' contributions under Sec. 16-158(e), 16-158(f), and 16-158(i-5) are $65,044,913, $4,119,231, and $4,948,241, 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.

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 projected School Districts' contributions under Sec. 16-158(f) reflect the repeal of the 3% "FAS Cap" threshold per PA 101-001 (SB 1814). This valuation reflects the original 6% "FAS Cap" threshold.

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, 2021
1.	Present value as of June 30, 2020 of future obligations to fund:		
	a.	90% of June 30, 2045 Actuarial Accrued Liability	$34,716,722,210
	b.	Benefit disbursements and administrative expenses through June 30, 2045	123,166,157,780
	c.	Total	$157,882,879,990
2.	Projected actuarial value of assets as of June 30, 2020		
	a.	With POB proceeds	55,800,526,591
	b.	Without POB proceeds	50,914,476,350
3.	Present value as of June 30, 2020 of future member contributions through June 30, 2045		16,098,171,581
4.	Present value as of June 30, 2020 of future School District contributions through June 30, 2045		
	a.	2.2% formula under §16-158(e)	$1,037,437,724
	b.	6% FAS cap increases under §16-158(f)	62,416,522
	c.	Salaries above the Governor's salary under §16-158(i-5)	85,434,607
	d.	Total	$1,185,288,853
5.	Present value as of June 30, 2020 of future Federal Funds contributions through June 30, 2045		218,531,710
6.	Present value as of June 30, 2020 of future State contributions through June 30, 2045		
	a.	Including POB proceeds: (1c) – (2a) – (3) – (4d) – 5	84,580,361,255
	b.	Excluding POB proceeds: (1c) – (2b) – (3) – (4d) – 5	89,466,411,496
7.	Present value as of June 30, 2020 of future covered payroll through June 30, 2045		178,868,573,120
8.	Determination of preliminary contribution rates for State and Federal Funds for year ended June 30, 2021		
	a.	Including POB proceeds: (6a) / (7)	47.29%
	b.	Excluding POB proceeds: (6b) / (7)	50.02%

EXHIBIT II (*continued*)

Development of Statutory State Contribution under Illinois Pension Code

	Fiscal Year Ending June 30, 2021
9. Determination of State contribution for year ending June 30, 2021:	
a. Projected payroll:	$11,214,640,162
b. State contribution before maximum:	
i) Gross contribution: (8a) x (9a)	$5,302,990,345
ii) Phase-in of the effect of assumption changes	46,800,000
iii) Net contribution: (i) – (ii)	$5,256,190,345
c. State contribution maximum:	
i) Gross maximum: (8b) x (9a)	$5,609,334,239
ii) State's debt service	422,197,518
iii) Phase-in of the effect of assumption changes	46,800,000
iv) Net contribution: (i) – (ii) – (iii)	$5,140,336,721
d. State contribution after maximum: minimum of (9b)(iii) and (9c)(iv)	$5,140,336,721*

* *The Benefit Trust Reserve State Contribution does not include the Guaranteed Minimum Annuity Reserve contribution. See page 31 for more details.*

EXHIBIT III

Development of State Contribution Based on Board-Adopted Actuarial Funding Policy

			Fiscal Year Ending June 30, 2021
1.	Projected employer Normal Cost for year ending June 30, 2021		
	a.	Total	$2,074,828,237
	b.	Administrative expenses	31,439,548
	c.	Member contributions	1,009,317,615
	d.	Employer Normal Cost: (a) + (b) – (c)	$1,096,950,170
2.	Projected Unfunded Actuarial Accrued Liability as of June 30, 2020		
	a.	Actuarial Accrued Liability	$138,493,070,413
	b.	Actuarial Value of Assets	55,800,526,591
	c.	Unfunded Actuarial Accrued Liability: (a) – (b)	$82,692,543,822
3.	Payment toward projected Unfunded Actuarial Accrued Liability for year ending June 30, 2021 (see Exhibit IV)		7,344,307,397
4.	Total employer contribution for year ending June 30, 2021: (1d) + (3)		$8,441,257,567
5.	Projected School District contributions for year ending June 30, 2021		
	a.	2.2% formula under §16-158(e)	$65,044,913
	b.	6% FAS cap increases under §16-158(f)	4,119,231
	c.	Salaries above the Governor's salary under §16-158(i-5)	4,948,241
	d.	Total	$74,112,385
6.	Estimated Federal Funds contribution for year ending June 30, 2021		23,348,881
7.	State contribution for year ending June 30, 2021: (4) – (5d) – (6)		$8,343,796,301

EXHIBIT IV

Components of Unfunded Liability Bases and Amortization Payment under Board-Adopted Actuarial Funding Policy

	Original Amount	Balance as of June 30, 2020	Remaining Amortization Period	2021 Amortization
June 30, 2015 valuation base:				
Projected UAAL as of June 30, 2016	$68,126,860,208	$64,151,476,371	16	$5,796,143,350
June 30, 2016 valuation base:				
Projected (gain)/loss as of June 30, 2017	$8,625,889,107	8,272,903,639	17	718,289,810
June 30, 2017 valuation base:				
Projected (gain)/loss as of June 30, 2018	$3,216,359,048	3,136,779,753	18	262,579,119
June 30, 2018 valuation base:				
Projected (gain)/loss as of June 30, 2019	$3,150,844,586	3,115,654,562	19	252,186,871
June 30, 2019 valuation base:				
Projected (gain)/loss as of June 30, 2020	$4,015,729,497	4,015,729,497	20	315,108,247
Total		$82,692,543,822		$7,344,307,397

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				
			2020	2021	2022	2023	2024
2012	2014	$335,329,627	- -	- -	- -	- -	- -
2013	2015	- -	- -	- -	- -	- -	- -
2014	2016	464,263,256	- -	- -	- -	- -	- -
2015	2017	42,517,859	($8,503,572)	- -	- -	- -	- -
2016	2018	410,000,000	(164,000,000)	($82,000,000)	- -	- -	- -
2017	2019	- -	- -	- -	- -	- -	- -
2018	2020	(70,000,000)	56,000,000	42,000,000	$28,000,000	$14,000,000	- -
2019	2021	8,500,000	N/A	(6,800,000)	(5,100,000)	(3,400,000)	($1,700,000)
Total			($116,503,572)	($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
2010	$77,293,198	$37,439,092	$31,323,784	$39,854,106	$45,969,414	48.4%	40.5%
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

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.

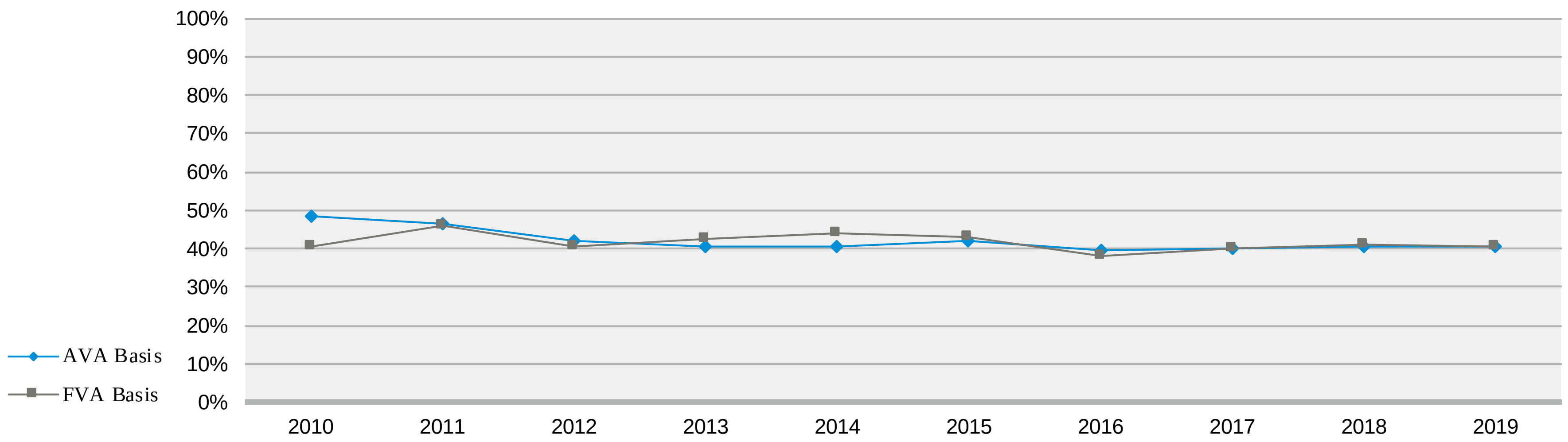


EXHIBIT VIII

Department of Insurance Information

	June 30, 2019	June 30, 2018
Actuarial Accrued Liabilities:		
Service Retirement	$82,809,306,042	$80,167,438,394
Disability Retirement	425,709,005	411,635,586
Survivor	2,553,790,929	2,389,390,585
Subtotal	$85,788,805,976	$82,968,464,565
Inactive	$3,537,804,681	$3,161,375,282
Active	42,130,358,296	40,889,490,317
Total	$131,456,968,953	$127,019,330,164
Headcounts and Salaries for Active Members:		
Male		
Count	37,477	37,491
Salaries	$2,662,229,567	$2,616,328,245
Female		
Count	123,275	122,934
Salaries	$7,300,680,197	$7,146,064,315
Total		
Count	160,752	160,425
Salaries	$9,962,909,764	$9,762,392,560

EXHIBIT IX

Roll Forward of Actuarial Accrued Liability and Normal Cost

	Actuarial Accrued Liabilities Developed for June 30, 2019 Valuation	Amount
1.	Actuarial Accrued Liability measured as of June 30, 2018	$126,900,615,529
2.	Normal Cost measured for fiscal year ended June 30, 2019	2,004,015,555
3.	Expected benefit payments for fiscal year ended June 30, 2019	6,865,623,729
4.	Interest on 1., 2. and 3. to June 30, 2019	8,783,027,345
5.	Adjustment for future AAI and APB buyouts as of June 30, 2019	634,934,253
6.	Actuarial Accrued Liability as of June 30, 2019: (1) + (2) – (3) + (4) + (5)	$131,456,968,953
7.	Normal Cost measured for fiscal year ended June 30, 2020	2,039,178,506
8.	Expected benefit payments for fiscal year ended June 30, 2020	7,374,703,269*
9.	Interest on 6., 7. and 8. to June 30, 2020	9,086,615,708
10.	Actuarial Accrued Liability as of June 30, 2020 (6) + (7) – (8) + (9)	$135,208,059,898

Based on member census as of June 30, 2018, assumptions and methods as of June 30, 2019, including the Projected Unit Credit actuarial cost method.

* *Includes $227,212,516 of projected buyout payments expected to be paid via additional state funds not included in the FY2020 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 2021
1. Employer normal cost plus interest on UAAL	
a. Employer normal cost	$1,167,182,741
b. Interest on the projected June 30, 2020 UAAL	5,388,623,500
c. Total employer normal cost plus interest on UAAL	$6,555,806,241
2. Contributions from sources other than State and Federal Funds	
a. School District contributions under §16-158(e)	($65,044,913)
b. School District contributions under §16-158(f)	(4,119,231)
c. School District contributions under §16-158(i-5)	(4,948,241)
d. Federal Funds contribution	(23,355,172)
e. Total contributions from sources other than State and Federal Funds	($97,467,557)
3. State share of normal cost plus interest on UAAL: (1c) + (2e)	$6,458,338,684
4. State contribution requirement	
a. State's share of normal cost plus interest on UAAL	$6,458,338,684
b. Guaranteed Minimum Annuity Reserve contribution	400,000
c. Total State contribution requirement	$6,458,738,684

EXHIBIT XI

Development of Actuarially Determined Contribution (ADC)

	Fiscal Year Ended June 30, 2019
Development of the ADC:	
1. Employer Normal Cost	$945,762,040
2. Amortization of Unfunded Actuarial Accrued Liability	6,483,274,750
3. Actuarially Determined Contribution: (1) + (2)	$7,429,036,790

The ADC for fiscal year ending June 30, 2019, is based on the valuation date of June 30, 2017, prepared by Segal Consulting.

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:	3.25% – 9.25%; composite approximately 4.44%
Includes Inflation at:	2.50%
Post-retirement Increase:	Tier I 3% compounded Tier II 1.25% not compounded (lesser of 3% or 1/2 CPI increase, but not less than zero)

Projections – Overview

Based on the results of the June 30, 2019, actuarial valuation, we have projected valuation results to June 30, 2046 commencing with Fiscal Year 2020.

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 2020 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 assumptions regarding the profile of new entrants to TRS were based on the recent experience of TRS with regard to new entrants. 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

Projections – Projection of Funded Ratio to 2046

Amounts above the 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	135,208,059,898	55,533,412,432	(79,674,647,466)	40.6%	124.2%	41.1%

TABLE 1 (*continued*)

Projections – Projection of Funded Ratio to 2046

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	$138,964,156,822	$58,603,298,434	($80,360,858,388)	41.6%	125.0%	42.2%
2022	142,746,598,989	61,404,676,128	(81,341,922,860)	42.4%	124.8%	43.0%
2023	146,779,678,170	64,170,492,044	(82,609,186,126)	42.9%	124.4%	43.7%
2024	150,825,621,849	67,244,890,596	(83,580,731,253)	43.6%	124.4%	44.6%
2025	154,875,416,921	70,455,547,223	(84,419,869,698)	44.4%	124.3%	45.5%
2026	158,915,855,588	73,806,810,521	(85,109,045,068)	45.1%	124.2%	46.4%
2027	162,924,219,758	77,298,636,442	(85,625,583,317)	45.9%	124.1%	47.4%
2028	166,882,563,552	80,916,518,217	(85,966,045,335)	46.7%	123.9%	48.5%
2029	170,773,350,092	84,669,067,593	(86,104,282,499)	47.6%	123.8%	49.6%
2030	174,580,487,895	88,555,967,590	(86,024,520,304)	48.5%	123.6%	50.7%
2031	178,280,871,218	92,581,512,889	(85,699,358,329)	49.4%	123.5%	51.9%
2032	181,852,835,735	96,769,714,622	(85,083,121,112)	50.3%	123.3%	53.2%
2033	185,270,621,458	101,142,436,828	(84,128,184,631)	51.4%	123.2%	54.6%
2034	188,516,465,090	106,365,991,592	(82,150,473,498)	52.9%	123.0%	56.4%
2035	191,568,758,577	111,844,829,070	(79,723,929,508)	54.5%	122.9%	58.4%
2036	194,418,408,783	117,607,185,444	(76,811,223,339)	56.2%	122.7%	60.5%
2037	197,050,751,304	123,684,432,161	(73,366,319,144)	58.1%	122.6%	62.8%
2038	199,436,995,111	130,096,910,102	(69,340,085,009)	60.2%	122.5%	65.2%
2039	201,566,311,329	136,879,257,923	(64,687,053,407)	62.5%	122.3%	67.9%
2040	203,442,900,316	144,085,926,850	(59,356,973,466)	65.0%	122.2%	70.8%
2041	205,051,370,271	151,748,128,776	(53,303,241,495)	67.9%	122.0%	74.0%
2042	206,409,163,238	159,930,033,216	(46,479,130,022)	71.1%	121.8%	77.5%
2043	207,545,463,755	168,705,863,990	(38,839,599,764)	74.8%	121.6%	81.3%
2044	208,511,637,518	178,170,738,395	(30,340,899,123)	78.9%	121.4%	85.4%
2045	209,358,523,648	188,422,671,283	(20,935,852,365)	83.6%	121.1%	90.0%
2046	210,153,482,472	189,138,134,224	(21,015,348,247)	82.8%	120.9%	90.0%

TABLE 2

Projections – Projection of Contributions to Trust to 2046 (Dollars)

Amounts above the 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 §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
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

* *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.*

TABLE 2 (*continued*)

Projections – Projection of Contributions to Trust to 2046 (Dollars)

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	$6,247,115,601
2022	1,044,158,484	67,290,213	4,170,880	5,366,594	76,827,687	23,365,947	5,401,475,183	6,545,827,301
2023	1,079,664,330	69,578,368	4,399,920	5,881,206	79,859,494	23,320,750	5,538,507,953	6,721,352,526
2024	1,115,621,320	71,895,596	4,595,920	6,444,222	82,935,739	23,155,340	5,697,250,420	6,918,962,818
2025	1,150,714,208	74,157,138	4,701,200	6,957,879	85,816,217	22,937,570	5,877,483,933	7,136,951,928
2026	1,186,219,703	76,445,270	4,847,920	7,562,350	88,855,539	22,643,616	6,061,381,869	7,359,100,728
2027	1,222,285,301	78,769,497	5,125,120	8,055,145	91,949,762	22,191,269	6,249,906,724	7,586,333,056
2028	1,258,313,882	81,091,339	5,196,240	8,491,794	94,779,373	21,642,999	6,424,939,608	7,799,675,861
2029	1,295,404,589	83,481,629	5,414,640	9,074,791	97,971,060	20,985,554	6,608,148,493	8,022,509,696
2030	1,333,989,774	85,968,230	5,589,920	9,399,581	100,957,731	20,217,356	6,787,145,068	8,242,309,928
2031	1,373,072,587	88,486,900	5,770,240	9,750,751	104,007,891	19,314,554	6,971,929,888	8,468,324,921
2032	1,412,769,505	91,045,146	5,906,320	10,102,111	107,053,577	18,303,214	7,177,946,320	8,716,072,615
2033	1,453,020,468	93,639,097	6,111,840	10,067,736	109,818,673	17,145,642	7,404,105,501	8,984,090,284
2034	1,493,635,413	96,256,504	6,048,560	9,852,913	112,157,977	15,865,727	8,263,887,428	9,885,546,546
2035	1,535,224,326	98,936,679	6,149,360	9,619,546	114,705,585	14,499,341	8,493,987,821	10,158,417,073
2036	1,577,585,580	101,666,626	6,041,280	9,118,728	116,826,634	13,076,432	8,728,361,372	10,435,850,018
2037	1,621,271,667	104,481,952	6,110,720	8,479,628	119,072,300	11,601,099	8,970,064,869	10,722,009,935
2038	1,665,605,207	107,339,002	6,263,600	7,809,904	121,412,506	9,956,618	9,215,350,556	11,012,324,887
2039	1,709,902,667	110,193,727	6,179,040	6,764,089	123,136,857	8,169,535	9,460,436,614	11,301,645,672
2040	1,754,452,452	113,064,714	6,256,320	5,531,820	124,852,853	6,316,029	9,706,918,724	11,592,540,058
2041	1,798,859,866	115,926,525	5,938,800	4,170,919	126,036,244	4,437,188	9,952,613,135	11,881,946,432
2042	1,843,513,959	118,804,233	5,611,760	2,685,801	127,101,794	2,662,853	10,199,672,351	12,172,950,957
2043	1,888,033,349	121,673,260	5,214,160	1,150,914	128,038,334	1,048,907	10,445,986,298	12,463,106,888
2044	1,932,307,377	124,526,475	4,695,600	-	129,222,075	-	10,690,942,719	12,752,472,172
2045	1,976,980,199	127,405,391	4,177,040	-	131,582,431	-	10,938,105,557	13,046,668,187
2046	2,022,320,960	130,327,351	3,418,240	-	133,745,591	-	1,103,917,253	3,259,983,804

* *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.*

TABLE 2 (*continued*)

Projections – Projection of Contributions to Trust to 2046 (Dollars)

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 – 2018 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%, and 2.00%, respectively, of total payrolls for those years. For 2019 - 2021, the estimate is 2.00% of payroll. All payrolls are assumed to increase at the same rate for years subsequent to 2021.

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 Disctrict 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 - 2020 are based on the June 30, 1993 – June 30, 2019 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 amount is the recertified amount. Items subsequent to 2020 are based on the June 30, 2019 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

Projections – Projection of Contributions to Trust to 2046 (Percent of Payroll)

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

Year Ended June 30	Assumed Payroll	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
1995	$4,633,650,000	9.10%	0.00%	0.00%	0.00%	0.00%	0.36%	5.67%	15.13%
1996	4,863,544,432	8.68%	0.00%	0.00%	0.00%	0.00%	0.35%	6.67%	15.70%
1997	4,903,151,093	8.58%	0.00%	0.00%	0.00%	0.00%	0.35%	7.71%	16.64%
1998	5,264,732,966	8.38%	0.00%	0.00%	0.00%	0.00%	0.34%	8.75%	17.46%
1999	5,558,349,721	15.59%	0.30%	0.00%	0.00%	0.30%	0.33%	10.20%	26.42%
2000	5,887,080,405	10.53%	0.58%	0.00%	0.00%	0.58%	0.31%	10.77%	22.18%
2001	6,271,637,672	10.26%	0.58%	0.00%	0.00%	0.58%	0.32%	11.47%	22.63%
2002	6,666,272,399	10.22%	0.58%	0.00%	0.00%	0.58%	0.35%	12.16%	23.30%
2003	7,115,762,553	10.29%	0.18%	0.00%	0.00%	0.18%	0.35%	13.01%	23.83%
2004	7,345,674,585	10.46%	0.58%	0.00%	0.00%	0.58%	0.40%	13.98%	25.43%
2005	7,669,150,690	9.93%	0.58%	0.00%	0.00%	0.58%	0.49%	11.76%	22.77%
2006	7,871,835,902	10.15%	0.58%	0.19%	0.00%	0.77%	0.31%	6.76%	17.98%
2007	7,939,262,146	10.41%	0.58%	0.24%	0.00%	2.84%	0.52%	9.26%	23.04%
2008	8,293,518,065	10.43%	0.58%	0.00%	0.00%	1.58%	0.58%	12.53%	25.12%
2009	8,817,486,572	9.94%	0.58%	0.03%	0.00%	1.68%	0.63%	16.44%	28.70%
2010	9,252,805,323	9.83%	0.58%	0.03%	0.00%	1.58%	0.82%	22.56%	34.79%
2011	9,684,686,327	9.79%	0.58%	0.05%	0.00%	1.53%	0.78%	24.34%	36.43%
2012	9,995,937,994	9.77%	0.58%	0.05%	0.00%	1.48%	0.85%	24.06%	36.15%
2013	9,932,764,038	9.74%	0.58%	0.05%	0.00%	1.34%	0.84%	27.21%	39.13%
2014	9,982,102,443	10.06%	0.58%	0.05%	0.00%	1.25%	0.97%	34.44%	46.72%
2015	10,416,171,908	10.04%	0.58%	0.06%	0.00%	1.20%	0.24%	32.76%	44.23%
2016	10,599,790,566	9.83%	0.58%	0.05%	0.00%	1.18%	0.76%	35.30%	47.06%
2017	10,541,189,447	9.81%	0.58%	0.02%	0.00%	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%

Note: 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.

The table above 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 3 (*continued*)

Projections – Projection of Contributions to Trust to 2046 (Percent of Payroll)

Year Ended June 30	Assumed Payroll	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	$11,214,640,162	9.00%	0.58%	0.04%	0.04%	0.66%	0.21%	45.84%	55.71%
2022	11,601,760,934	9.00%	0.58%	0.04%	0.05%	0.66%	0.20%	46.56%	56.42%
2023	11,996,270,331	9.00%	0.58%	0.04%	0.05%	0.67%	0.19%	46.17%	56.03%
2024	12,395,792,441	9.00%	0.58%	0.04%	0.05%	0.67%	0.19%	45.96%	55.82%
2025	12,785,713,417	9.00%	0.58%	0.04%	0.05%	0.67%	0.18%	45.97%	55.82%
2026	13,180,218,924	9.00%	0.58%	0.04%	0.06%	0.67%	0.17%	45.99%	55.83%
2027	13,580,947,792	9.00%	0.58%	0.04%	0.06%	0.68%	0.16%	46.02%	55.86%
2028	13,981,265,352	9.00%	0.58%	0.04%	0.06%	0.68%	0.15%	45.95%	55.79%
2029	14,393,384,325	9.00%	0.58%	0.04%	0.06%	0.68%	0.15%	45.91%	55.74%
2030	14,822,108,600	9.00%	0.58%	0.04%	0.06%	0.68%	0.14%	45.79%	55.61%
2031	15,256,362,080	9.00%	0.58%	0.04%	0.06%	0.68%	0.13%	45.70%	55.51%
2032	15,697,438,942	9.00%	0.58%	0.04%	0.06%	0.68%	0.12%	45.73%	55.53%
2033	16,144,671,869	9.00%	0.58%	0.04%	0.06%	0.68%	0.11%	45.86%	55.65%
2034	16,595,949,035	9.00%	0.58%	0.04%	0.06%	0.68%	0.10%	49.79%	59.57%
2035	17,058,048,068	9.00%	0.58%	0.04%	0.06%	0.67%	0.09%	49.79%	59.55%
2036	17,528,728,669	9.00%	0.58%	0.03%	0.05%	0.67%	0.07%	49.79%	59.54%
2037	18,014,129,632	9.00%	0.58%	0.03%	0.05%	0.66%	0.06%	49.79%	59.52%
2038	18,506,724,527	9.00%	0.58%	0.03%	0.04%	0.66%	0.05%	49.79%	59.50%
2039	18,998,918,518	9.00%	0.58%	0.03%	0.04%	0.65%	0.04%	49.79%	59.49%
2040	19,493,916,130	9.00%	0.58%	0.03%	0.03%	0.64%	0.03%	49.79%	59.47%
2041	19,987,331,844	9.00%	0.58%	0.03%	0.02%	0.63%	0.02%	49.79%	59.45%
2042	20,483,488,428	9.00%	0.58%	0.03%	0.01%	0.62%	0.01%	49.79%	59.43%
2043	20,978,148,325	9.00%	0.58%	0.02%	0.01%	0.61%	0.01%	49.79%	59.41%
2044	21,470,081,972	9.00%	0.58%	0.02%	0.00%	0.60%	0.00%	49.79%	59.40%
2045	21,966,446,656	9.00%	0.58%	0.02%	0.00%	0.60%	0.00%	49.79%	59.39%
2046	22,470,232,893	9.00%	0.58%	0.02%	0.00%	0.60%	0.00%	4.91%	14.51%

TABLE 4

Projections – Projection of Employer Normal Cost and Amortization Amount to 2046

Amounts above the 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 Total	Employer Rate Normal Cost	Employer Rate Amortization	Amount of Employer Contribution Total	Amount of Employer Contribution Normal Cost	Amount of Employer Contribution 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%	34.29%	4,923,519,270	1,167,213,754	3,756,305,516

TABLE 4 (*continued*)

Projections – Projection of Employer Normal Cost and Amortization Amount to 2046

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	47.42%	10.07%	37.35%	5,501,668,817	1,168,161,149	4,333,507,668
2023	28	47.03%	9.72%	37.31%	5,641,688,196	1,165,837,225	4,475,850,971
2024	29	46.82%	9.34%	37.48%	5,803,341,499	1,157,497,416	4,645,844,082
2025	30	46.82%	8.97%	37.85%	5,986,237,720	1,146,782,737	4,839,454,983
2026	31	46.83%	8.59%	38.25%	6,172,881,024	1,131,803,064	5,041,077,960
2027	32	46.86%	8.17%	38.69%	6,364,047,754	1,109,574,287	5,254,473,467
2028	33	46.79%	7.74%	39.05%	6,541,361,980	1,081,839,798	5,459,522,182
2029	34	46.74%	7.29%	39.45%	6,727,105,107	1,049,173,915	5,677,931,192
2030	35	46.61%	6.82%	39.79%	6,908,320,154	1,010,410,611	5,897,909,543
2031	36	46.51%	6.33%	40.18%	7,095,252,333	965,628,188	6,129,624,145
2032	37	46.53%	5.83%	40.70%	7,303,303,111	914,423,905	6,388,879,206
2033	38	46.65%	5.31%	41.34%	7,531,069,815	856,601,295	6,674,468,520
2034	39	50.57%	4.78%	45.78%	8,391,911,133	793,812,816	7,598,098,316
2035	40	50.55%	4.25%	46.30%	8,623,192,746	725,165,312	7,898,027,434
2036	41	50.54%	3.73%	46.80%	8,858,264,437	654,595,410	8,203,669,027
2037	42	50.52%	3.22%	47.30%	9,100,738,268	579,825,768	8,520,912,500
2038	43	50.50%	2.69%	47.82%	9,346,719,680	497,078,923	8,849,640,757
2039	44	50.49%	2.15%	48.33%	9,591,743,005	408,754,597	9,182,988,409
2040	45	50.47%	1.62%	48.85%	9,838,087,606	315,586,819	9,522,500,787
2041	46	50.45%	1.11%	49.34%	10,083,086,567	221,835,563	9,861,251,004
2042	47	50.43%	0.65%	49.78%	10,329,436,998	133,237,277	10,196,199,721
2043	48	50.41%	0.25%	50.16%	10,575,073,539	52,520,713	10,522,552,826
2044	49	50.40%	-0.07%	50.47%	10,820,164,794	(15,850,272)	10,836,015,066
2045	50	50.39%	-0.31%	50.70%	11,069,687,988	(67,241,737)	11,136,929,725
2046	51	5.51%	-0.44%	5.95%	1,237,662,843	(99,353,935)	1,337,016,778

TABLE 4 (*continued*)

Projections – Projection of Employer Normal Cost and Amortization Amount to 2046

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 2021 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 - 2021 are based on the June 30, 1993 - June 30, 2019 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 2020 are based on the June 30, 2019 valuation.

TABLE 4 (*continued*)

Projections – Projection of Employer Normal Cost and Amortization Amount to 2046

Notes (*continued*)

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.

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

Projections – Projection of Funded Ratio to 2046 by Tier
Total Tier I and Tier II

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

Year Ended June 30	Contributions	Benefits and Expenses	Market Value Asset Return	Actuarial Value of Assets *	Market 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	2,617,831,332	53,391,192,733	53,262,789,367	131,456,968,953	78,065,776,220	40.6%
2020	5,893,184,063	7,176,323,805	3,707,229,968	55,533,412,432	55,686,879,593	135,208,059,898	79,674,647,466	41.1%

Notes:

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.

Projected amounts may not add to the dollar due to rounding.

Projected buyout amounts are excluded from both the contributions and benefit payments.

** For 2001 to 2008, assets are at fair value; for 2009 and after, assets are 5-year smoothed value.*

TABLE 5 (*continued*)

Projections – Projection of Funded Ratio to 2046 by Tier
Total Tier I and Tier II (*continued*)

Year Ended June 30	Contributions	Benefits and Expenses	Market Value Asset Return	Actuarial Value of Assets *	Market Value of Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	AVA Funded Ratio
2021	$6,247,115,601	$7,447,608,833	$3,856,064,308	$58,603,298,434	$58,342,450,669	$138,964,156,822	$80,360,858,388	42.2%
2022	6,545,827,301	7,721,248,900	4,042,831,791	61,404,676,128	61,209,860,862	142,746,598,989	81,341,922,860	43.0%
2023	6,721,352,526	8,000,636,659	4,239,915,316	64,170,492,044	64,170,492,044	146,779,678,170	82,609,186,126	43.7%
2024	6,918,962,818	8,288,562,713	4,443,998,447	67,244,890,596	67,244,890,596	150,825,621,849	83,580,731,253	44.6%
2025	7,136,951,928	8,582,831,845	4,656,536,545	70,455,547,223	70,455,547,223	154,875,416,921	84,419,869,698	45.5%
2026	7,359,100,728	8,886,274,648	4,878,437,218	73,806,810,521	73,806,810,521	158,915,855,588	85,109,045,068	46.4%
2027	7,586,333,056	9,204,353,167	5,109,846,033	77,298,636,442	77,298,636,442	162,924,219,758	85,625,583,317	47.4%
2028	7,799,675,861	9,532,065,016	5,350,270,931	80,916,518,217	80,916,518,217	166,882,563,552	85,966,045,335	48.5%
2029	8,022,509,696	9,869,472,884	5,599,512,564	84,669,067,593	84,669,067,593	170,773,350,092	86,104,282,499	49.6%
2030	8,242,309,928	10,213,261,362	5,857,851,431	88,555,967,590	88,555,967,590	174,580,487,895	86,024,520,304	50.7%
2031	8,468,324,921	10,568,201,668	6,125,422,045	92,581,512,889	92,581,512,889	178,280,871,218	85,699,358,329	51.9%
2032	8,716,072,615	10,931,052,488	6,403,181,607	96,769,714,622	96,769,714,622	181,852,835,735	85,083,121,112	53.2%
2033	8,984,090,284	11,304,049,528	6,692,681,450	101,142,436,828	101,142,436,828	185,270,621,458	84,128,184,631	54.6%
2034	9,885,546,546	11,679,185,013	7,017,193,232	106,365,991,592	106,365,991,592	188,516,465,090	82,150,473,498	56.4%
2035	10,158,417,073	12,058,689,473	7,379,109,877	111,844,829,070	111,844,829,070	191,568,758,577	79,723,929,508	58.4%
2036	10,435,850,018	12,432,740,510	7,759,246,868	117,607,185,444	117,607,185,444	194,418,408,783	76,811,223,339	60.5%
2037	10,722,009,935	12,804,383,137	8,159,619,919	123,684,432,161	123,684,432,161	197,050,751,304	73,366,319,144	62.8%
2038	11,012,324,887	13,181,824,704	8,581,977,758	130,096,910,102	130,096,910,102	199,436,995,111	69,340,085,009	65.2%
2039	11,301,645,672	13,547,477,446	9,028,179,595	136,879,257,923	136,879,257,923	201,566,311,329	64,687,053,407	67.9%
2040	11,592,540,058	13,887,109,264	9,501,238,132	144,085,926,850	144,085,926,850	203,442,900,316	59,356,973,466	70.8%
2041	11,881,946,432	14,223,794,697	10,004,050,190	151,748,128,776	151,748,128,776	205,051,370,271	53,303,241,495	74.0%
2042	12,172,950,957	14,530,887,743	10,539,841,227	159,930,033,216	159,930,033,216	206,409,163,238	46,479,130,022	77.5%
2043	12,463,106,888	14,800,567,324	11,113,291,210	168,705,863,990	168,705,863,990	207,545,463,755	38,839,599,764	81.3%
2044	12,752,472,172	15,017,724,418	11,730,126,651	178,170,738,395	178,170,738,395	208,511,637,518	30,340,899,123	85.4%
2045	13,046,668,187	15,191,613,887	12,396,878,588	188,422,671,283	188,422,671,283	209,358,523,648	20,935,852,365	90.0%
2046	3,259,983,804	15,312,277,570	12,767,756,708	189,138,134,224	189,138,134,224	210,153,482,472	21,015,348,247	90.0%

Notes:

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.

Projected amounts may not add to the dollar due to rounding.

Projected buyout amounts are excluded from both the contributions and benefit payments.

** For 2001 to 2008, assets are at fair value; for 2009 and after, assets are 5-year smoothed value.*

TABLE 5 (*continued*)

Projections – Projection of Funded Ratio to 2046 by Tier
Tier I

Year Ended June 30	Contributions	Benefits and Expenses	Market Value Asset Return	Actuarial Value of Assets	Market 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	5,707,130,261	7,141,218,543	3,655,602,100	54,671,152,188	54,822,236,484	134,513,610,373	79,842,458,184	40.6%
2021	6,019,416,373	7,405,014,233	3,789,060,629	57,481,554,047	57,225,699,253	138,067,061,366	80,585,507,319	41.6%
2022	6,275,265,219	7,669,764,909	3,956,991,459	59,978,481,478	59,788,191,021	141,604,073,214	81,625,591,736	42.4%
2023	6,406,652,139	7,940,679,363	4,131,482,419	62,385,646,216	62,385,646,216	145,344,474,842	82,958,828,625	42.9%
2024	6,558,464,914	8,216,734,849	4,308,955,787	65,036,332,069	65,036,332,069	149,050,028,955	84,013,696,886	43.6%
2025	6,729,795,798	8,503,667,841	4,490,457,723	67,752,917,749	67,752,917,749	152,701,502,421	84,948,584,672	44.4%
2026	6,902,504,694	8,798,845,331	4,676,332,320	70,532,909,431	70,532,909,431	156,279,988,995	85,747,079,564	45.1%
2027	7,077,020,335	9,107,943,605	4,866,221,346	73,368,207,507	73,368,207,507	159,756,241,067	86,388,033,560	45.9%
2028	7,233,776,915	9,425,798,009	5,059,053,787	76,235,240,199	76,235,240,199	163,104,731,349	86,869,491,149	46.7%
2029	7,396,784,375	9,750,883,653	5,254,073,339	79,135,214,261	79,135,214,261	166,301,998,274	87,166,784,014	47.6%
2030	7,553,166,846	10,083,918,326	5,450,888,696	82,055,351,478	82,055,351,478	169,321,533,166	87,266,181,688	48.5%
2031	7,712,571,924	10,427,648,812	5,648,846,912	84,989,121,503	84,989,121,503	172,131,051,735	87,141,930,233	49.4%
2032	7,890,126,091	10,778,426,673	5,848,147,985	87,948,968,905	87,948,968,905	174,699,177,879	86,750,208,974	50.3%
2033	8,084,275,065	11,137,964,608	6,049,548,689	90,944,828,051	90,944,828,051	176,990,632,488	86,045,804,437	51.4%
2034	8,908,309,754	11,498,930,029	6,275,466,254	94,629,674,029	94,629,674,029	178,976,126,513	84,346,452,484	52.9%
2035	9,100,689,421	11,862,508,713	6,527,413,507	98,395,268,243	98,395,268,243	180,623,449,587	82,228,181,344	54.5%
2036	9,295,028,902	12,219,613,474	6,785,308,317	102,255,991,989	102,255,991,989	181,911,425,924	79,655,433,935	56.2%
2037	9,496,011,883	12,572,912,084	7,050,227,932	106,229,319,720	106,229,319,720	182,813,332,614	76,584,012,894	58.1%
2038	9,698,664,356	12,929,528,714	7,322,972,128	110,321,427,489	110,321,427,489	183,288,815,965	72,967,388,475	60.2%
2039	9,898,038,963	13,274,354,654	7,604,328,875	114,549,440,673	114,549,440,673	183,310,496,294	68,761,055,620	62.5%
2040	10,098,341,612	13,589,373,933	7,896,274,716	118,954,683,068	118,954,683,068	182,870,894,589	63,916,211,521	65.0%
2041	10,297,625,167	13,900,491,494	8,200,727,493	123,552,544,234	123,552,544,234	181,939,848,060	58,387,303,826	67.9%
2042	10,500,374,268	14,180,998,705	8,519,856,241	128,391,776,038	128,391,776,038	180,519,398,573	52,127,622,535	71.1%
2043	10,705,875,679	14,420,823,160	8,857,401,161	133,534,229,719	133,534,229,719	178,625,752,311	45,091,522,592	74.8%
2044	10,914,922,015	14,607,359,882	9,218,160,755	139,059,952,607	139,059,952,607	176,293,159,921	37,233,207,315	78.9%
2045	11,133,822,728	14,742,962,309	9,607,876,797	145,058,689,823	145,058,689,823	173,563,839,125	28,505,149,302	83.6%
2046	1,279,348,710	14,822,931,444	9,680,082,892	141,195,189,982	141,195,189,982	170,492,189,978	29,296,999,996	82.8%

Notes:

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.

Projected amounts may not add to the dollar due to rounding.

TABLE 5 (*continued*)

Projections – Projection of Funded Ratio to 2046 by Tier
Tier II

Year Ended June 30	Contributions	Benefits and Expenses	Market Value Asset Return	Actuarial Value of Assets	Market 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	186,053,802	35,105,262	51,627,868	862,260,243	864,643,109	694,449,525	(167,810,719)	124.2%
2021	227,699,229	42,594,600	67,003,680	1,121,744,387	1,116,751,417	897,095,456	(224,648,931)	125.0%
2022	270,562,082	51,483,990	85,840,332	1,426,194,650	1,421,669,840	1,142,525,775	(283,668,875)	124.8%
2023	314,700,387	59,957,296	108,432,897	1,784,845,828	1,784,845,828	1,435,203,328	(349,642,500)	124.4%
2024	360,497,904	71,827,864	135,042,659	2,208,558,527	2,208,558,527	1,775,592,894	(432,965,633)	124.4%
2025	407,156,130	79,164,004	166,078,821	2,702,629,474	2,702,629,474	2,173,914,500	(528,714,974)	124.3%
2026	456,596,034	87,429,317	202,104,898	3,273,901,089	3,273,901,089	2,635,866,593	(638,034,496)	124.2%
2027	509,312,720	96,409,561	243,624,687	3,930,428,935	3,930,428,935	3,167,978,692	(762,450,244)	124.1%
2028	565,898,947	106,267,007	291,217,143	4,681,278,018	4,681,278,018	3,777,832,203	(903,445,815)	123.9%
2029	625,725,321	118,589,232	345,439,224	5,533,853,332	5,533,853,332	4,471,351,817	(1,062,501,515)	123.8%
2030	689,143,082	129,343,036	406,962,735	6,500,616,113	6,500,616,113	5,258,954,729	(1,241,661,384)	123.6%
2031	755,752,996	140,552,856	476,575,133	7,592,391,386	7,592,391,386	6,149,819,482	(1,442,571,903)	123.5%
2032	825,946,525	152,625,815	555,033,622	8,820,745,718	8,820,745,718	7,153,657,856	(1,667,087,862)	123.3%
2033	899,815,219	166,084,920	643,132,761	10,197,608,777	10,197,608,777	8,279,988,970	(1,917,619,807)	123.2%
2034	977,236,792	180,254,984	741,726,978	11,736,317,563	11,736,317,563	9,540,338,577	(2,195,978,986)	123.0%
2035	1,057,727,652	196,180,760	851,696,371	13,449,560,826	13,449,560,826	10,945,308,991	(2,504,251,836)	122.9%
2036	1,140,821,115	213,127,037	973,938,551	15,351,193,456	15,351,193,456	12,506,982,859	(2,844,210,597)	122.7%
2037	1,225,998,052	231,471,054	1,109,391,987	17,455,112,441	17,455,112,441	14,237,418,691	(3,217,693,750)	122.6%
2038	1,313,660,531	252,295,989	1,259,005,630	19,775,482,613	19,775,482,613	16,148,179,146	(3,627,303,467)	122.5%
2039	1,403,606,709	273,122,792	1,423,850,720	22,329,817,249	22,329,817,249	18,255,815,036	(4,074,002,214)	122.3%
2040	1,494,198,446	297,735,330	1,604,963,417	25,131,243,782	25,131,243,782	20,572,005,727	(4,559,238,055)	122.2%
2041	1,584,321,266	323,303,203	1,803,322,697	28,195,584,542	28,195,584,542	23,111,522,211	(5,084,062,330)	122.0%
2042	1,672,576,689	349,889,038	2,019,984,986	31,538,257,178	31,538,257,178	25,889,764,665	(5,648,492,513)	121.8%
2043	1,757,231,209	379,744,164	2,255,890,049	35,171,634,272	35,171,634,272	28,919,711,444	(6,251,922,828)	121.6%
2044	1,837,550,157	410,364,536	2,511,965,896	39,110,785,788	39,110,785,788	32,218,477,597	(6,892,308,191)	121.4%
2045	1,912,845,459	448,651,578	2,789,001,791	43,363,981,460	43,363,981,460	35,794,684,522	(7,569,296,937)	121.1%
2046	1,980,635,093	489,346,126	3,087,673,816	47,942,944,243	47,942,944,243	39,661,292,494	(8,281,651,749)	120.9%

Notes:

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.

Projected amounts may not add to the dollar due to rounding.

TABLE 6

Projections – 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
2019	$41,658,829,662	$532,094,381	-	$89,266,044,911	$131,456,968,953
2020	46,321,080,629	661,232,162	$33,217,363	88,192,529,743	135,208,059,898
2021	51,143,025,986	798,441,280	98,654,176	86,924,035,380	138,964,156,822
2022	56,125,033,609	946,976,348	195,549,427	85,479,039,605	142,746,598,989
2023	61,261,239,451	1,112,089,764	323,113,564	84,083,235,391	146,779,678,170
2024	66,538,936,763	1,294,891,694	480,701,200	82,511,092,192	150,825,621,849
2025	71,939,817,782	1,495,651,678	678,262,822	80,761,684,639	154,875,416,921
2026	77,441,718,725	1,716,329,885	919,536,709	78,838,270,270	158,915,855,588
2027	83,011,791,826	1,958,898,749	1,209,079,943	76,744,449,241	162,924,219,758
2028	88,618,297,034	2,225,462,498	1,552,369,705	74,486,434,315	166,882,563,552
2029	94,232,618,632	2,516,480,892	1,954,870,926	72,069,379,643	170,773,350,092
2030	99,820,429,971	2,833,224,064	2,425,730,665	69,501,103,195	174,580,487,895
2031	105,339,396,018	3,177,361,493	2,972,457,989	66,791,655,718	178,280,871,218
2032	110,745,148,136	3,550,407,731	3,603,250,125	63,954,029,742	181,852,835,735
2033	115,989,251,352	3,953,916,066	4,326,072,904	61,001,381,136	185,270,621,458
2034	121,024,216,484	4,389,393,385	5,150,945,192	57,951,910,029	188,516,465,090
2035	125,801,471,279	4,858,115,616	6,087,193,374	54,821,978,308	191,568,758,577
2036	130,279,333,321	5,361,572,522	7,145,410,337	51,632,092,603	194,418,408,783
2037	134,410,311,697	5,900,872,165	8,336,546,526	48,403,020,917	197,050,751,304
2038	138,133,718,589	6,476,992,108	9,671,187,037	45,155,097,376	199,436,995,111
2039	141,401,351,982	7,091,214,120	11,164,600,915	41,909,144,312	201,566,311,329
2040	144,166,677,115	7,744,591,065	12,827,414,662	38,704,217,473	203,442,900,316
2041	146,397,832,897	8,437,661,742	14,673,860,470	35,542,015,163	205,051,370,271
2042	148,078,756,829	9,171,708,197	16,718,056,468	32,440,641,744	206,409,163,238
2043	149,206,283,856	9,946,275,441	18,973,436,003	29,419,468,455	207,545,463,755
2044	149,799,910,232	10,760,728,953	21,457,748,644	26,493,249,690	208,511,637,518
2045	149,891,739,701	11,611,419,396	24,183,265,126	23,672,099,424	209,358,523,648
2046	149,529,032,408	12,494,336,727	27,166,955,767	20,963,157,570	210,153,482,472

TABLE 7

Projections – 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
2019	$1,956,453,453	$117,702,647	-	$2,074,156,099
2020	1,959,895,237	117,212,564	$33,441,953	2,110,549,754
2021	1,960,522,284	117,910,997	66,627,527	2,145,060,808
2022	1,960,029,715	120,056,707	99,708,394	2,179,794,816
2023	1,955,915,491	123,432,669	132,522,595	2,211,870,755
2024	1,945,622,612	127,495,057	165,250,231	2,238,367,901
2025	1,930,029,005	131,860,307	199,763,677	2,261,652,990
2026	1,908,137,214	136,613,487	236,322,140	2,281,072,841
2027	1,876,917,914	141,581,676	275,286,654	2,293,786,244
2028	1,836,816,637	146,893,600	317,247,832	2,300,958,069
2029	1,789,979,456	152,548,598	361,699,490	2,304,227,544
2030	1,735,763,601	158,644,545	408,439,377	2,302,847,523
2031	1,673,145,859	165,070,106	457,714,546	2,295,930,510
2032	1,601,546,645	171,705,466	509,934,502	2,283,186,613
2033	1,521,034,497	178,592,082	564,734,598	2,264,361,177
2034	1,432,453,425	185,683,617	622,785,473	2,240,922,515
2035	1,336,113,870	192,947,629	683,506,960	2,212,568,459
2036	1,235,764,587	200,390,937	746,884,763	2,183,040,286
2037	1,130,111,125	207,865,829	812,618,985	2,150,595,940
2038	1,014,943,977	215,262,245	880,595,454	2,110,801,676
2039	890,434,139	222,642,403	952,318,431	2,065,394,973
2040	759,588,538	230,006,987	1,025,793,761	2,015,389,286
2041	626,883,947	237,139,353	1,100,638,883	1,964,662,184
2042	498,718,977	244,117,118	1,176,490,951	1,919,327,046
2043	378,530,267	250,630,560	1,252,582,297	1,881,743,124
2044	270,035,850	256,458,321	1,329,772,891	1,856,267,062
2045	180,937,660	261,141,460	1,406,077,772	1,848,156,891
2046	115,370,797	264,267,658	1,480,334,665	1,859,973,121

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

TABLE 8

Projections – Projection of Benefit Payments to 2046 by Member Group

Year Ended June 30	Tier I Current Active	Tier II Current Active	New Entrants	Inactives	Total Benefit Payments	Administrative Expenses	Total Benefits and Expenses
2019	$119,591,705	$27,356,199	-	$6,718,675,825	$6,865,623,729	$24,335,680	$6,889,959,409
2020	270,569,078	28,294,782	$1,309,640	6,847,317,254	7,147,490,754	28,833,052	7,176,323,806
2021	432,222,634	29,927,980	5,573,946	6,948,444,725	7,416,169,285	31,439,548	7,447,608,834
2022	603,203,004	30,408,132	12,648,036	7,042,464,911	7,688,724,083	32,524,817	7,721,248,900
2023	787,057,074	27,808,356	22,346,240	7,129,794,191	7,967,005,861	33,630,800	8,000,636,661
2024	987,445,472	25,942,838	34,655,765	7,205,767,802	8,253,811,877	34,750,835	8,288,562,712
2025	1,209,797,334	25,315,735	41,165,636	7,270,709,186	8,546,987,891	35,843,955	8,582,831,846
2026	1,455,603,764	24,396,790	48,809,875	7,320,514,293	8,849,324,722	36,949,926	8,886,274,649
2027	1,730,662,587	23,134,000	57,410,821	7,355,072,414	9,166,279,822	38,073,345	9,204,353,167
2028	2,032,126,985	21,662,010	66,977,635	7,372,102,776	9,492,869,406	39,195,610	9,532,065,017
2029	2,356,975,224	21,711,331	77,386,988	7,373,048,381	9,829,121,924	40,350,960	9,869,472,885
2030	2,708,147,716	22,627,852	85,248,852	7,355,684,080	10,171,708,500	41,552,862	10,213,261,362
2031	3,090,038,378	24,000,427	93,011,244	7,318,381,354	10,525,431,403	42,770,265	10,568,201,668
2032	3,501,169,884	25,971,979	100,926,171	7,258,977,658	10,887,045,692	44,006,797	10,931,052,489
2033	3,942,538,744	28,648,921	109,407,375	7,178,193,902	11,258,788,942	45,260,586	11,304,049,529
2034	4,410,798,398	32,134,859	117,679,872	7,072,046,169	11,632,659,298	46,525,714	11,679,185,012
2035	4,904,093,549	36,722,448	126,510,824	6,943,541,471	12,010,868,292	47,821,180	12,058,689,472
2036	5,416,226,739	42,298,193	135,293,052	6,789,781,823	12,383,599,807	49,140,704	12,432,740,511
2037	5,948,697,971	49,184,099	144,097,960	6,611,901,612	12,753,881,642	50,501,495	12,804,383,138
2038	6,506,841,237	57,471,258	153,905,111	6,411,724,644	13,129,942,250	51,882,455	13,181,824,705
2039	7,074,659,273	66,994,018	162,407,392	6,190,154,475	13,494,215,158	53,262,290	13,547,477,448
2040	7,650,284,649	78,060,913	173,131,165	5,930,982,552	13,832,459,279	54,649,985	13,887,109,264
2041	8,220,864,288	91,023,436	182,929,251	5,672,944,477	14,167,761,452	56,033,245	14,223,794,697
2042	8,775,370,280	105,277,443	192,511,984	5,400,303,846	14,473,463,553	57,424,190	14,530,887,743
2043	9,303,687,690	122,278,569	202,729,054	5,113,061,073	14,741,756,386	58,810,938	14,800,567,324
2044	9,787,421,248	141,948,399	211,177,716	4,816,987,012	14,957,534,375	60,190,043	15,017,724,418
2045	10,223,401,518	166,698,467	222,369,293	4,517,563,038	15,130,032,316	61,581,571	15,191,613,887
2046	10,603,286,278	196,218,621	231,432,087	4,218,346,680	15,249,283,666	62,993,904	15,312,277,570

Note: The projected benefit payments shown above do not include projected buyout amounts of $227,212,516, $241,865,851, and $232,586,541 for the years ending June 30, 2020, 2021, and 2022, respectively.

TABLE 9

Projections – Projection of Payroll to 2046 by Member Group

Year Ended June 30	Tier I Current Active	Tier II Current Active	New Entrants	Total Payroll
2019	$8,856,525,819	$1,614,624,894	-	$10,471,150,713
2020	8,768,452,651	1,609,732,720	$457,531,749	10,835,717,120
2021	8,684,648,734	1,610,826,518	919,164,910	11,214,640,162
2022	8,595,515,583	1,619,920,955	1,386,324,396	11,601,760,934
2023	8,499,599,366	1,638,634,273	1,858,036,692	11,996,270,331
2024	8,390,260,172	1,668,245,002	2,337,287,267	12,395,792,441
2025	8,261,756,422	1,702,913,490	2,821,043,505	12,785,713,417
2026	8,106,929,657	1,737,941,296	3,335,347,971	13,180,218,924
2027	7,921,917,567	1,773,914,253	3,885,115,972	13,580,947,792
2028	7,693,499,278	1,809,810,011	4,477,956,063	13,981,265,352
2029	7,440,880,755	1,845,935,187	5,106,568,383	14,393,384,325
2030	7,164,963,243	1,881,824,245	5,775,321,112	14,822,108,600
2031	6,859,106,564	1,917,725,658	6,479,529,858	15,256,362,080
2032	6,520,255,332	1,951,530,580	7,225,653,030	15,697,438,942
2033	6,146,724,993	1,982,930,672	8,015,016,204	16,144,671,869
2034	5,737,762,455	2,011,625,720	8,846,560,860	16,595,949,035
2035	5,305,518,602	2,037,632,389	9,714,897,077	17,058,048,068
2036	4,852,938,497	2,060,087,836	10,615,702,336	17,528,728,669
2037	4,391,929,055	2,078,408,050	11,543,792,527	18,014,129,632
2038	3,910,496,401	2,091,880,166	12,504,347,960	18,506,724,527
2039	3,403,288,420	2,100,703,181	13,494,926,917	18,998,918,518
2040	2,891,711,175	2,106,269,225	14,495,935,730	19,493,916,130
2041	2,383,762,227	2,106,381,567	15,497,188,050	19,987,331,844
2042	1,899,302,995	2,099,081,491	16,485,103,942	20,483,488,428
2043	1,453,357,110	2,084,598,881	17,440,192,334	20,978,148,325
2044	1,052,858,007	2,062,016,358	18,355,207,607	21,470,081,972
2045	712,608,224	2,032,807,531	19,221,030,901	21,966,446,656
2046	463,176,302	1,992,993,359	20,014,063,232	22,470,232,893

TABLE 10

Projections – 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 Sub-Total	Tier II Number Active	Tier II Number Retired and Inactive	Tier II Sub-Total	Total Number Active	Total Number Retired and Inactive	Grand Total
2019	112,544	233,937	346,481	48,208	19,849	68,057	160,752	253,786	414,538
2020	106,320	231,203	337,523	54,432	18,878	73,310	160,752	250,081	410,833
2021	100,567	228,312	328,879	60,185	17,912	78,097	160,752	246,225	406,977
2022	95,231	225,245	320,476	65,521	16,971	82,492	160,752	242,216	402,968
2023	90,184	222,055	312,239	70,568	16,121	86,689	160,752	238,175	398,927
2024	85,425	218,826	304,251	75,327	15,371	90,698	160,752	234,197	394,949
2025	80,776	215,370	296,146	79,976	14,711	94,687	160,752	230,081	390,833
2026	76,126	211,784	287,910	84,626	14,126	98,752	160,752	225,909	386,661
2027	71,396	208,147	279,543	89,356	13,633	102,989	160,752	221,780	382,532
2028	66,714	204,324	271,038	94,038	13,224	107,262	160,752	217,548	378,300
2029	62,093	200,298	262,391	98,659	13,061	111,720	160,752	213,359	374,111
2030	57,485	196,115	253,600	103,267	12,954	116,221	160,752	209,069	369,821
2031	52,878	191,790	244,668	107,874	12,953	120,827	160,752	204,743	365,495
2032	48,276	187,324	235,600	112,476	13,053	125,529	160,752	200,378	361,130
2033	43,684	182,725	226,409	117,068	13,276	130,344	160,752	196,001	356,753
2034	39,177	177,920	217,097	121,575	13,593	135,168	160,752	191,512	352,264
2035	34,779	172,895	207,674	125,973	14,019	139,992	160,752	186,915	347,667
2036	30,554	167,598	198,152	130,198	14,523	144,721	160,752	182,121	342,873
2037	26,404	162,141	188,545	134,348	15,122	149,470	160,752	177,262	338,014
2038	22,318	156,544	178,862	138,434	15,850	154,284	160,752	172,395	333,147
2039	18,415	150,710	169,125	142,337	16,639	158,976	160,752	167,349	328,101
2040	14,761	149,584	164,345	145,991	18,573	164,564	160,752	168,157	328,909
2041	11,452	148,092	159,544	149,300	20,615	169,915	160,752	168,707	329,459
2042	8,536	146,205	154,741	152,216	22,751	174,967	160,752	168,956	329,708
2043	6,030	143,925	149,955	154,722	25,002	179,724	160,752	168,927	329,679
2044	3,982	141,224	145,206	156,770	27,334	184,104	160,752	168,558	329,310
2045	2,523	137,981	140,504	158,229	29,859	188,088	160,752	167,840	328,592
2046	1,541	134,326	135,867	159,211	32,520	191,731	160,752	166,846	327,598

TABLE 11

Projections – Projection of Employer Normal Cost to 2046 by Member Group

Year Ended June 30	Payroll			Employer Normal Cost ($)				Employer Normal Cost (% of Pay)			
	Tier I	Tier II	Total	Tier I	Tier II	Administrative Expenses	Total	Tier I (% of pay)	Tier II (% of pay)	Admin. Expenses (% of pay)	Total (% of pay)
2021	$8,684,648,734	$2,529,991,428	$11,214,640,162	$1,178,903,898	($43,160,704)	$31,439,548	$1,167,182,742	13.57%	-1.71%	0.28%	10.41%
2022	8,595,515,583	3,006,245,351	11,601,760,934	1,186,433,313	(50,796,981)	32,524,817	1,168,161,149	13.80%	-1.69%	0.28%	10.07%
2023	8,499,599,366	3,496,670,965	11,996,270,331	1,190,951,548	(58,745,123)	33,630,800	1,165,837,225	14.01%	-1.68%	0.28%	9.72%
2024	8,390,260,172	4,005,532,269	12,395,792,441	1,190,499,197	(67,752,616)	34,750,835	1,157,497,416	14.19%	-1.69%	0.28%	9.34%
2025	8,261,756,422	4,523,956,995	12,785,713,417	1,186,470,927	(75,532,145)	35,843,955	1,146,782,737	14.36%	-1.67%	0.28%	8.97%
2026	8,106,929,657	5,073,289,267	13,180,218,924	1,178,513,545	(83,660,407)	36,949,926	1,131,803,064	14.54%	-1.65%	0.28%	8.59%
2027	7,921,917,567	5,659,030,225	13,580,947,792	1,163,945,333	(92,444,391)	38,073,345	1,109,574,287	14.69%	-1.63%	0.28%	8.17%
2028	7,693,499,278	6,287,766,074	13,981,265,352	1,144,401,702	(101,757,515)	39,195,610	1,081,839,798	14.87%	-1.62%	0.28%	7.74%
2029	7,440,880,755	6,952,503,570	14,393,384,325	1,120,300,188	(111,477,233)	40,350,960	1,049,173,915	15.06%	-1.60%	0.28%	7.29%
2030	7,164,963,243	7,657,145,357	14,822,108,600	1,090,916,909	(122,059,160)	41,552,862	1,010,410,611	15.23%	-1.59%	0.28%	6.82%
2031	6,859,106,564	8,397,255,516	15,256,362,080	1,055,826,268	(132,968,345)	42,770,265	965,628,188	15.39%	-1.58%	0.28%	6.33%
2032	6,520,255,332	9,177,183,610	15,697,438,942	1,014,723,665	(144,306,557)	44,006,797	914,423,905	15.56%	-1.57%	0.28%	5.83%
2033	6,146,724,993	9,997,946,876	16,144,671,869	967,829,248	(156,488,539)	45,260,586	856,601,295	15.75%	-1.57%	0.28%	5.31%
2034	5,737,762,455	10,858,186,580	16,595,949,035	916,054,804	(168,767,702)	46,525,714	793,812,816	15.97%	-1.55%	0.28%	4.78%
2035	5,305,518,602	11,752,529,466	17,058,048,068	858,617,195	(181,273,063)	47,821,180	725,165,312	16.18%	-1.54%	0.28%	4.25%
2036	4,852,938,497	12,675,790,172	17,528,728,669	799,000,122	(193,545,416)	49,140,704	654,595,410	16.46%	-1.53%	0.28%	3.73%
2037	4,391,929,055	13,622,200,577	18,014,129,632	734,837,510	(205,513,238)	50,501,495	579,825,768	16.73%	-1.51%	0.28%	3.22%
2038	3,910,496,401	14,596,228,126	18,506,724,527	662,999,301	(217,802,833)	51,882,455	497,078,923	16.95%	-1.49%	0.28%	2.69%
2039	3,403,288,420	15,595,630,098	18,998,918,518	584,138,182	(228,645,875)	53,262,290	408,754,597	17.16%	-1.47%	0.28%	2.15%
2040	2,891,711,175	16,602,204,955	19,493,916,130	499,334,532	(238,397,698)	54,649,985	315,586,819	17.27%	-1.44%	0.28%	1.62%
2041	2,383,762,227	17,603,569,617	19,987,331,844	412,345,347	(246,543,029)	56,033,245	221,835,563	17.30%	-1.40%	0.28%	1.11%
2042	1,899,302,995	18,584,185,433	20,483,488,428	327,781,707	(251,968,620)	57,424,190	133,237,277	17.26%	-1.36%	0.28%	0.65%
2043	1,453,357,110	19,524,791,215	20,978,148,325	247,728,128	(254,018,352)	58,810,938	52,520,713	17.05%	-1.30%	0.28%	0.25%
2044	1,052,858,007	20,417,223,965	21,470,081,972	175,278,629	(251,318,945)	60,190,043	(15,850,272)	16.65%	-1.23%	0.28%	-0.07%
2045	712,608,224	21,253,838,432	21,966,446,656	116,802,920	(245,626,228)	61,581,571	(67,241,737)	16.39%	-1.16%	0.28%	-0.31%
2046	463,176,302	22,007,056,591	22,470,232,893	73,684,930	(236,032,769)	62,993,904	(99,353,935)	15.91%	-1.07%	0.28%	-0.44%

TABLE 12

Projections – Projection of Debt Service to 2033

Fiscal Year	Debt Service
2019	$374,735,158
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

EXHIBIT 1

GASB 25 Schedule of Employer Contributions ($ in thousands)

Fiscal Year ended June 30	Actuarially Determined Contribution (ADC)*	Percentage Contributed
2010	$2,481,914	90.6%
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%

**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, 2017, was contributed in the fiscal year ended June 30, 2019).

EXHIBIT 1 (*continued*)

GASB 25 Schedule of Employer Contributions ($ 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
2010	$2,481,914	$2,079,129	$170,653	$2,249,782	$232,132	$9,251,139	24.3%
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%

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

EXHIBIT 2
GASB 25 Schedule of Funding Progress ($ in thousands)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Valuation Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) – (2)	Funded Ratio (2) / (3)	Covered Payroll	UAAL as a % of Payroll (4) / (6)
6/30/2010	$37,439,092	$77,293,198	$39,854,106	48.4%	$9,251,139	430.8%
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%

EXHIBIT 3
GASB 25 Solvency Test ($ in thousands)

Valuation as of June 30	Actuarial Accrued Liability for: (1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active Member (Employer Financed Portion)	Valuation Assets	Portion of Actuarial Accrued Liability Covered by Valuation Assets (1)	(2)	(3)
2010	$7,715,984	$47,475,906	$22,101,308	$37,439,092	100%	63%	0%
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%

EXHIBIT 4
GASB 67 Net Pension Liability

	June 30, 2019	June 30, 2018
The components of the net pension liability:		
Total pension liability	$134,370,954,628	$129,914,383,296
Plan fiduciary net position	(53,262,789,367)	(51,969,546,694)
Net pension liability	$81,108,165,261	$77,944,836,602
Plan fiduciary net position as a percentage of the total pension liability	39.6%	40.0%

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, 2019.

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of June 30, 2019, 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
	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.

Discount rate: The discount rate used to measure the total pension liability was 7.00% as of June 30, 2019. 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, 2019, 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, 2019. 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, 2019.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability as of June 30, 2019, 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, 2019	$99,066,519,428	$81,108,165,261	$66,342,829,110*

* *Revised after completion of the 2019 Comprehensive Annual Financial Report*

EXHIBIT 5

GASB 67 Schedules of Changes in Net Pension Liability

Fiscal Year Ending June 30	2019	2018	2017	2016
Total pension liability				
Service cost	$1,947,627,286	$1,838,002,948	$1,877,570,053	$1,681,242,232
Interest	8,991,684,121	8,703,519,454	8,390,352,464	8,264,257,311
Change of benefit terms	0	(374,603,419)	0	0
Differences between expected and actual experience	258,778,925	1,191,346,970	482,486,212	701,827,169
Changes of assumptions	77,241,572	(666,054,719)	(2,725,599,755)	7,553,894,504
Benefit payments, including refunds of employee contributions	(6,818,760,572)	(6,551,634,376)	(6,438,005,920)	(5,931,207,177)
Net change in total pension liability	$4,456,571,332	$4,140,576,858	$1,586,803,054	$12,270,014,039
Total pension liability – beginning	129,914,383,296	125,773,806,438	124,187,003,384	111,916,989,345
Total pension liability – ending (a)	$134,370,954,628	$129,914,383,296	$125,773,806,438	$124,187,003,384
Plan fiduciary net position				
Contributions – employer	$88,514,781	$84,633,117	$149,495,577	$148,040,767
Contributions – nonemployer contributing entity	4,466,020,692	4,095,125,358	3,986,363,699	3,742,469,245
Contributions – member	963,972,120	938,037,245	929,130,165	951,809,398
Net investment income	2,617,831,332	4,049,271,728	5,520,453,001	(44,103,178)
Benefit payments, including refunds of employee contributions	(6,818,760,572)	(6,551,634,376)	(6,438,005,920)	(5,931,207,177)
Administrative expense	(24,335,680)	(21,550,896)	(22,728,735)	(22,967,917)
Net change in plan fiduciary net position	$1,293,242,673	$2,593,882,176	$4,124,707,787	($1,155,958,862)
Plan fiduciary net position – beginning	51,969,546,694	49,375,664,518	45,250,956,731	46,406,915,593
Plan fiduciary net position – ending (b)	$53,262,789,367	$51,969,546,694	$49,375,664,518	$45,250,956,731
Net pension liability – ending (a) – (b)	$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	39.6%	40.0%	39.3%	36.4%
Actual covered employee payroll	$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	776.1%	766.9%	766.6%	804.5%

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.

EXHIBIT 6

GASB 68 Reconciliation of Collective Net Pension Liability

	Increase/(Decrease) For Fiscal Year Ending June 30, 2019		
	Total Pension Liability (a)	**Plan Fiduciary Net Position (b)**	**Net Pension Liability (a) – (b)**
Balances at beginning of year	$129,914,383,296	$51,969,546,694	$77,944,836,602
Changes for the year			
Service cost	1,947,627,286		1,947,627,286
Interest	8,991,684,121		8,991,684,121
Differences between expected and actual experience	258,778,925		258,778,925
Contributions – employer		88,514,781	(88,514,781)
Contributions – nonemployer contributing entity		4,466,020,692	(4,466,020,692)
Contributions – member		963,972,120	(963,972,120)
Net investment income		2,617,831,332	(2,617,831,332)
Benefit payments, including refunds of employee contributions	(6,818,760,572)	(6,818,760,572)	0
Administrative expense		(24,335,680)	24,335,680
Change of assumptions	77,241,572	0	77,241,572
Change of benefit terms	0	0	0
Net changes	4,456,571,332	1,293,242,673	3,163,328,659
Balances at end of year	$134,370,954,628	$53,262,789,367	$81,108,165,261

EXHIBIT 7

GASB 68 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, 2019	Outstanding Balance at June 30, 2019
Outflows					
Demographic	2014	$39,950,212	5.12	$936,332	$0
Investment	2015	1,621,728,539	5.00	324,345,707	0
Assumption	2015	1,136,454,886	4.93	214,381,954	0
Demographic	2016	701,827,169	5.21	134,707,710	162,996,329
Investment	2016	3,482,927,259	5.00	696,585,452	696,585,451
Assumption	2016	7,553,894,504	5.21	1,449,883,782	1,754,359,376
Demographic	2017	482,486,212	5.14	93,868,913	200,879,473
Demographic	2018	1,191,346,970	5.46	218,195,416	754,956,138
Demographic	2019	258,778,925	5.43*	47,657,261	211,121,664
Investment	2019	973,676,334	5.00	194,735,267	778,941,067
Assumption	2019	77,241,572	5.43*	14,224,967	63,016,605
Total outflows				**$3,389,522,761**	**$4,622,856,103**
Inflows					
Demographic	2015	$90,079,446	4.93	$16,992,674	$0
Investment	2017	2,401,737,113	5.00	480,347,423	960,694,844
Assumption	2017	2,725,599,755	5.14	530,272,326	1,134,782,777
Investment	2018	643,913,847	5.00	128,782,769	386,348,309
Assumption	2018	666,054,719	5.46	121,988,044	422,078,631
Total inflows				**$1,278,383,236**	**$2,903,904,561**

* *Equal to the total expected remaining service lives of 2,298,235 years, divided by total employees that are provided with pensions through the plan of 423,131 (as shown in the table below), rounded to two decimal places*

	Expected Remaining Service	Counts	Average of the Expected Remaining Service
Actives Members	2,298,235	160,752	14.30
Inactive Members	-	139,559	-
Retirees and Beneficiaries	-	122,820	-
Total Employees	2,298,235	423,131	5.43

EXHIBIT 7 (continued)

GASB 68 Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

Fiscal Year Ending June 30	2019	2018
Deferred Outflows of Resources		
Difference between expected and actual experience in the Total Pension Liability	$ 1,329,953,604	$ 1,566,540,311
Changes of assumptions or other inputs	1,817,375,981	3,418,625,112
Net difference between projected and actual earnings on pension plan investments	128,483,365	-
Total Deferred Outflows of Resources	$ 3,275,812,950	$ 4,985,165,423
Deferred Inflows of Resources		
Difference between expected and actual experience in the Total Pension Liability	$ -	$ 16,992,674
Changes of assumptions or other inputs	1,556,861,408	2,209,121,778
Net difference between projected and actual earnings on pension plan investments	-	238,656,735
Total Deferred Inflows of Resources	$ 1,556,861,408	$ 2,464,771,187
Net Deferred Outflows/(Inflows) of Resources	**$ 1,718,951,542**	**$ 2,520,394,236**

Deferred outflows of resources and deferred inflows of resources related to pension will be recognized as follows:

Year Ended June 30:		
2019	N/A	$ 1,854,522,030
2020	$ 1,588,468,205	1,331,850,710
2021	(359,944,523)	(616,562,018)
2022	162,945,618	(93,671,877)
2023	300,872,885	44,255,391
2024	26,609,357	-
Thereafter	-	-

EXHIBIT 8

GASB 68 Collective Pension Expense

	Fiscal Year Ending June 30, 2019	Fiscal Year Ending June 30, 2018
Components of pension expense		
Service cost	$1,947,627,286	$1,838,002,948
Interest on the total pension liability	8,991,684,121	8,703,519,454
Projected earnings on plan investments	(3,591,507,666)	(3,405,357,881)
Contributions – member	(963,972,120)	(938,037,245)
Administrative expense	24,335,680	21,550,896
Current year recognition of:		
Changes of assumptions	1,026,230,333	1,028,141,645
Difference between expected and actual experience	478,372,958	436,303,122
Difference between projected and actual earnings on pension plan investments	606,536,234	(352,846,979)
Change of benefit terms	-	(374,603,419)
Total pension expense	$8,519,306,826	$6,956,672,541

EXHIBIT 9

GASB 67 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
2020	$53,262,389,367*	$5,882,486,083	$7,147,490,753	$27,899,441	$3,683,115,612	$55,652,600,868
2021	55,652,600,868	6,211,127,815	7,414,834,591	29,552,476	3,852,517,987	58,271,859,603
2022	58,271,859,603	6,473,880,101	7,682,929,263	29,850,374	4,035,668,688	61,068,628,755
2023	61,068,628,755	6,613,034,727	7,954,051,335	30,205,366	4,226,811,244	63,924,218,024
2024	63,924,218,024	6,774,426,233	8,231,300,633	30,613,105	4,422,633,199	66,859,363,718
2025	66,859,363,718	6,956,043,775	8,512,021,377	31,059,048	4,624,609,177	69,896,936,245
2026	69,896,936,245	7,140,187,603	8,807,489,256	31,533,196	4,833,326,317	73,031,427,713
2027	73,031,427,713	7,326,853,819	9,116,446,422	32,009,150	5,048,443,879	76,258,269,839
2028	76,258,269,839	7,497,190,459	9,433,868,802	32,480,493	5,269,158,330	79,558,269,334
2029	79,558,269,334	7,672,502,382	9,759,814,085	32,922,829	5,494,870,645	82,932,905,448
2030	82,932,905,448	7,841,703,429	10,090,820,418	33,374,692	5,725,416,173	86,375,829,939
2031	86,375,829,939	8,014,625,289	10,435,564,317	33,836,889	5,960,390,939	89,881,444,962
2032	89,881,444,962	8,206,193,068	10,787,717,223	34,278,888	6,200,148,041	93,465,789,960
2033	93,465,789,960	8,414,872,874	11,149,521,064	34,696,022	6,445,678,250	97,142,123,999
2034	97,142,123,999	9,253,304,314	11,512,119,168	35,086,312	6,719,662,139	101,567,884,972
2035	101,567,884,972	9,458,997,120	11,878,606,826	35,441,784	7,023,825,146	106,136,658,627
2036	106,136,658,627	9,665,938,559	12,237,735,838	35,783,970	7,338,300,760	110,867,378,138
2037	110,867,378,138	9,877,973,062	12,593,259,543	36,107,292	7,664,417,688	115,780,402,052
2038	115,780,402,052	10,092,456,626	12,953,679,765	36,430,128	8,003,210,279	120,885,959,064
2039	120,885,959,064	10,302,393,074	13,300,012,953	36,725,008	8,355,815,063	126,207,429,240
2040	126,207,429,240	10,510,145,994	13,619,852,509	36,971,317	8,724,386,323	131,785,137,730
2041	131,785,137,730	10,714,524,989	13,931,860,654	37,191,845	9,111,051,178	137,641,661,397
2042	137,641,661,397	10,917,943,407	14,210,949,127	37,374,941	9,518,352,975	143,829,633,713
2043	143,829,633,713	11,119,341,813	14,450,311,742	37,541,613	9,950,176,456	150,411,298,626
2044	150,411,298,626	11,318,953,857	14,633,962,330	37,690,138	10,411,446,452	157,470,046,467
2045	157,470,046,467	11,523,852,261	14,774,078,357	37,818,317	10,907,821,698	165,089,823,752
2046	165,089,823,752	1,645,435,184	14,853,100,173	37,937,450	11,092,691,577	162,936,912,889
2047	162,936,912,889	1,596,874,859	14,886,403,693	38,062,202	10,939,118,216	160,548,440,069
2048	160,548,440,069	1,579,432,098	14,885,002,843	38,179,292	10,771,359,554	157,976,049,587
2049	157,976,049,587	1,586,304,047	14,856,026,911	38,262,786	10,592,543,973	155,260,607,909
2050	155,260,607,909	1,596,141,977	14,829,566,843	38,293,273	10,403,732,419	152,392,622,189
2051	152,392,622,189	1,607,437,219	14,807,457,103	38,024,613	10,204,151,996	149,358,729,688
2052	149,358,729,688	1,618,972,871	14,801,880,825	37,703,363	9,992,389,682	146,130,508,053
2053	146,130,508,053	1,629,575,227	14,805,220,461	37,330,888	9,766,681,399	142,684,213,330
2054	142,684,213,330	1,638,630,455	14,802,155,020	36,908,765	9,525,879,767	139,009,659,767
2055	139,009,659,767	1,646,992,293	14,843,545,483	36,438,766	9,267,521,465	135,044,189,275
2056	135,044,189,275	1,655,307,467	14,848,152,937	35,922,848	8,990,086,358	130,805,507,316

** Does not reflect $400,000 AAI buyout receivable*

EXHIBIT 9 (continued)

GASB 67 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
2057	$130,805,507,316	$1,663,884,456	$14,830,127,508	$35,363,140	$8,694,329,295	$126,298,230,419
2058	126,298,230,419	1,672,714,102	14,781,548,650	34,761,926	8,380,850,253	121,535,484,198
2059	121,535,484,198	1,682,588,275	14,687,917,776	34,121,632	8,051,103,104	116,547,136,168
2060	116,547,136,168	1,695,113,567	14,614,042,233	33,444,809	7,704,966,460	111,299,729,153
2061	111,299,729,153	1,710,822,055	14,465,628,578	32,734,115	7,343,417,118	105,855,605,634
2062	105,855,605,634	1,729,043,919	14,266,411,967	31,992,298	6,969,964,782	100,256,210,070
2063	100,256,210,070	1,749,546,194	14,028,115,645	31,222,180	6,587,091,998	94,533,510,436
2064	94,533,510,436	1,772,034,477	13,742,252,287	30,426,638	6,197,323,175	88,730,189,163
2065	88,730,189,163	1,796,425,582	13,428,791,266	29,608,587	5,802,944,142	82,871,159,034
2066	82,871,159,034	1,822,439,675	13,076,150,179	28,783,619	5,406,093,838	76,994,758,749
2067	76,994,758,749	1,849,264,239	12,680,042,202	27,956,599	5,009,577,403	71,145,601,590
2068	71,145,601,590	1,876,745,277	12,252,992,805	27,129,047	4,616,073,931	65,358,298,946
2069	65,358,298,946	1,904,784,825	11,788,931,545	26,302,435	4,228,215,206	59,676,064,998
2070	59,676,064,998	1,933,254,308	11,295,116,790	25,478,192	3,848,767,626	54,137,491,950
2071	54,137,491,950	1,962,150,933	10,773,293,426	24,657,696	3,480,371,430	48,782,063,190
2072	48,782,063,190	1,991,480,760	10,226,019,667	23,842,271	3,125,701,082	43,649,383,094
2073	43,649,383,094	2,021,250,507	9,657,159,172	23,033,184	2,787,393,852	38,777,835,097
2074	38,777,835,097	2,051,466,630	9,056,963,994	22,231,644	2,468,477,942	34,218,584,032
2075	34,218,584,032	2,082,135,840	8,432,858,952	21,438,797	2,172,275,215	30,018,697,339
2076	30,018,697,339	2,113,264,949	7,804,752,082	20,655,726	1,901,383,814	26,207,938,293
2077	26,207,938,293	2,144,860,869	7,180,301,698	19,883,451	1,657,619,331	22,810,233,345
2078	22,810,233,345	2,176,930,621	6,562,108,083	19,122,924	1,442,565,821	19,848,498,780
2079	19,848,498,780	2,209,481,327	5,947,532,671	18,375,030	1,257,919,991	17,349,992,396
2080	17,349,992,396	2,242,520,219	5,355,960,602	17,640,588	1,104,911,634	15,323,823,060
2081	15,323,823,060	2,276,054,639	4,794,812,761	16,920,349	983,918,868	13,772,063,457
2082	13,772,063,457	2,310,092,035	4,258,992,860	16,214,993	895,265,388	12,702,213,027
2083	12,702,213,027	2,344,639,973	3,752,391,803	15,525,138	839,340,218	12,118,276,277
2084	12,118,276,277	2,379,706,129	3,277,374,929	14,851,333	816,341,135	12,022,097,279
2085	12,022,097,279	2,415,298,295	2,836,600,982	14,194,059	826,304,423	12,412,904,957
2086	12,412,904,957	2,451,424,384	2,432,139,665	13,553,736	869,103,931	13,287,739,871
2087	13,287,739,871	2,488,092,423	2,065,283,904	12,930,718	944,487,514	14,642,105,185
2088	14,642,105,185	2,525,310,564	1,736,502,044	12,325,301	1,052,124,276	16,470,712,680
2089	16,470,712,680	2,563,087,080	1,445,372,231	11,737,717	1,191,659,087	18,768,348,899
2090	18,768,348,899	2,601,430,369	1,190,606,400	11,168,144	1,362,772,377	21,530,777,101
2091	21,530,777,101	2,640,348,956	970,345,832	10,616,701	1,565,232,922	24,755,396,447
2092	24,755,396,447	2,679,851,494	782,240,122	10,083,456	1,798,941,228	28,441,865,592
2093	28,441,865,592	2,719,946,767	623,618,910	9,568,425	2,063,967,172	32,592,592,196
2094	32,592,592,196	2,760,643,691	491,579,889	9,071,576	2,360,581,182	37,213,165,605

EXHIBIT 9 (continued)

GASB 67 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
2095	$37,213,165,605	$2,801,951,316	$382,973,558	$8,592,831	$2,689,285,065	$42,312,835,597
2096	42,312,835,597	2,843,878,829	294,775,573	8,132,068	3,050,832,483	47,904,639,267
2097	47,904,639,267	2,886,435,555	224,062,029	7,689,126	3,446,238,703	54,005,562,370
2098	54,005,562,370	2,929,630,961	168,097,032	7,263,806	3,876,788,820	60,636,621,313
2099	60,636,621,313	2,973,474,654	124,474,187	6,855,872	4,344,038,553	67,822,804,461
2100	67,822,804,461	3,017,976,389	90,942,261	6,465,057	4,849,816,230	75,593,189,762
2101	75,593,189,762	3,063,146,066	65,535,556	6,091,066	5,396,226,464	83,980,935,669
2102	83,980,935,669	3,108,993,734	46,618,035	5,733,575	5,985,647,971	93,023,225,764
2103	93,023,225,764	3,155,529,595	32,725,905	5,392,236	6,620,735,204	102,761,372,422
2104	102,761,372,422	3,202,764,004	22,749,484	5,066,680	7,304,419,244	113,240,739,505
2105	113,240,739,505	3,250,707,472	15,691,290	4,756,521	8,039,910,854	124,510,910,021
2106	124,510,910,021	3,299,370,669	10,808,791	4,461,352	8,830,707,220	136,625,717,767
2107	136,625,717,767	3,348,764,426	7,485,978	4,180,756	9,680,598,663	149,643,414,121
2108	149,643,414,121	3,398,899,736	5,173,091	3,914,303	10,593,682,420	163,626,908,883
2109	163,626,908,883	3,449,787,759	3,646,430	3,661,552	11,574,370,414	178,643,759,074
2110	178,643,759,074	3,501,439,822	2,589,249	3,422,057	12,627,403,133	194,766,590,723
2111	194,766,590,723	3,553,867,426	1,862,677	3,195,365	13,757,869,679	212,073,269,786
2112	212,073,269,786	3,607,082,242	1,362,166	2,981,021	14,971,224,752	230,647,233,593
2113	230,647,233,593	3,661,096,117	807,497	2,778,566	16,273,319,203	250,578,062,849
2114	250,578,062,849	3,715,921,080	547,134	2,587,544	17,670,411,924	271,961,261,175
2115	271,961,261,175	3,771,569,338	368,955	2,407,498	19,169,196,033	294,899,250,093
2116	294,899,250,093	3,828,053,283	269,566	2,237,976	20,776,841,607	319,501,637,441
2117	319,501,637,441	3,885,385,495	247,070	2,078,529	22,501,021,717	345,885,719,054
2118	345,885,719,054	3,943,578,743	6,523	1,928,715	24,349,957,856	374,177,320,416
2119	374,177,320,416	4,002,645,989	3,066	1,788,097	26,332,442,348	404,510,617,590
2120	404,510,617,590	4,062,600,389	1,550	1,656,249	28,457,876,222	437,029,436,402
2121	437,029,436,402	4,123,455,299	564	1,532,749	30,736,327,818	471,887,686,206
2122	471,887,686,206	4,185,224,277	0	1,417,190	33,178,571,282	509,250,064,575

EXHIBIT 9 (continued)

GASB 67 Development of Blended Discount Rate

Fiscal Year	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments at 7.00%	Present Value of "Unfunded" Benefit Payments at 3.50%*	Present Value of Benefit Payments at 7.00%
2020	$53,262,389,367**	$7,147,490,753	$7,147,490,753	$0	$6,909,740,116	$0	$6,909,740,116
2021	55,652,600,868	7,414,834,591	7,414,834,591	0	6,699,244,074	0	6,699,244,074
2022	58,271,859,603	7,682,929,263	7,682,929,263	0	6,487,350,914	0	6,487,350,914
2023	61,068,628,755	7,954,051,335	7,954,051,335	0	6,276,899,392	0	6,276,899,392
2024	63,924,218,024	8,231,300,633	8,231,300,633	0	6,070,737,639	0	6,070,737,639
2025	66,859,363,718	8,512,021,377	8,512,021,377	0	5,867,078,896	0	5,867,078,896
2026	69,896,936,245	8,807,489,256	8,807,489,256	0	5,673,585,018	0	5,673,585,018
2027	73,031,427,713	9,116,446,422	9,116,446,422	0	5,488,418,901	0	5,488,418,901
2028	76,258,269,839	9,433,868,802	9,433,868,802	0	5,307,960,983	0	5,307,960,983
2029	79,558,269,334	9,759,814,085	9,759,814,085	0	5,132,106,461	0	5,132,106,461
2030	82,932,905,448	10,090,820,418	10,090,820,418	0	4,959,030,868	0	4,959,030,868
2031	86,375,829,939	10,435,564,317	10,435,564,317	0	4,792,945,555	0	4,792,945,555
2032	89,881,444,962	10,787,717,223	10,787,717,223	0	4,630,547,385	0	4,630,547,385
2033	93,465,789,960	11,149,521,064	11,149,521,064	0	4,472,756,068	0	4,472,756,068
2034	97,142,123,999	11,512,119,168	11,512,119,168	0	4,316,090,080	0	4,316,090,080
2035	101,567,884,972	11,878,606,826	11,878,606,826	0	4,162,142,581	0	4,162,142,581
2036	106,136,658,627	12,237,735,838	12,237,735,838	0	4,007,455,814	0	4,007,455,814
2037	110,867,378,138	12,593,259,543	12,593,259,543	0	3,854,091,710	0	3,854,091,710
2038	115,780,402,052	12,953,679,765	12,953,679,765	0	3,705,043,141	0	3,705,043,141
2039	120,885,959,064	13,300,012,953	13,300,012,953	0	3,555,235,707	0	3,555,235,707
2040	126,207,429,240	13,619,852,509	13,619,852,509	0	3,402,553,496	0	3,402,553,496
2041	131,785,137,730	13,931,860,654	13,931,860,654	0	3,252,804,048	0	3,252,804,048
2042	137,641,661,397	14,210,949,127	14,210,949,127	0	3,100,902,326	0	3,100,902,326
2043	143,829,633,713	14,450,311,742	14,450,311,742	0	2,946,852,787	0	2,946,852,787
2044	150,411,298,626	14,633,962,330	14,633,962,330	0	2,789,069,776	0	2,789,069,776
2045	157,470,046,467	14,774,078,357	14,774,078,357	0	2,631,564,791	0	2,631,564,791
2046	165,089,823,752	14,853,100,173	14,853,100,173	0	2,472,560,924	0	2,472,560,924
2047	162,936,912,889	14,886,403,693	14,886,403,693	0	2,315,985,872	0	2,315,985,872
2048	160,548,440,069	14,885,002,843	14,885,002,843	0	2,164,269,095	0	2,164,269,095
2049	157,976,049,587	14,856,026,911	14,856,026,911	0	2,018,743,939	0	2,018,743,939
2050	155,260,607,909	14,829,566,843	14,829,566,843	0	1,883,316,219	0	1,883,316,219
2051	152,392,622,189	14,807,457,103	14,807,457,103	0	1,757,484,430	0	1,757,484,430
2052	149,358,729,688	14,801,880,825	14,801,880,825	0	1,641,890,267	0	1,641,890,267
2053	146,130,508,053	14,805,220,461	14,805,220,461	0	1,534,823,098	0	1,534,823,098
2054	142,684,213,330	14,802,155,020	14,802,155,020	0	1,434,117,113	0	1,434,117,113
2055	139,009,659,767	14,843,545,483	14,843,545,483	0	1,344,044,165	0	1,344,044,165
2056	135,044,189,275	14,848,152,937	14,848,152,937	0	1,256,505,942	0	1,256,505,942

* *Bond Buyer’s 20-Bond GO index*

*** Does not reflect $400,000 AAI buyout receivable*

EXHIBIT 9 (continued)

GASB 67 Development of Blended Discount Rate

Fiscal Year	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments at 7.00%	Present Value of "Unfunded" Benefit Payments at 3.50%*	Present Value of Benefit Payments at 7.00%
2057	$130,805,507,316	$14,830,127,508	$14,830,127,508	$0	$1,172,879,031	$0	$1,172,879,031
2058	126,298,230,419	14,781,548,650	14,781,548,650	0	1,092,557,987	0	1,092,557,987
2059	121,535,484,198	14,687,917,776	14,687,917,776	0	1,014,614,382	0	1,014,614,382
2060	116,547,136,168	14,614,042,233	14,614,042,233	0	943,468,407	0	943,468,407
2061	111,299,729,153	14,465,628,578	14,465,628,578	0	872,791,556	0	872,791,556
2062	105,855,605,634	14,266,411,967	14,266,411,967	0	804,459,545	0	804,459,545
2063	100,256,210,070	14,028,115,645	14,028,115,645	0	739,273,278	0	739,273,278
2064	94,533,510,436	13,742,252,287	13,742,252,287	0	676,830,327	0	676,830,327
2065	88,730,189,163	13,428,791,266	13,428,791,266	0	618,123,192	0	618,123,192
2066	82,871,159,034	13,076,150,179	13,076,150,179	0	562,515,168	0	562,515,168
2067	76,994,758,749	12,680,042,202	12,680,042,202	0	509,789,938	0	509,789,938
2068	71,145,601,590	12,252,992,805	12,252,992,805	0	460,393,264	0	460,393,264
2069	65,358,298,946	11,788,931,545	11,788,931,545	0	413,978,180	0	413,978,180
2070	59,676,064,998	11,295,116,790	11,295,116,790	0	370,689,217	0	370,689,217
2071	54,137,491,950	10,773,293,426	10,773,293,426	0	330,433,399	0	330,433,399
2072	48,782,063,190	10,226,019,667	10,226,019,667	0	293,128,668	0	293,128,668
2073	43,649,383,094	9,657,159,172	9,657,159,172	0	258,712,423	0	258,712,423
2074	38,777,835,097	9,056,963,994	9,056,963,994	0	226,760,161	0	226,760,161
2075	34,218,584,032	8,432,858,952	8,432,858,952	0	197,321,848	0	197,321,848
2076	30,018,697,339	7,804,752,082	7,804,752,082	0	170,677,264	0	170,677,264
2077	26,207,938,293	7,180,301,698	7,180,301,698	0	146,749,110	0	146,749,110
2078	22,810,233,345	6,562,108,083	6,562,108,083	0	125,340,778	0	125,340,778
2079	19,848,498,780	5,947,532,671	5,947,532,671	0	106,170,060	0	106,170,060
2080	17,349,992,396	5,355,960,602	5,355,960,602	0	89,354,993	0	89,354,993
2081	15,323,823,060	4,794,812,761	4,794,812,761	0	74,760,006	0	74,760,006
2082	13,772,063,457	4,258,992,860	4,258,992,860	0	62,061,291	0	62,061,291
2083	12,702,213,027	3,752,391,803	3,752,391,803	0	51,102,047	0	51,102,047
2084	12,118,276,277	3,277,374,929	3,277,374,929	0	41,713,100	0	41,713,100
2085	12,022,097,279	2,836,600,982	2,836,600,982	0	33,741,222	0	33,741,222
2086	12,412,904,957	2,432,139,665	2,432,139,665	0	27,037,547	0	27,037,547
2087	13,287,739,871	2,065,283,904	2,065,283,904	0	21,457,285	0	21,457,285
2088	14,642,105,185	1,736,502,044	1,736,502,044	0	16,861,124	0	16,861,124
2089	16,470,712,680	1,445,372,231	1,445,372,231	0	13,116,174	0	13,116,174
2090	18,768,348,899	1,190,606,400	1,190,606,400	0	10,097,454	0	10,097,454
2091	21,530,777,101	970,345,832	970,345,832	0	7,691,064	0	7,691,064
2092	24,755,396,447	782,240,122	782,240,122	0	5,794,503	0	5,794,503
2093	28,441,865,592	623,618,910	623,618,910	0	4,317,294	0	4,317,294
2094	32,592,592,196	491,579,889	491,579,889	0	3,180,553	0	3,180,553

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

EXHIBIT 9 (continued)

GASB 67 Development of Blended Discount Rate

Fiscal Year	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments at 7.00%	Present Value of "Unfunded" Benefit Payments at 3.50%*	Present Value of Benefit Payments at 7.00%
2095	$37,213,165,605	$382,973,558	$382,973,558	$0	$2,315,760	$0	$2,315,760
2096	42,312,835,597	294,775,573	294,775,573	0	1,665,837	0	1,665,837
2097	47,904,639,267	224,062,029	224,062,029	0	1,183,383	0	1,183,383
2098	54,005,562,370	168,097,032	168,097,032	0	829,724	0	829,724
2099	60,636,621,313	124,474,187	124,474,187	0	574,208	0	574,208
2100	67,822,804,461	90,942,261	90,942,261	0	392,077	0	392,077
2101	75,593,189,762	65,535,556	65,535,556	0	264,058	0	264,058
2102	83,980,935,669	46,618,035	46,618,035	0	175,547	0	175,547
2103	93,023,225,764	32,725,905	32,725,905	0	115,172	0	115,172
2104	102,761,372,422	22,749,484	22,749,484	0	74,824	0	74,824
2105	113,240,739,505	15,691,290	15,691,290	0	48,233	0	48,233
2106	124,510,910,021	10,808,791	10,808,791	0	31,051	0	31,051
2107	136,625,717,767	7,485,978	7,485,978	0	20,099	0	20,099
2108	149,643,414,121	5,173,091	5,173,091	0	12,980	0	12,980
2109	163,626,908,883	3,646,430	3,646,430	0	8,551	0	8,551
2110	178,643,759,074	2,589,249	2,589,249	0	5,675	0	5,675
2111	194,766,590,723	1,862,677	1,862,677	0	3,815	0	3,815
2112	212,073,269,786	1,362,166	1,362,166	0	2,608	0	2,608
2113	230,647,233,593	807,497	807,497	0	1,445	0	1,445
2114	250,578,062,849	547,134	547,134	0	915	0	915
2115	271,961,261,175	368,955	368,955	0	577	0	577
2116	294,899,250,093	269,566	269,566	0	394	0	394
2117	319,501,637,441	247,070	247,070	0	337	0	337
2118	345,885,719,054	6,523	6,523	0	8	0	8
2119	374,177,320,416	3,066	3,066	0	4	0	4
2120	404,510,617,590	1,550	1,550	0	2	0	2
2121	437,029,436,402	564	564	0	1	0	1
2122	471,887,686,206	0	0	0	0	0	0
Total					$152,893,619,711	$0	$152,893,619,711

** 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, 2019 are summarized in the following table:

Asset Classes	Expected Arithmetic Returns Over 20 Years*	Target Allocation**
US Equities Large Cap	6.3%	15.0%
US Equities Small/Mid Cap	7.7	2.0
International Equities Developed	7.0	13.6
Emerging Markets Equities	9.5	3.4
US Bonds Code	2.2	8.0
US Bonds High Yield	4.0	4.2
International Debt Developed	1.1	2.2
Emerging International Debt	4.4	2.6
Real Return	1.8	4.0
Real Estate	5.2	16.0
Absolute Return	4.1	14.0
Private Equity	9.7	15.0
Total		100.0%

* *Based of the 2018 Horizon Survey Study*

** *Breakout determined with assistance from TRS staff*

Summary of Assumptions and Methods

Rationale for Assumptions:	The information and analysis used in supporting each assumption that has a significant effect on this valuation is shown in the demographic and economic experience review dated September 18, 2018. 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.)

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, 2017 and June 30, 2018 is 5.93%.

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%

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%

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 1 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 (previously, 25%).

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.)

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 Purchased
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

2.2 Upgrade 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.)

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	$46,549	5.1%	$46,625	26.2%
27	49,685	6.8	50,763	26.0
32	60,801	3.7	53,235	10.5
37	64,603	1.9	57,119	5.4
42	68,534	1.3	58,814	4.6
47	68,519	1.0	63,042	3.1
52	70,003	0.7	60,168	1.9
57	83,547	0.3	61,104	0.9
62	60,139	0.2	68,666	0.4

Substitutes, part-time, and hourly paid:

	Male		Female	
Age	**Salary**	**Proportion**	**Salary**	**Proportion**
22	$26,626	6.6%	$28,485	18.7%
27	24,139	7.5	26,559	14.5
32	24,385	3.2	24,906	6.8
37	24,345	2.1	22,281	6.9
42	21,769	2.2	20,037	9.6
47	21,598	1.4	19,637	5.8
52	19,521	1.5	19,076	4.1
57	17,945	1.1	18,994	3.0
62	19,018	1.2	19,200	1.8
67	18,089	0.7	20,375	0.7
70	20,414	0.3	16,843	0.3

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: $28,833,052 of administrative expenses is expected to be paid for the year beginning July 1, 2019. $31,439,548 of administrative expenses is expected to be paid for the year beginning July 1, 2020 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.

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.

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

Membership:

Employers of the System include:

- The Illinois public common school districts outside of Chicago,
- Certain state agencies employing certified teachers, and
- The State Board of Education, Illinois School Board Association, statewide and national teacher organizations, educational cooperatives and the retirement system.

Employees covered under the System include:

- 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;
- Any position requiring teacher certification in certain state agencies;
- 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;
- Any employee of a school board association who is certificated under the teacher certification law;
- 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;
- 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;

- 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;
- 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
- Any educational, administrative, professional, or other staff employed in a charter school that is certificated under the teacher certification law.

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.

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.

"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.

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.

"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

Eligibility	*Tier I:* Age 60 with 10 years of service, or age 62 with 5 years of service *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. *Tier II:* The annual benefit is the amount under (i) below.

(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.*

(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.

(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.

Maximum amount under (i) and (ii) above is 75% of final average salary.

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* *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.*

Early Retirement

Eligibility	*Tier I:* Age 55 with 20 years of service *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. *Tier II:* Equal to the amount computed under normal retirement, reduced by 6% for each year the member is under age 67.
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 nondiscounted 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: (a) 35% of the member's most recent annual contract salary, or (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. 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.

Deferred Vested Benefits

Eligibility	*Tier I:* 5 years of service *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. *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.*

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. 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. 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. 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. 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.

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.

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.

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.

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.

New 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.

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).

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.

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.

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 ending 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 ending 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:

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 Actuarial Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., 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.

Actuarial Math: The term given to a funding policy which is designed to systematically fully fund a public employee retirement system over a reasonable amount of time.

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.

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:

a. Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)
b. Multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
c. Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: 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.
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:

(a) Investment return — the rate of investment yield that the System will earn over the long-term future;

(b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;

(c) Retirement rates — the rate or probability of retirement at a given age;

(d) Turnover rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement;

(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.

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.

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 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.

- 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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