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TEACHERS'
Retirement System
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KENTUCKY

Teachers' Retirement System of the State of Kentucky Report of the Actuary on the Annual Valuation of the Retirement Annuity Trust

Prepared as of June 30, 2021

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November 15, 2021

Board of Trustees
Teachers' Retirement System of the
State of Kentucky
479 Versailles Road
Frankfort, KY 40601-3800

Members of the Board:

Section 161.400 of the law governing the operation of the Teachers' Retirement System of the State of Kentucky provides that the actuary shall make an actuarial valuation of the system. We have submitted the results of the annual actuarial valuation prepared as of June 30, 2021. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The combined member and state contribution rates as a percentage of payroll for the fiscal year ending June 30, 2024 required to support the total benefits of the system are as follows:

Group	Combined Member and State Contribution Requirement
University members hired before July 1, 2008	37.00%
University members hired on or after July 1, 2008	38.00%
Non-University members hired before July 1, 2008	39.96%
Non-University members hired on or after July 1, 2008	40.96%

These rates represent an increase since the previous valuation in the total pension actuarially determined employer contribution rates (ADEC) of 0.19% of payroll for the fiscal year ending June 30, 2024.

A breakdown of the changes in the components of the ADEC are as follows:

- a decrease in the expected state special appropriation from 2.61% to 2.38%, or 0.23% of payroll,
- a decrease in the amount required for life insurance benefits of 0.08% to 0.06% of payroll,
- the additional required increase of 0.40%, from 15.78% to 16.18%.

Since the previous valuation, various economic and demographic assumptions have been revised to reflect the results of the experience investigation for the five-year period ending June 30, 2020. In addition, the contribution requirements for the fiscal year ending June 30, 2024 use a direct rate smoothing methodology over a five-year period. These revised assumption changes and methods were adopted by the Board on September 20, 2021 and are discussed on page 4 of the report. The valuation also considers the effect of membership to the System enacted as of June 20, 2021.

The financing objective of the system is that contribution rates will remain relatively level over time as a percentage of payroll. The promised benefits of the system are included in the actuarially calculated contribution rates which are developed using the entry age normal cost method.

Five-year market related value of plan assets is used for actuarial valuation purposes. Gains and losses are reflected in the total unfunded actuarial accrued liability that is being amortized by regular annual contributions as a level percentage of payroll in accordance with the funding policy adopted by the Board, on the assumption that payroll will increase by 2.75% annually. The assumptions recommended by the actuary and adopted by the Board are reasonably related to the experience under the system and to reasonable expectations of anticipated experience under the system.

We have prepared the trend information shown in the Schedule of Funding Progress in the Financial Section of the Annual Report and Schedule A, Schedule B, Schedule C, Solvency Test and Analysis of Financial Experience shown in the Actuarial Section of the Annual Report. We have also included a Sensitivity Analysis that is required under Actuarial Standards of Practice Statement No. 51 (ASOP 51).

This is to certify that the independent consulting actuary is a member of the American Academy of Actuaries and has experience in performing valuations for public retirement systems, that the assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the system.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan’s funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

We note that as we are preparing this report, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions due to the pandemic. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

This actuarial valuation was performed to determine the recommended funding amount for the system. The asset values used to determine unfunded actuarial accrued liabilities and funded ratios are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market-related values. The unfunded actuarial accrued liability amounts and funded ratios using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return of assets. Therefore, liability amounts in this report cannot be used to assess a settlement of the obligation.

For fiscal years ending 2007 through 2018, the system was not funded on an actuarially sound basis as the full actuarially determined employer contributions were not made by the State. However, since that time, the State has appropriated enough to satisfy the actuarially determined employer contributions. Also, it is our understanding that the state budget includes an additional appropriation to the pension plan equal to the ADEC for the 2022 fiscal year.

If contributions by the employer to the system in subsequent fiscal years are less than those required, the assets are expected to become insufficient to pay promised benefits. However, assuming that contributions to the system are made by the employer and state from year to year in the future at rates recommended on the basis of the successive actuarial valuations, the continued sufficiency of the assets to provide the benefits called for under the system may be safely anticipated.

Respectfully submitted,

Edward J. Koebel, EA, FCA, MAAA
Chief Executive Officer

Alisa Bennett, FSA, EA, FCA, MAAA
President

Cathy Turcot
Principal and Managing Director

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Section I – Summary of Principal Results

1. For convenience of reference, the principal results of the valuation and a comparison with the results of the previous valuation are summarized below (all dollar amounts are $1,000's):

Valuation Date	June 30, 2021	June 30, 2020
Number of active members	69,256	73,151
Annual salaries	$ 3,784,400	$ 3,723,482
Number of annuitants and beneficiaries	57,465	56,629
Annual allowances	$ 2,265,323	$ 2,198,098
Assets:		
Market value	$ 25,935,779	$ 20,717,000
Actuarial value	22,624,398	20,796,494
Actuarial Accrued Liability	$ 39,581,704	$ 35,582,250
Unfunded Actuarial Accrued Liability (UAAL)	$ 16,957,306	$ 14,785,756
Funded Ratio based on Actuarial Value of Assets	57.2%	58.4%
Amortization period (years)	22.9	24.4

Contribution rates are shown separately for university and non-university members on the following pages.

Section I – Summary of Principal Results

CONTRIBUTION RATES FOR UNIVERSITY MEMBERS

Valuation Date	**June 30, 2021**		**June 30, 2020**	
For fiscal year ending:	**June 30, 2024**		**June 30, 2023**	
	Members hired before 7/1/2008	**Members on and after 7/1/2008**	**Members hired before 7/1/2008**	**Members on and after 7/1/2008**
Retirement Annuity Trust:				
Normal*	12.280%	12.280%	10.570%	10.570%
Actuarial Accrued Liability	24.720	25.720	26.240	27.240
Total**	37. 00%	38. 00%	36.810%	37.810%
Member	7.625%	7.625%	7.625%	7.625%
State	29.375	30.375	29.185	30.185
Total**	37. 00%	38. 00%	36.810%	37.810%
Life Insurance Trust:				
State	0.060%	0.060%	0.080%	0.080%
Health Insurance Trust:				
Member	2.775%	2.775%	2.775%	2.775%
State Match	2.775	1.775	2.775	1.775
Total	5.550%	4.550%	5.550%	4.550%
Total Contributions	42.610%	42.610%	42.440%	42.440%
Member Statutory	10.400%	10.400%	10.400%	10.400%
State Statutory	13.650	13.650	13.650	13.650
Required Increase	16.180	16.180	15.780	15.780
State Special	2.380	2.380	2.610	2.610
Total	42.610%	42.610%	42.440%	42.440%

* Includes a load for administrative expenses for the contribution rates for fiscal year ending June 30, 2024.

** Total Contribution Rates for fiscal year ending June 30, 2024 shown above apply a 5-year contribution direct rate smoothing methodology and are anticipated to increase each year until the full funding rates are achieved in not more than 5 years. Please see the projections in the Schedule H of the report for anticipated increases to the total contribution rates.

Section I – Summary of Principal Results

CONTRIBUTION RATES FOR NON-UNIVERSITY MEMBERS

Valuation Date	June 30, 2021		June 30, 2020	
For fiscal year ending:	**June 30, 2024**		**June 30, 2023**	
	Members hired before 7/1/2008	**Members on and after 7/1/2008**	**Members hired before 7/1/2008**	**Members on and after 7/1/2008**
Retirement Annuity Trust:				
Normal*	16.410%	16.410%	14.820%	14.820%
Accrued liability	23.550	24.550	24.950	25.950
Total**	39.960%	40.960%	39.770%	40.770%
Member	9.105%	9.105%	9.105%	9.105%
State	30.855	31.855	30.665	31.665
Total**	39.960%	40.960%	39.770%	40.770%
Life Insurance Trust:				
State	0.060%	0.060%	0.080%	0.080%
Health Insurance Trust:				
Member	3.750%	3.750%	3.750%	3.750%
State Match	3.750	2.750	3.750	2.750
Total	7.500%	6.500%	7.500%	6.500%
Total Contributions	47.520%	47.520%	47.350%	47.350%
Member Statutory	12.855%	12.855%	12.855%	12.855%
State Statutory	16.105	16.105	16.105	16.105
Required Increase	16.180	16.180	15.780	15.780
State Special	2.380	2.380	2.610	2.610
Total	47.520%	47.520%	47.350%	47.350%

* Includes a load for administrative expenses for the contribution rates for fiscal year ending June 30, 2024.

** Total Contribution Rates for fiscal year ending June 30, 2024 shown above apply a 5-year contribution direct rate smoothing methodology and are anticipated to increase each year until the full funding rates are achieved in not more than 5 years. Please see the projections in the Schedule H of the report for anticipated increases to the total contribution rates.

2. The valuation includes only the assets and liabilities associated with the pension plan. The valuation of the Health Insurance Fund and the active and retired life insurance benefits has been prepared separately.
3. Comments on the valuation results as of June 30, 2021 are given in Section IV and further discussion of the contribution levels and funding is set out in Sections V and VI.
4. Schedule B shows the development of the actuarial value of assets.
5. Schedule D of this report outlines the full set of actuarial assumptions and methods employed in the current valuation. Since the previous valuation, various economic and demographic assumptions have been revised to reflect the results of the experience investigation for the five-year period ending June 30, 2020. **The valuation liabilities fully reflect the impact of all assumption changes. However direct-rate smoothing is used to phase in the required contributions over a five-year period.** The assumption changes adopted by the Board on September 20, 2021, are summarized below:
   - Price Inflation assumed rate changed from 3.00% to 2.50%,
   - Wage Inflation assumed rated changed from 3.50% to 2.75%,
   - Assumed investment rate of return changed from 7.50% to 7.10%,
   - Assumed Salary Scale changed to a service-based table and adjusted to reflect a decrease of 0.25% in merit & promotion for all ages,
   - An administrative expense load of 0.32% of payroll has been added to the normal cost rate,
   - Assumed rates of mortality have been revised to the Pub-2010 (Teachers Benefit-Weighted) Mortality Table projected generationally with the MP-2020 improvement scale with various set-forwards, set-backs, and adjustments, and
   - Assumed rates of withdrawal, disability, and retirement have been adjusted to reflect experience more closely.
   - Increased load for unused sick leave from 2.0% to 3.0% for all active liability at the time of retirement.

6. Provisions of the system, as summarized in Schedule F, were taken into account in the current valuation. Since the previous valuation, the System has been amended to reflect a new Tier of benefits for members hired on or after January 1, 2022. These plan changes will first be recognized in the June 30, 2022 valuation.

7. The funded ratio shown in the Summary of Principal Results, is the ratio of actuarial value of assets to the actuarial accrued liability. The funded status would be different based on the market value of assets. The funded ratio is an indication of progress in funding the promised benefits. Since the ratio is less than 100%, there is a need for additional contributions toward the payment of the unfunded actuarial accrued liability. In addition, this funded ratio does not have any relationship to measuring the sufficiency if the plan had to settle its liabilities.

Section II – Membership Data

1. Data regarding the membership of the system for use as a basis of the valuation were furnished by the retirement system office. The following table shows the number of active members and their annual salaries as of June 30, 2021 on the basis of which the valuation was prepared.

GROUP	NUMBER	ANNUAL SALARIES ($1,000's)
University hired before 7/1/2008	1,197	$ 91,384
University hired after 7/1/2008	1,850	100,077
Non-University Full Time hired before 7/1/2008	28,937	2,038,325
Non-University Full Time hired after 7/1/2008	28,866	1,497,694
Non-University Part Time hired before 7/1/2008	914	8,393
Non-University Part Time hired after 7/1/2008	7,492	48,527
Total	69,256	$ 3,784,400

2. The following table shows the number and annual retirement allowances payable to annuitants and beneficiaries on the roll of the retirement system as of the valuation date.

THE NUMBER AND ANNUAL RETIREMENT ALLOWANCES OF ANNUITANTS AND BENEFICIARIES ON THE ROLL AS OF JUNE 30, 2021

GROUP	NUMBER	ANNUAL RETIREMENT ALLOWANCES[1] ($1,000's)
Service Retirements	50,129	$ 2,061,901
Disability Retirements	2,831	88,783
Beneficiaries of Deceased Members	4,505	114,639
Total	57,465	$ 2,265,323

[1] Includes cost-of-living adjustments effective through July 1, 2021.

In addition, there are 10,538 terminated vested employees entitled to benefits in the future and 50,697 inactive non-vested members.

3. Table 1 of Schedule G shows a distribution by age and years of service of the number and annual salaries of active members included in the valuation, while Table 2 shows the number and annual retirement allowances of annuitants and beneficiaries included in the valuation, distributed by age.

Section III – Assets

1. As of June 30, 2021, the market value of pension plan assets for valuation purposes held by the system amounted to $25,935,779,206. This value excludes assets in the Health Insurance Trust, the 403(b) Program Reserve Fund, and the Life Insurance Trust, which are not included in the assets used for pension plan valuation purposes. The investment return for the plan year ending June 30, 2021 on a market value basis was 29.6%. Schedule C shows the receipts and disbursements for the year preceding the valuation date and a reconciliation of the asset balances for the pension plan.

2. The five-year market related value of pension plan assets used for valuation purposes as of June 30, 2021 was $22,624,398,184. The estimated investment return for the plan year ending June 30, 2021 on an actuarial value of assets basis was 12.9%, compared to the assumed investment rate of return for the period of 7.50%. Schedule B shows the development of the actuarial value of assets as of June 30, 2021.

3. Below is a history of actual investment rates of return for the pension plan over the past five years:

Fiscal Year End	Market Value Rate of Return	Actuarial Value Rate of Return
2021	29.6%	12.9%
2020	5.5%	7.0%
2019	5.6%	7.1%
2018	10.5%	9.1%
2017	15.0%	9.3%

Section IV – Comments on Valuation

1. Schedule A of this report contains the valuation balance sheet which shows the present and prospective assets and liabilities of the system as of June 30, 2021. The valuation was prepared in accordance with the actuarial assumptions and the actuarial cost method, which are described in Schedule D and Schedule E.

2. The valuation balance sheet shows that the system has total prospective liabilities of $19,390,203,005 for benefits expected to be paid on account of the present active members. The liability on account of benefits payable to annuitants and beneficiaries amounts to $24,863,842,172 of which $649,868,631 is for special appropriations remaining to be made toward funding ad hoc increases and sick leave allowances granted after 1981. The liability for benefits expected to be paid to inactive members and to members entitled to deferred vested benefits is $503,787,965. The total prospective liability of the system amounts to $44,757,833,142. Against these liabilities, the system has present assets for valuation purposes of $22,624,398,184. When this amount is deducted from the total liabilities of $44,757,833,142, there remains $22,133,434,958 as the present value contributions to be made in the future.

3. The employer's contributions to the system consist of normal contributions and actuarial accrued liability contributions. The valuation indicates that employer normal contributions at the rate of 12.28% of payroll for University and 16.41% of payroll for Non-University are required. This includes a load for administrative expenses of 0.32% of payroll.

4. Prospective normal employer and employee contributions have a present value of $5,176,128,758. When this amount is subtracted from $22,133,434,958, which is the present value of the total future contributions to be made by the employer, there remains $16,957,306,200 as the amount of future unfunded actuarial accrued liability contributions.

5. The unfunded actuarial accrued liability <u>increased</u> by approximately $2,171.6 million for the plan year ending June 30, 2021, and the funding ratio <u>decreased</u> from 58.4% to 57.2%. These results were mainly due to the assumption changes that were made as a result of the experience study for the five-year period ending June 30, 2020, offset by the investment experience for the fiscal year ending June 30, 2021. See Section VII for a complete breakdown of the experience of the System.

Section V – Contributions Payable Under the System

1. Section 161.540 of the retirement law provides that each university member contribute 10.400% of annual salary to the system and each non-university member contribute 12.855% of annual salary. Of this amount, for each university member, 2.775% is paid to the Health Insurance Trust for medical benefits and for each non-university member, 3.75% is paid to the Health Insurance Trust for medical benefits. The remainder, 7.625% for university members and 9.105% for non-university members, is applicable for the retirement benefits taken into account in the valuation.
2. Section 161.550 provides that the State will match a portion of the member contributions and contribute a supplemental 3.25% of members' salaries towards discharging the system's unfunded obligations. Additional contributions are made to the Health Insurance Trust as required under 161.550(3).
3. Therefore for university members, 10.875% of the salaries of active members who become members before July 1, 2008 and 11.875% of the salaries of active members who become members on or after July 1, 2008 is funded by statute or supplemental funding for the pension plan and Life Insurance Trust. For non-university members, 12.355% of the salaries of active members who become members before July 1, 2008 and 13.355% of the salaries of active members who become members on or after July 1, 2008 is funded by statute or supplemental funding for the pension plan and Life Insurance Trust. Of these amounts, 0.06% of payroll will be allocated to the Life Insurance Trust.
4. Based on the results of the valuation, an additional 23.05% of payroll for both university and non-university would be required in order to maintain the amortization of the unfunded actuarial accrued liability of the pension plan based on the funding policy adopted by the Board. However, due to the results of the experience study adopted by the Board, direct-rate smoothing of contribution rates will be used to phase in the impact over a 5-year period. The resulting required increase based on direct-rate smoothing is 16.18% of payroll for the fiscal year ending June 30, 2024.

Section V – Contributions Payable Under the System

5. An additional special appropriation of 2.38% of total payroll will be made by the State. Therefore, the total actuarially determined employer contribution rate to the pension plan is 29.375% for university members who become members before July 1, 2008 and 30.375% for university members who become members on or after July 1, 2008. The total actuarially determined employer contribution rate to the pension plan is 30.855% for non-university members who become members before July 1, 2008 and 31.855% for non-university members who become members on or after July 1, 2008. The total member and employer contribution rates to the pension plan are shown in the following tables.

CONTRIBUTION RATES BY SOURCE

UNIVERSITY

	Members hired before 7/1/2008	Members hired on and after 7/1/2008
Member		
Statutory Total	10.400%	10.400%
Statutory Health Insurance Trust	(2.775)	(2.775)
Contribution to Retirement Annuity Trust	7.625%	7.625%
Employer		
Statutory Matching Total	10.400%	10.400%
Statutory Health Insurance Trust	(2.775)	(1.775)
Supplemental Funding	3.250	3.250
Subtotal	10.875%	11.875%
Life Insurance Trust	(0.060)%	(0.060)%
Additional to Comply with Board Funding Policy using Direct-Rate Smoothing of the Impact of the Assumption Changes over Five Years	16.180	16.180
Special Appropriation	2.380	2.380
Contribution to Retirement Annuity Trust	29.375%	30.375%
Total Contribution to Retirement Annuity Trust	37.000%	38.000%

Section V – Contributions Payable Under the System

CONTRIBUTION RATES BY SOURCE

NON-UNIVERSITY

	Members hired before 7/1/2008	Members hired on and after 7/1/2008
Member		
Statutory Total	12.855%	12.855%
Statutory Medical Insurance Trust	(3.750)	(3.750)
Contribution to Retirement Annuity Trust	9.105%	9.105%
Employer		
Statutory Matching Total	12.855%	12.855%
Statutory Medical Insurance Trust	(3.750)	(2.750)
Supplemental Funding	3.250	3.250
Subtotal	12.355%	13.355%
Life Insurance Trust	(0.060)%	(0.060)%
Additional to Comply with Board Funding Policy using Direct-Rate Smoothing of the Impact of the Assumption Changes over Five Years	16.180	16.180
Special Appropriation	2.380	2.380
Contribution to Retirement Annuity Trust	30.855%	31.855%
Total Contribution to Retirement Annuity Trust	39.960%	40.960%

6. The valuation indicates that normal contributions at the rate of 12.28% of active university members' salaries and 16.41% of active non-university members' salaries are required. The difference between the total contribution rate and the normal rate remains to be applied toward the liquidation of the unfunded actuarial accrued liability. This actuarial accrued liability rate, based on the assumptions set forth in the Board's funding policy and including the impact of direct-rate smoothing of contributions, is 24.72% for university members hired before July 1, 2008, 25.72% for university members hired on and after July 1, 2008, 23.55% for non-university members hired before July 1, 2008, and 24.55% for non-university members hired on and after July 1, 2008. These rates include special appropriations of 2.38% of payroll to be made by the State. These rates are shown in the following table:

Section V – Contributions Payable Under the System

ACTUARIALLY DETERMINED CONTRIBUTION RATES

RATE	PERCENTAGE OF ACTIVE MEMBERS' SALARIES			
	UNIVERSITY		NON-UNIVERSITY	
	Members hired before 7/1/2008	Members hired on and after 7/1/2008	Members hired before 7/1/2008	Members hired on and after 7/1/2008
Normal*	12.28%	12.28%	16.41%	16.41%
Actuarial Accrued liability**	24.72	25.72	23.55	24.55
Total***	37.00%	38.00%	39.96%	40.96%

* Includes a load for administrative expenses.

** Includes special appropriations of 2.38% of payroll to be made by the State.

*** Total Contribution Rates shown above apply a 5-year contribution direct rate smoothing methodology and are anticipated to increase each year until the full funding rates are achieved in not more than 5 years. Please see the projections in the Schedule H of the report for anticipated increases to the total contribution rates.

7. The following table shows the components of the total Unfunded Actuarial Accrued Liability (UAAL) and the derivation of the UAAL contribution rate in accordance with the funding policy:

TOTAL UAAL AND UAAL CONTRIBUTION PAYMENT
(Dollar amounts in thousands)

	ORIGINAL UAAL	CURRENT UAAL	REMAINING AMORTIZATION PERIOD (YEARS)	AMORTIZATION PAYMENT
Legacy	$14,010,205	$15,366,216	23	$1,058,344
New Incremental 6/30/2015	(351,610)	(335,907)	14	(32,292)
New Incremental 6/30/2016*	340,766	330,271	15	30,192
New Incremental 6/30/2017	(428,468)	(420,716)	16	(36,731)
New Incremental 6/30/2018	(192,240)	(190,511)	17	(15,945)
New Incremental 6/30/2019	53,306	53,138	18	4,278
New Incremental 6/30/2020	112,464	112,436	19	8,731
New Incremental 6/30/2021*	2,042,379	2,042,379	20	153,407
Total UAAL		$16,957,306		$1,169,984**
Blended amortization period (years)				22.9

* Includes assumption changes

** Before direct rate smoothing

Section VI – Comments on Level of Funding

1. Our calculations indicate that the contribution rates shown in the previous section will be sufficient to cover the benefits of the system, the annual 1.5% increases in the allowances of retired members and beneficiaries, and the liabilities for ad hoc increases and sick leave allowances granted after 1981.
2. The valuation indicates that the present statutory contribution rates, supplemental funding and special appropriations, if continued at the current level percentage, along with an additional required contribution of 16.18%, are sufficient to meet the cost of benefits currently accruing and provide for the amortization of the unfunded actuarial accrued liability in accordance with the Board funding policy and the direct rate smoothing methodology of phasing in the additional required contribution. However, as existing special contributions expire, the statutory contributions or supplemental funding may be required to increase as an equal percentage of payroll.

3. There are no excess assets or contributions available to provide additional benefits, and there is a cumulative increase in the required employer contribution of 16.18% of payroll for the fiscal year ending June 30, 2024, as shown in the following table:

Valuation Date	Fiscal Year	Increase/ (Decrease)	Cumulative Increase	Amount
June 30, 2004	June 30, 2007	0.11%	0.11%	$ 3,174,600
June 30, 2005	June 30, 2008	1.21	1.32	38,965,900
June 30, 2006	June 30, 2009	0.56	1.88	60,499,800
June 30, 2007	June 30, 2010	0.58	2.46	82,331,200
June 30, 2008	June 30, 2011	1.13	3.59	121,457,000
June 30, 2009	June 30, 2012	2.22	5.81	208,649,000
June 30, 2010	June 30, 2013	1.46	7.27	260,980,000
June 30, 2011	June 30, 2014	0.75	8.02	299,420,000
June 30, 2012	June 30, 2015	2.40	10.42	386,400,000
June 30, 2013	June 30, 2016	2.55	12.97	487,400,000
June 30, 2014	June 30, 2017	0.83	13.80	520,372,000
June 30, 2015	June 30, 2018	(0.31)	13.49	512,883,000
June 30, 2016	June 30, 2019	1.12	14.61	553,597,000
June 30, 2017	June 30, 2020	(0.51)	14.10	538,253,000
June 30, 2018	June 30, 2021	0.17	14.27	551,092,000
June 30, 2019	June 30, 2022	0.55	14.82	579,208,000
June 30, 2020	June 30, 2023	0.96	15.78	629,415,000
June 30, 2021	June 30, 2024	0.40	16.18	646,456,000

The amounts above are calculated by the actuary as the minimum additional dollar amount to be contributed by the State in order to comply with the Board's funding policy and include the impact of direct-rate smoothing of the cost of assumption changes over five years. Effective September 21, 2020, the amount to be provided by the State shall not be less than the prior year's dollar amount until the plan reaches a funded ratio of 100%. In addition, as existing special contributions expire, the statutory contributions or supplemental funding may be required to increase as an equal percentage of payroll, in order to amortize the unfunded actuarial accrued liability in accordance with the Board funding policy. Any further benefit improvements must be accompanied by the entire additional contributions necessary to support the benefits.

Section VII – Analysis of Financial Experience

The following table shows the estimated gain or loss from various factors that resulted in an increase of $2,171,550,663 in the unfunded actuarial accrued liability from $14,785,755,537 to $16,957,306,200 during the year ending June 30, 2021. The increase in the unfunded actuarial accrued liability was primarily due to the assumption changes from the experience study. There were also demographic losses due to turnover and retirements, and mortality. These losses were partially offset by a gain due to investment return on an actuarial value basis that was greater than expected and gain due to salary increases that were less than expected.

ANALYSIS OF FINANCIAL EXPERIENCE
(Dollar amounts in thousands)

ITEM	AMOUNT OF INCREASE/ (DECREASE)
Interest (7.50%) added to previous unfunded actuarial accrued liability	$ 1,108,932
Expected actuarial accrued liability contribution	(966,928)
Experience:	
Valuation asset growth	(1,096,513)
Pensioners' mortality	15,649
Turnover and retirements	64,350
New entrants	34,518
Salary increases	(48,593)
Amendments	0
Assumption changes	3,060,136
Method changes	0
Total	$ 2,171,551

Section VIII – Accounting Information

The information required under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 will be issued in separate reports. The following information is provided for informational purposes only.

1. The following is a distribution of the number of employees by type of membership.

NUMBER OF ACTIVE AND RETIRED MEMBERS
AS OF JUNE 30, 2021

GROUP	NUMBER
Retirees and beneficiaries currently receiving benefits	57,465
Terminated vested employees entitled to benefits but not yet receiving benefits	10,538
Inactive non-vested members	50,697
Active plan members	69,256
Total	187,956

2. The schedule of funding progress is shown below.

SCHEDULE OF FUNDING PROGRESS
(Dollar amounts in thousands)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Annual Salaries (c)	UAAL as a Percentage of Annual Salaries ((b - a) / c)
6/30/2016*	$17,496,894	$32,028,227	$14,531,333	54.6%	$3,537,226	410.8%
6/30/2017	18,514,638	32,819,887	14,305,249	56.4	3,563,584	401.4
6/30/2018	19,496,056	33,795,671	14,299,615	57.7	3,605,116	396.6
6/30/2019	20,154,161	34,676,713	14,522,552	58.1	3,648,428	398.0
6/30/2020	20,796,494	35,582,250	14,785,756	58.4	3,723,482	397.1
6/30/2021*	22,624,398	39,581,704	16,957,306	57.2	3,784,400	448.1

* Reflects change in assumptions

Section VIII – Accounting Information

3. The information presented above was determined as part of the actuarial valuation at June 30, 2021. Additional information as of the latest actuarial valuation follows.

Valuation date	6/30/2021
Actuarial cost method	Entry Age
Amortization method	Level percent of pay, closed
Remaining amortization period	22.9 years
Asset valuation method	5-year smoothed market
Actuarial assumptions:	
Investment Rate of Return*	7.10%
Projected salary Increases**	3.00% - 7.50%
Cost-of-living adjustments	1.50% Annually
*Includes price inflation at	2.50%
**Includes wage inflation at	2.75%

SCHEDULE OF EMPLOYER CONTRIBUTIONS

Fiscal Year Ending June 30	Actuarially Determined Employer Contributions	Actual Employer Contributions	Percentage Contributed
2016	$ 999,270,174	$ 565,454,590	57%
2017	1,076,617,093	1,060,719,993	99
2018	1,080,892,201	1,048,671,201	97
2019	1,123,034,823	1,123,034,823	100
2020	1,134,281,095	1,134,281,095	100
2021	1,146,977,669	1,146,977,669	100

Section IX – Risk Assessment

Actuarial Standards of Practice (ASOP) No. 51, issued by the Actuarial Standards Board, provides guidance on assessing and disclosing risks related to pension plan funding. This guidance is binding on all credentialed actuaries practicing in the United States. This standard was issued as final in September 2017 with application to measurement dates on or after November 1, 2018.

The term "risk" frequently has a negative connotation, but from an actuarial perspective, it may be thought of as simply the fact that what actually happens in the real world will not always match what was expected, based on actuarial assumptions. Of course, when actual experience is better than expected, the favorable risk is easily absorbed. The risk of unfavorable experience will likely be unpleasant, and so there is an understandable focus on aspects of risk that are negative.

Risk usually can be reduced or eliminated at some cost. Consumers, for example, buy auto and home insurance to reduce the risk associated with accidents or catastrophes. Another way to express this concept, however, is that there is generally some reward for assuming risk. Thus, retirement plans invest not just in US Treasury bonds which have almost no risk, but also in equities which are considerably riskier – because they have an expected reward of a higher return that justifies the risk.

Under ASOP 51, the actuary is called on to identify the significant risks to the pension plan and provide information to help those sponsoring and administering the plan understand the implications of these risks. In this section, we identify some of the key risks for the Plan and provide information to help interested parties better understand these risks.

Section IX – Risk Assessment

Sensitivity Analysis

The valuation results are a projection of expected benefit payments based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing liabilities and valuation results. The charts on the following pages provide a simple analysis on how the costs are sensitive to changes in the assumed discount rate, the assumed price inflation rate and the rate of wage inflation. The charts show the actuarial accrued liability, the unfunded actuarial accrued liability, the funded ratio and the employer contribution rate under each of the following scenarios:

- **TABLE 1** - The discount rate assumption sensitivity analysis shows the valuation results with the baseline discount rate assumption, 7.10%, together with an increase and a decrease of 1.00% in the discount rate. Under this scenario, the underlying price inflation rate assumption is held constant at 2.50% and the wage inflation assumption is held constant at 2.75%.

- **TABLE 2** - The price inflation assumption sensitivity analysis shows the valuation results with the baseline underlying price inflation rate assumption, 2.50%, together with decreases in the price inflation rate to 2.25% and 2.00%. Under this scenario, the decrease in the underlying price inflation rate assumption leads to corresponding decreases in the discount rate (6.85% and 6.60%, respectively), the wage inflation assumption (2.50% and 2.25%, respectively), and the assumed rates of salary increase for active members.

- **TABLE 3** - The wage inflation assumption sensitivity analysis shows the valuation results with the baseline underlying wage inflation assumption, 2.75%, together with decreases in the wage inflation assumption to 1.25% and 0.00%. Under this scenario, all other assumptions, including the individual member salary scale, are held constant so that the only impact is in the amortization of the unfunded actuarial accrued liability, leading to higher employer contribution rates.

Section IX – Risk Assessment

TABLE 1

TEACHERS' RETIREMENT SYSTEM OF KENTUCKY ASSUMED DISCOUNT RATE SENSITIVITY ANALYSIS AS OF JUNE 30, 2021 ($1,000's)	Decrease Discount Rate	Valuation Results	Increase Discount Rate
Actuarial Accrued Liability	$ 44,406,323	$ 39,581,704	$ 35,572,290
Actuarial Value of Assets	22,624,398	22,624,398	22,624,398
Unfunded Actuarial Accrued Liability	$ 21,781,925	$ 16,957,306	$ 12,947,892
Funded Ratio	50.9%	57.2%	63.6%
Employer ADEC – University*	47.645%	37.245%	28.295%
Employer ADEC – Non-University*	49.125%	38.725%	29.775%
Discount Rate	6.10%	7.10%	8.10%
Wage Inflation Rate	2.75%	2.75%	2.75%
Price Inflation Rate	2.50%	2.50%	2.50%

* Less 1% for members hired before July 1, 2008. The ADEC rates do not include the impact of direct-rate smoothing.

TABLE 2

TEACHERS' RETIREMENT SYSTEM OF KENTUCKY PRICE INFLATION ASSUMPTION SENSITIVITY ANALYSIS AS OF JUNE 30, 2021 ($1,000's)	Valuation Results	Decrease Inflation Rate 0.25%	Decrease Inflation Rate 0.50%
Actuarial Accrued Liability	$ 39,581,704	$ 40,564,606	$ 41,592,224
Actuarial Value of Assets	22,624,398	22,624,398	22,624,398
Unfunded Actuarial Accrued Liability	$ 16,957,306	$ 17,940,208	$ 18,967,826
Funded Ratio	57.2%	55.8%	54.4%
Employer ADEC – University*	37.245%	39.755%	42.385%
Employer ADEC – Non-University*	38.725%	41.235%	43.865%
Discount Rate	7.10%	6.85%	6.60%
Wage Inflation Rate	2.75%	2.50%	2.25%
Price Inflation Rate	2.50%	2.25%	2.00%

* Less 1% for members hired before July 1, 2008. The ADEC rates do not include the impact of direct-rate smoothing.

TABLE 3

TEACHERS' RETIREMENT SYSTEM OF KENTUCKY WAGE INFLATION ASSUMPTION SENSITIVITY ANALYSIS AS OF JUNE 30, 2021 ($1,000's)	Valuation Results	Decrease Wage Inflation to 1.25%	No Wage Inflation
Actuarial Accrued Liability	$ 39,581,704	$ 39,581,704	$ 39,581,704
Actuarial Value of Assets	22,624,398	22,624,398	22,624,398
Unfunded Actuarial Accrued Liability	$ 16,957,306	$ 16,957,306	$ 16,957,306
Funded Ratio	57.2%	57.2%	57.2%
Employer ADEC – University*	37.245%	42.075%	46.465%
Employer ADEC – Non-University*	38.725%	43.555%	47.945%
Discount Rate	7.10%	7.10%	7.10%
Wage Inflation Rate	2.75%	1.25%	0.00%
Price Inflation Rate	2.50%	2.50%	2.50%

* Less 1% for members hired before July 1, 2008. The ADEC rates do not include the impact of direct-rate smoothing.

Schedule A – Valuation Balance Sheet and Solvency Test

SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES
AS OF JUNE 30, 2021
(Dollar amounts in thousands)

	ACTUARIAL LIABILITIES		
(1)	Present value of prospective benefits payable on account of present active members		
	- Service retirement benefits	$ 18,372,260	
	- Disability retirement benefits	679,933	
	- Death and survivor benefits	113,044	
	- Refunds of member contributions	224,966	
	Total		$ 19,390,203
(2)	Present value of prospective benefits payable on account of present retired and disabled members, and beneficiaries of deceased members		
	- Service retirement benefits	$ 22,895,771	
	- Disability retirement benefits	1,001,568	
	- Death and survivor benefits	966,503	
	Total		$ 24,863,842
(3)	Present value of prospective benefits payable on account of inactive members and members entitled to deferred vested benefits		$ 503,788
(4)	TOTAL ACTUARIAL LIABILITIES		$ 44,757,833
	PRESENT AND PROSPECTIVE ASSETS		
(5)	Actuarial value of assets		$ 22,624,398
(6)	Present value of total future contributions = (4)-(5)	$ 22,133,435	
(7)	Present value of future member contributions and employer normal contributions		$ 5,176,129
(8)	Prospective unfunded actuarial accrued liability contributions = (6)-(7)		$ 16,957,306
(9)	TOTAL PRESENT AND PROSPECTIVE ASSETS		$ 44,757,833

Schedule A – Valuation Balance Sheet and Solvency Test

SOLVENCY TEST
(Dollar amounts in millions)

	Aggregate Actuarial Accrued Liability For				Portion of Accrued Liabilities Covered by Assets		
Valuation Date	(1) Active Member Contributions	(2) Retirants And Beneficiaries	(3) Active Members (Employer Financed Portion)	Valuation Assets	(1)	(2)	(3)
6/30/2016	$3,756.0	$20,416.4	$7,855.8	$17,496.9	100%	67%	0%
6/30/2017	3,849.9	21,108.0	7,862.1	18,514.6	100	69	0
6/30/2018	3,927.8	21,922.5	7,945.4	19,496.1	100	71	0
6/30/2019	4,022.4	22,601.6	8,052.7	20,154.2	100	71	0
6/30/2020	4,158.7	23,158.6	8,265.0	20,796.5	100	72	0
6/30/2021	4,282.8	25,367.6	9,931.3	22,624.4	100	72	0

Schedule B – Development of the Actuarial Value of Assets

AS OF JUNE 30, 2021

(1)	Actuarial Value of Assets Beginning of Year		$ 20,796,494,009
(2)	Net Position at Market Value at End of Year		$ 25,935,779,206
(3)	Net Position at Market Value at Beginning of Year		$ 20,717,000,324
(4)	Cash Flow		
	a.	Contributions	$ 1,474,810,846
	b.	Benefit Payments	2,260,614,434
	c.	Administrative Expense	12,601,841
	d.	Net: (4)a – (4)b – (4)c	$ (798,405,429)
(5)	Investment Income		
	a.	Market total: (2) – (3) – (4)d	$ 6,017,184,311
	b.	Assumed Rate	7.50%
	c.	Amount for Immediate Recognition: [(3) x (5)b] + [(4)d x (5)b x 0.5]	$ 1,523,834,821
	d.	Amount for Phased-In Recognition: (5)a – (5)c	$ 4,493,349,490
(6)	Phased-In Recognition of Investment Income		
	a.	Current Year: 0.20 x (5)d	$ 898,669,898
	b.	First Prior Year	(81,156,976)
	c.	Second Prior Year	(77,474,783)
	d.	Third Prior Year	115,121,921
	e.	Fourth Prior Year	247,314,723
	f.	Total Recognized Investment Gain	$ 1,102,474,783
(7)	Actuarial Value of Assets End of Year: (1) + (4)d + (5)c + (6)f		$ 22,624,398,184
(8)	Difference Between Market & Actuarial Values: (2) – (7)		$ 3,311,381,022
(9)	Net Investment Rate of Return on Actuarial Value:		12.9%

Schedule C – Summary of Receipts and Disbursements

SUMMARY OF RECEIPTS AND DISBURSEMENTS*
(Market Value)

	For the Year Ending	
	June 30, 2021	**June 30, 2020**
Receipts for the Year		
Contributions		
Members	$ 327,833,177	$ 324,664,055
Employers	1,146,977,669	1,134,281,095
Total	1,474,810,846	1,458,945,150
Net Investment Income	6,017,184,311	1,094,023,378
TOTAL	$ 7,491,995,157	$ 2,552,968,528
Disbursements for the Year		
Benefit Payments	$ 2,235,240,616	$ 2,167,239,241
Refunds to Members	25,373,818	28,472,217
Miscellaneous, including expenses	12,601,841	12,166,651
TOTAL	$ 2,273,216,275	$ 2,207,878,109
Excess of Receipts over Disbursements	$ 5,218,778,882	$ 345,090,419
Reconciliation of Net Position		
Net Position as of the Beginning of the Year	$ 20,717,000,324	$ 20,371,909,905
Excess of Receipts over Disbursements	5,218,778,882	345,090,419
Net Position as of the End of the Year	$ 25,935,779,206	$ 20,717,000,324
Net Investment Rate of Return on Market Value	29.6%	5.5%

* Excludes assets for Health Insurance Trust, the 403(b) Program Reserve Fund and the Life Insurance Trust.

Schedule D – Outline of Actuarial Assumptions and Methods

The assumptions and methods used in the valuation were selected based on the actuarial experience study prepared as of June 30, 2020, submitted to, and adopted by the Board on September 20, 2021.

INVESTMENT RATE OF RETURN: 7.10% per annum, compounded annually, including price inflation at 2.50% per annum.

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 2.75% per annum:

Service	Annual Rate
1	7.50%
2	5.50%
3	5.00%
4	5.00%
5	5.00%
6	4.75%
7	4.50%
8	4.25%
9	4.00%
10	4.00%
11	4.00%
12	3.75%
13	3.50%
14	3.50%
15	3.25%
16	3.25%
>=17	3.00%

Schedule D – Outline of Actuarial Assumptions and Methods

SEPARATIONS FROM SERVICE: Representative values of the assumed annual rates of death, disability, withdrawal, service retirement and early retirement are as follows:

MALES							
	Annual Rate of						
						RETIREMENT	
			WITHDRAWAL			Before	After
			Service			27 Years	27 Years
Age	DEATH*	DISABILITY	0 – 4	5 – 9	10+	of Service	of Service**
20	0.031%	0.01%	20.00%				
25	0.020	0.01	11.00	3.25%			
30	0.032	0.01	10.00	3.60	2.80%		
35	0.042	0.02	11.00	3.60	1.55		
40	0.052	0.07	12.50	4.00	1.25		
45	0.072	0.18	11.50	4.00	1.10		17.00%
50	0.115	0.28	14.25	4.50	1.10		25.00
55	0.187	0.40	15.00	6.00	1.25	5.25%	40.00
60	0.304	0.50	15.00	0.00	0.00	13.50	33.00
62	0.366	0.50	15.00	0.00	0.00	15.00	30.00
65	0.478	0.50	20.00	0.00	0.00	20.00	30.00
70	0.723	0.50	20.00	0.00	0.00	25.00	30.00
75	1.141	0.50	20.00	0.00	0.00	100.00	100.00

*Base Rates.
**Plus 8.5% in year when first eligible for unreduced retirement with 27 years of service.

FEMALES							
	Annual Rate of						
						RETIREMENT	
			WITHDRAWAL			Before	After
			Service			27 Years	27 Years
Age	DEATH*	DISABILITY	0 – 4	5 – 9	10+	of Service	of Service**
20	0.014%	0.01%	13.00%				
25	0.010	0.01	9.00	4.50%			
30	0.013	0.02	11.00	4.25	1.00%		
35	0.022	0.06	11.00	3.50	1.60		
40	0.030	0.10	12.50	4.00	1.20		
45	0.041	0.24	13.50	4.00	1.00		17.00%
50	0.058	0.38	15.00	4.50	1.25		20.00
55	0.091	0.50	15.00	5.00	1.60	5.00%	50.00
60	0.141	0.60	17.50	0.00	0.00	15.00	40.00
62	0.166	0.62	17.50	0.00	0.00	15.00	40.00
65	0.212	0.65	25.00	0.00	0.00	25.00	40.00
70	0.344	0.65	25.00	0.00	0.00	30.00	35.00
75	0.639	0.65	25.00	0.00	0.00	100.00	100.00

*Base Rates.
**Plus 10.0% in year when first eligible for unreduced retirement with 27 years of service.

Schedule D – Outline of Actuarial Assumptions and Methods

DEATHS AFTER RETIREMENT:

Mortality Assumption: All mortality rates use Pub-2010 benefit-weighted tables.

Mortality Projection: All mortality rates are projected from 2010 using generational improvement with Scale MP-2020 adjusted to 75% of the standard rates.

Service Retirements: Mortality rates are based on the Teachers Mortality Table for Retirees. Rates for male members are set forward 2 years and multiplied by 102%. Rates for female members are set forward 2 years and multiplied by 98%.

Survivors of Deceased Members: Mortality rates are based on the Teachers Mortality Table for Contingent Survivors. Rates for male members are set forward 2 years and multiplied by 101%.

Disabled Members at Retirement: Mortality rates are based on the Teachers Mortality Table for Disabled Retirees. Rates for male members are set forward 1 year and multiplied by 96%. Rates for female members are set back 2 years and multiplied by 98%.

Representative values of the assumed annual rates of death after service retirement, disability retirement, and survivors of deceased members are shown below:

	Annual Rate of Death After*					
	Service Retirement		Disability Retirement		Survivors of Deceased Members	
Age	Male	Female	Male	Female	Male	Female
45	0.0836%	0.0568%	1.0646%	0.7755%	0.6020%	0.2620%
50	0.1357	0.0843	1.6435	1.1910	0.7545	0.3200
55	0.2744	0.2215	2.1130	1.5416	0.8959	0.4460
60	0.4427	0.3322	2.4806	1.7616	1.1413	0.6220
65	0.7579	0.5351	3.0653	1.9834	1.6443	0.8990
70	1.4066	0.9682	3.9485	2.4149	2.5876	1.3530
75	2.6816	1.8649	5.3155	3.2562	4.1006	2.1510
80	5.0500	3.5819	7.6118	4.7705	6.5630	3.5730
85	9.4585	6.8071	11.2109	7.3423	10.7717	6.3160
90	16.9116	12.6077	16.9738	11.1653	17.7306	11.3290
95	26.9423	21.5110	24.2170	15.7356	26.8670	18.5900

*Base Rates.

Schedule D – Outline of Actuarial Assumptions and Methods

ASSETS: Five-year market related actuarial value, as developed in Schedule B. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected actuarial value of assets, based on the ultimate assumed valuation rate of return of 7.10%. The amount recognized each year is 20% of the difference between market value and expected actuarial value.

ADMINISTRATIVE EXPENSE LOAD: 0.32% of payroll added to the normal cost rate.

PERCENT MARRIED: 100%, with females 3 years younger than males.

UNUSED SICK LEAVE LOAD: 3% of active liability at the time of retirement.

Schedule E – Actuarial Cost Method

1. The valuation is prepared on the projected benefit basis, under which the present value, at the interest rate assumed to be earned in the future, of each active member's expected benefit at retirement or death is determined, based on his/her age, service, sex and compensation. The calculations take into account the probability of a member's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his/her terminating with a service, disability or survivor's benefit. Future salary increases and post-retirement cost-of-living adjustments are also anticipated. The present value of the expected benefits payable on account of the active members is added to the present value of the expected future payments to retired members and beneficiaries and inactive members to obtain the present value of all expected benefits payable from the system on account of the present group of members and beneficiaries.
2. The employer contributions required to support the benefits of the system are determined following a level funding approach and consist of a normal contribution and an actuarial accrued liability contribution.
3. The normal contribution is determined using the "entry age normal" method. Under this method, a calculation is made to determine the uniform and constant percentage rate of employer contribution which, if applied to the compensation of the average new member during the entire period of his/her anticipated covered service, would be required in addition to the contributions of the member to meet the cost of all benefits payable on his/her behalf.
4. The unfunded actuarial accrued liability is determined by subtracting the present value of prospective employer normal contributions and member contributions, together with the current actuarial value of assets held, from the present value of expected benefits to be paid from the system.

Schedule F – Summary of Main System Provisions

AS INTERPRETED FOR VALUATION PURPOSES

The Teachers' Retirement System of the State of Kentucky was established on July 1, 1940. The valuation took into account amendments to the system effective through June 30, 2021. The following summary describes the main benefit and contribution provisions of the system as interpreted for the valuation.

1 - DEFINITIONS

"Final average salary" means the average of the five highest annual salaries which the member has received for service in a covered position and on which the member has made contributions or on which the public board, institution or agency has picked up the member contributions. For a member who retires after attaining age 55 with 27 years of service, "final average salary" means the average of the three highest annual salaries.

2 - BENEFITS

Service Retirement Allowance

Members Before 7/1/2008

Condition for Allowance	Completion of 27 years of service or attainment of age 55 and 5 years of service.
Amount of Allowance	The annual retirement allowance for non-university members is equal to:
	(a) 2.0% of final average salary multiplied by service before July 1, 1983, plus
	(b) 2.5% of final average salary multiplied by service after July 1, 1983.
	(c) For individuals who become members of the retirement system on or after July 1, 2002 and have less than 10 years of service at retirement, the retirement allowance is 2.0% of final average salary multiplied by service. If, however, they have 10 or more years, they receive a benefit percentage of 2.5% for all years of service up to 30 years.

(d) For members retiring on or after July 1, 2004, the retirement allowance formula is 3.0% of final average salary for each year of service credit earned in excess of 30 years.

The annual retirement allowance for university members is equal to 2.0% of final average salary multiplied by all years of service.

For all members, the annual allowance is reduced by 5% per year from the earlier of age 60 or the date the member would have completed 27 years of service.

The minimum annual service allowance for all members is $440 multiplied by credited service.

Members on and after 7/1/2008

Condition for Retirement	Completion of 27 years of service, attainment of age 60 and 5 years of service or attainment of age 55 and 10 years of service.

Amount of Allowance

The annual retirement allowance for non-university members is equal to:

1.7% of final average salary if service is 10 years or less.
2.0% of final average salary if service is greater than 10 years and no more than 20 years.
2.3% of final average salary if service is greater than 20 years but no more than 26 years.
2.5% of final average salary if service is greater than 26 years but no more than 30 years.
3.0% of final average salary for years of service greater than 30 years.

The annual retirement allowance for university members is equal to:

1.5% of final average salary if service is 10 years or less.
1.7% of final average salary if service is greater than 10 years and no more than 20 years.
1.85% of final average salary if service is greater than 20 years but less than 27 years.
2.0% of final average salary if service is greater than or equal to 27 years.

.

For all members, the annual allowance is reduced by 6% per year from the earlier of age 60 or the date the member would have completed 27 years of service.

Schedule F – Summary of Main System Provisions

Disability Retirement Allowance

Condition for Allowance	Totally and permanently incapable of being employed as a teacher and under 27 years of service but after completing 5 years of service.
Amount of Allowance	The disability allowance is equal to 60% of the member's final average salary. The disability allowance is payable over an entitlement period equal to 25% of the service credited to the member at the date of disability or five years, whichever is longer. After the disability entitlement period has expired and if the member remains disabled, he will be retired under service retirement. The service retirement allowance will be computed with service credit given for the period of disability retirement. The allowance will not be less than $6,000 per year. The service retirement allowance will not be reduced for commencement of the allowance before age 60 or the completion of 27 years of service.

Benefits Payable on Separation from Service	Any member who ceases to be in service is entitled to receive his contributions with allowable interest. A member who has completed 5 years of creditable service and leaves his contributions with the system may be continued in the membership of the system after separation from service, and file application for service retirement after the attainment of age 60.
Life Insurance	A separate Life Insurance Trust has been created as of June 30, 2000 to pay benefits on behalf of deceased TRS active and retired members.

Schedule F – Summary of Main System Provisions

Death Benefits

A surviving spouse of an active member with less than 10 years of service may elect to receive an annual allowance of \$2,880 except that if income from other sources exceeds \$6,600 per year the annual allowance will be \$2,160.

A surviving spouse of an active member with 10 or more years of service may elect to receive an allowance which is the actuarial equivalent of the allowance the deceased member would have received upon retirement. The allowance will commence on the date the deceased member would have been eligible for service retirement and will be payable during the life of the spouse.

If the deceased member is survived by unmarried children under age 18 the following schedule of annual allowances applies:

Number of Children	Annual Allowance
1	\$ 2,400
2	4,080
3	4,800
4 or more	5,280

The allowances are payable until a child attains age 18, or age 23 if a full-time student.

If the member has no eligible survivor, a refund of his accumulated contributions is payable to his estate.

Options

In lieu of the regular Option 1, a retirement allowance payable in the form of a life annuity with refundable balance, any member before retirement may elect to receive a reduced allowance which is actuarially equivalent to the full allowance, in one of the following forms:

Option 2. A single life annuity payable during the member's lifetime with payments for 10 years certain.

Option 3. At the death of the member his allowance is continued throughout the life of his beneficiary.

Option 3(a). At the death of the beneficiary designated by the member under Option 3, the member's benefit will revert to what would have been paid had he not selected an option.

Option 4. At the death of the member one half of his allowance is continued throughout the life of his beneficiary.

Schedule F – Summary of Main System Provisions

	Option 4(a). At the death of the beneficiary designated by the member under Option 4, the member's benefit will revert to what would have been paid had he not selected an option.
Post-Retirement Adjustments	The retirement allowance of each retired member and of each beneficiary shall be increased by 1.50% each July 1.

3 - CONTRIBUTIONS

Member Contributions	University members contribute 7.625% of salary to the retirement system. Non-university members contribute 9.105% of salary to the retirement system. Member contributions are picked up by the employer.

Schedule G – Tables of Employee Data

TABLE 1
AGE – SERVICE TABLE

Distribution of Active Members as of June 30, 2021 by Age and Service Groups

Attained Age	Completed Years of Service									Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 & Over	No.	Payroll
Under 25	1,532	1,856	4							3,392	$ 90,641,018
25 to 29	632	4,433	1,933							6,998	299,260,435
30 to 34	418	1,885	4,250	1,499	2					8,054	404,571,295
35 to 39	370	1,328	2,108	4,212	1,596	6				9,620	546,010,412
40 to 44	402	1,176	1,363	2,008	4,383	1,308	4			10,644	653,419,418
45 to 49	258	859	988	1,336	1,995	3,895	1,012	3		10,346	680,678,821
50 to 54	459	704	642	1,005	1,360	2,001	2,425	374	4	8,974	582,342,175
55 to 59	605	717	422	535	843	1,017	802	291	23	5,255	301,740,472
60 to 64	452	766	281	256	421	433	356	113	63	3,141	147,378,070
65 to 69	357	568	221	103	137	186	121	49	32	1,774	57,690,361
70 & Over	252	410	174	59	52	37	34	15	25	1,058	20,667,746
Total Count	5,737	14,702	12,386	11,013	10,789	8,883	4,754	845	147	69,256	$ 3,784,400,223

Average Age: 43.4
Average Service: 11.7

Schedule G – Tables of Employee Data

TABLE 2

SCHEDULE OF ACTIVE MEMBER VALUATION DATA

Valuation Date	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
6/30/2021	69,256	$ 3,784,400,223	$ 54,644	7.35%
6/30/2020	73,151	3,723,481,576	50,901	1.35
6/30/2019	72,647	3,648,427,710	50,221	0.58
6/30/2018	72,205	3,605,115,787	49,929	1.06
6/30/2017	72,130	3,563,584,342	49,405	0.35
6/30/2016	71,848	3,537,226,348	49,232	1.19
6/30/2015	72,246	3,515,113,127	48,655	2.45
6/30/2014	73,407	3,486,326,799	47,493	2.12
6/30/2013	74,831	3,480,066,406	46,506	1.51
6/30/2012	75,951	3,479,567,004	45,813	1.33

Schedule G – Tables of Employee Data

TABLE 3

**NUMBER OF RETIRED MEMBERS AND BENEFICIARIES
AND THEIR BENEFITS BY AGE
AS OF JUNE 30, 2021**

Attained Age	Number of Members	Total Annual Benefits	Average Annual Benefits
49 & Under	803	$ 9,465,245	$ 11,787
50 - 54	1,602	67,058,670	41,859
55 - 59	4,217	189,483,762	44,933
60 - 64	7,032	301,805,954	42,919
65 - 69	10,932	453,797,433	41,511
70 - 74	14,216	568,443,423	39,986
75 - 79	9,002	345,260,894	38,354
80 - 84	5,226	190,248,293	36,404
85 - 89	2,804	93,145,292	33,219
90 - 94	1,246	36,594,008	29,369
95 & Over	385	10,020,384	26,027
Total	57,465	$ 2,265,323,358	$ 39,421

Average Current Age: 70.7 Average Age at Retirement: 56.2

TABLE 4

**SCHEDULE OF RETIRANTS, BENEFICIARIES AND SURVIVORS
ADDED TO AND REMOVED FROM ROLLS**

	ADDED TO ROLLS		REMOVED FROM ROLLS		ROLLS AT END OF YEAR			
Fiscal Year Ending June 30	Number	Annual Allowances (in millions)	Number	Annual Allowances (in millions)	Number	Annual Allowances (in millions)	Increase In Annual Allowances	Average Annual Allowance
2012	2,513	$111.2	838	$19.4	46,094	$1,525.2	6.4%	$33,089
2013	2,303	105.7	991	22.2	47,406	1,608.7	5.5%	33,934
2014	2,146	99.6	976	23.4	48,576	1,684.9	4.7%	34,685
2015	2,917	119.1	1,671	36.3	49,822	1,767.6	4.9%	35,479
2016	2,753	128.2	1,012	26.9	51,563	1,868.9	5.7%	36,244
2017	2,638	119.8	1,235	35.2	52,966	1,953.5	4.5%	36,881
2018	2,499	120.0	1,088	30.0	54,377	2,043.5	4.6%	37,581
2019	2,355	113.8	1,119	32.8	55,613	2,124.5	4.0%	38,201
2020	2,145	107.6	1,129	34.0	56,629	2,198.1	3.5%	38,816
2021	2,137	108.3	1,301	41.1	57,465	2,265.3	3.1%	39,421

Schedule H – 30-year Baseline Projection of TRS

The results of actuarial valuations are a "snapshot" of the financial position on the valuation date, based on the assumed number of active employees and current beneficiaries. Projections simulate future actuarial valuation results over a forecast period (twenty years in this case) by "creating" future new hires and performing valuations using the projected membership. The following items are assumed for the projected results provided on the following page.

- Active Employee Growth Rate: 0.00%
- Valuation Discount Rate: 7.10%
- Investment Rate of Return: 7.10% each year
- Actuarial Value of Assets: 5 year smoothing, No Corridor
- Amortization Method: Level Percent of Payroll, Closed
- Amortization Bases:
  - Legacy amortization from 2014 valuation amortized over closed 30-year period
  - Subsequent bases amortized over closed 20-year period from date of valuation
- Amortization Period: Weighted 22.9-year period as of Valuation Date
- Future Contributions: Based on Expected Actuarially Determined Contributions including the impact of direct-rate smoothing of the impact of the assumption changes over a 5-year period beginning with the 2021 valuation

All other demographic and economic changes are assumed to occur in accordance with the actuarial assumptions used for the actuarial valuation.

Schedule H – 30-year Baseline Projection of TRS

($ in millions)

Fiscal Year End	Non-University Payroll (1)	University Payroll (2)	Total Payroll (3)	Unfunded Accrued Liability (4)	Funding Ratio (5)	Direct Rate Smoothing Contribution in Dollars (6)	Salary Percentage Contribution in Dollars (7)	Additional for Unfunded Accrued Liability (8)
2024	$3,741	$186	$3,927	$16,957	57.2%	$1,237	$590	$647
2025	3,820	186	4,006	16,130	60.1%	1,263	588	675
2026	3,899	187	4,086	15,390	62.8%	1,307	588	719
2027	3,976	189	4,165	14,546	65.6%	1,343	588	755
2028	4,051	191	4,242	13,580	68.6%	1,370	589	781
2029	4,130	195	4,325	13,462	69.5%	1,400	596	804
2030	4,213	198	4,411	13,298	70.4%	1,431	604	827
2031	4,298	202	4,500	13,093	71.5%	1,463	612	851
2032	4,388	205	4,593	12,842	72.5%	1,496	621	875
2033	4,480	209	4,689	12,542	73.6%	1,530	630	900
2034	4,574	213	4,787	12,187	74.8%	1,565	639	926
2035	4,675	217	4,892	11,773	76.0%	1,601	648	953
2036	4,781	221	5,002	11,295	77.3%	1,640	658	982
2037	4,893	226	5,119	10,749	78.8%	1,679	669	1,010
2038	5,011	230	5,241	10,126	80.3%	1,769	681	1,088
2039	5,134	236	5,370	9,421	81.9%	1,769	694	1,075
2040	5,265	242	5,507	8,626	83.6%	1,873	708	1,165
2041	5,403	248	5,651	7,684	85.6%	1,948	723	1,225
2042	5,548	254	5,802	6,677	87.6%	1,997	737	1,260
2043	5,698	261	5,959	5,493	90.0%	2,034	753	1,281
2044	5,855	268	6,123	4,151	92.5%	1,805	767	1,038
2045	6,019	276	6,295	2,666	95.3%	1,941	788	1,153
2046	6,191	284	6,475	1,042	98.2%	2,072	810	1,262
2047	6,369	292	6,661	0	100.0%	0	832	0
2048	6,554	301	6,855	0	100.0%	0	856	0
2049	6,747	310	7,057	0	100.0%	0	881	0
2050	6,957	319	7,276	0	100.0%	0	906	0
2051	7,169	327	7,496	0	100.0%	0	933	0
2052	7,388	335	7,723	0	100.0%	0	962	0
2053	7,612	343	7,955	0	100.0%	0	991	0