Teachers' Retirement System of the State of Kentucky

The 79th Comprehensive Annual Financial Report

A Component Unit of the Commonwealth of Kentucky
Fiscal Years Ended June 30, 2019 and 2018

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

Gary L. Harbin, CPA
Executive Secretary

This report was prepared by the
Teachers' Retirement System staff.

TABLE OF CONTENTS

Introductory Section

TEACHERS'
Retirement System
TRS
KENTUCKY

Teachers' Retirement System of the State of Kentucky

Chair's Letter

December 11, 2019

Dear Members:

On behalf of the Board of Trustees and staff, I am pleased to present this Comprehensive Annual Financial Report of the Teachers' Retirement System of the State of Kentucky for the years ending June 30, 2019 and 2018, the 79th year of operation of the system. The accompanying reports from the independent auditor and the consulting actuary substantiate the financial integrity and the actuarial soundness of TRS.

TRS closed the 2019 fiscal year with 72,647 active members, 55,613 retirees and annual annuity and medical insurance benefits of $2.3 billion.

The Board of Trustees is committed to managing retirement system funds in a prudent, professional manner. Every effort will be made to ensure that TRS continues to operate in a fiscally sound manner. In this vein, the actions of the Board of Trustees in recent years have resulted in a reduction of more than $8 billion in liabilities for the state through decisions related to investing and the implementation of the Shared Responsibility solution that prefunded retiree health care. Present and future members of the system deserve to be able to avail themselves of the retirement benefits as promised by law.

We appreciate the support and cooperation extended by the governor and the legislature. This cooperation allows TRS to meet not only current challenges but also to make timely provisions for the future.

The board pledges to continue to administer the affairs of the Teachers' Retirement System in the most competent and efficient manner possible.

Sincerely,

Alison Wright

Alison Wright
Chair
Board of Trustees

Letter of Transmittal

Teachers' Retirement System
of the State of Kentucky

December 11, 2019

Honorable Andrew G. Beshear, Governor
Commonwealth of Kentucky
Capitol
Frankfort, Kentucky

Dear Governor Beshear:

It is my pleasure to submit the 79th Comprehensive Annual Financial Report (CAFR) of the Teachers' Retirement System of the State of Kentucky (TRS), a component unit of the Commonwealth of Kentucky, for the fiscal years ended June 30, 2019 and 2018. Allow me to begin this transmittal letter with my thanks for your expressions of support for continuing to fully fund the retirement system for Kentucky's teachers. With your help and the assistance of the General Assembly, we look forward to the second consecutive biennium of full pension funding for TRS of the actuarially determined employer contribution (ADEC). The importance of the consistent full funding of the retirement plan for Kentucky's teachers cannot be overstated — as evidenced by the record $21.9 billion net assets at the close of the fiscal year, which is a $4.2 billion improvement in fiduciary net position since 2016.

TRS produced this annual report, which is required by state law and contains the annual audit and actuarial valuations of the retirement system, that provides you, the General Assembly and the public with information necessary to better understand TRS, which is the largest financial institution in the commonwealth. Contained within are numerous examples of how Kentucky teachers' future well-being is being provided for at a low cost with a great economic benefit for those educators and the state's businesses. Many of the retirement dollars are spent in Kentucky by the 88% of retirees who live there and receive 91% of the retirement benefits paid by TRS.

This report conforms with the principles of governmental accounting and generally accepted accounting principles. Responsibility for both the accuracy of the data and the completeness and fairness of the presentation, including all disclosures, rests with TRS management. To the best of management's knowledge and belief, the enclosed data is accurate in all material aspects and reported in a manner designed to present fairly the financial position and results of operations of TRS for the years ended June 30, 2019 and 2018. Discussion and analysis of net assets and related additions and deductions are presented in Management's Discussion and Analysis in the Financial Section of this report.

Management is responsible for maintaining a system of internal controls to establish reasonable assurance that assets are safeguarded, transactions are executed accurately, and financial statements are presented fairly. Limits are inherent in all systems of internal control based on the recognition that the costs of such systems should be related to the benefits to be derived. Management believes TRS's controls provide this appropriate balance. The system of internal controls includes policies and procedures and an internal audit department that reports to the Board of Trustees.

Profile of TRS

TRS began operations on July 1, 1940, as a cost-sharing, multiple-employer defined benefit plan. The primary purpose of the plan is to provide retirement annuity plan coverage and retiree health insurance for local school districts and other public educational agencies in the state.

TRS paid $2.3 billion in total benefits (retirement, medical, etc.) during the fiscal year. The number of TRS active and retired members is contained in the preceding board chair's letter. For most TRS retirees, the average annuity of $38,200 replaces Social Security. TRS usually provides a higher benefit at a normal cost that is comparable with the federal program.

TRS is a blended component unit of the commonwealth. An annual operating budget is prepared for the administration of the retirement system and approved by the 11-member board. Biennial budget requests also are submitted to the General Assembly for adoption. TRS's investment earnings also pay for the agency's administrative expenses, which are among the lowest of U.S. public pension plans.

The plan is described in the Notes to Financial Statements in the Financial Section of this report. Also, the Summary of Main System Provisions as Interpreted for Valuation Purposes in the Actuarial Section is useful in understanding benefit and contribution provisions.

Professional consultants are appointed by the board to perform essential services for the effective and efficient operation of TRS. Reports from the state Office of the Auditor of Public Accounts (APA) and the board's independent actuary are enclosed in this CAFR. The system's consultants, which are appointed by the board, are listed in the Additional Supporting Schedules of the Financial Section and in the Investment Section's Professional Service Providers table and Health Insurance Trust Professional Service Providers table.

Major Initiatives

TRS is efficient, effective and always working to improve the retirement security of Kentucky's teachers. The highest levels of professionalism, integrity, performance and teamwork are required at all levels of the organization. TRS is an organization that does it right. The latest affirmation of this, elaborated upon later in this letter, came with the independent annual audit by the APA that resulted in no findings.

During the past year, TRS continued work on several major initiatives concerning funding, investments, benefit administration and cost containment.

Personalized Medicine

Possibly the initiative that best fits all of the above goals is TRS's cutting-edge personalized medicine project under TRS's Medicare Eligible Health Plan. Personalized medicine uses DNA testing to help a patient's doctor make more effective treatment decisions for better health outcomes. This program, which began in fall 2017, is focused on making sure that a retiree's medications are safe and will be beneficial, avoiding the costly and sometimes harmful trial-and-error process of traditional medicine. That longstanding process involves finding the right prescription without the benefit of having the DNA information. Coriell Life Sciences, which has been providing clinical research services for more than 65 years, is TRS's scientific partner in the program. Vital to the project is the link between retirees and doctors provided by the pharmacists of the Know Your Rx Coalition. The coalition, a purchasing collaborative founded with TRS, reduces cost for members like TRS while providing personal service to customers.

As anticipated, the results of the first year, according to Coriell have been impressive. For about a fourth of participants, DNA test results led to a recommended change in medication. The program, in its first year, saw an 11% reduction in spending for those involved while spending for a control group increased 3.5%, according to Coriell.

TRS is looking to expand this program that garners national attention. In March, TRS presented at the National Institutes of Health's Genomics in Health and Wellness conference in Bethesda, Maryland. TRS also presented at Harvard University medical school in the fall to the Personalized Medicine Coalition's Personalized Medicine Conference.

Retiree Health Care

Kentucky continues to be a national leader in prefunding retiree health care benefits as a result of the Shared Responsibility solution enacted in 2010 through the collective efforts of the board, the education community and elected officials. The plan immediately eliminated $3.1 billion in actuarial liability from the retired teacher health care plan. Combined with other cost control measures, more than $5 billion in actuarial accrued liability has been eliminated from the TRS Health Insurance Trust. In only nine years, the medical insurance fund has achieved a 46% funded ratio compared to pay-as-you-go status before the law took effect. This remarkable improvement confirms that the medical insurance fund is on schedule to be funded fully in 21 years. The success of Shared Responsibility for the retirement security of current and future retired teachers is a national model.

Beyond Shared Responsibility, the Board of Trustees regularly reviews the health care plan to contain costs and maintain a meaningful benefit for retired teachers. The 2007 move to Medicare Advantage continues to be stable and financially feasible for TRS's members and the medical plan. The cost of coverage for 2020 is a reduction for the second straight year and remains at the same level as it was two decades ago.

Some recent cost-saving initiatives include moving the TRS-sponsored Medicare Part D Employer Group Waiver drug plan from fully insured to a self-funded plan to achieve the greatest federal subsidies. Additionally, as referenced previously, TRS is part of the Know Your Rx Coalition, which it joined in 2012.Through the coalition, TRS saves money leveraging greater prescription purchasing power, obtaining deeper drug discounts and increasing the rate at which prescriptions are filled with generic drugs 88% of the time, up from 73%. Additionally, coalition pharmacists work with retired teachers and their physicians to maximize prescription dollars both for the retiree and the medical plan, including supporting the personalized medicine pilot.

Investing

Investment income provides about two thirds of annuity payments made by TRS. As noted earlier, these TRS annuities bolster Kentucky's economy as retirees cover the expenses of daily life in the state's cities and towns. The consistent contributions from members and employers are the cornerstone of these investments that provide the benefits upon which retired teachers rely.

The Investment Section of this report contains asset allocations, strategic target ranges for investments, discussion of the current year market environment and historical performance schedules, among others.

According to KRS 161.430, the TRS board is responsible for investing the assets of the system. The board delegates investment authority to the Investment Committee. The committee works closely with experienced investment counselors and the system's professional staff in evaluating and selecting investment allocations.

The investment objectives of the board are to ensure that funds shall be invested solely in the interest of its members and their beneficiaries and that investment income shall be used for the exclusive purpose of providing benefits to the members and their beneficiaries, while making payment of reasonable expenses in administering the plan and its trust funds. The investment program shall also provide a reasonable rate of total return with major emphasis being placed upon the protection of the invested assets.

TRS regularly obtains independent reviews and always is seeking to improve its investment program and continue the tradition of adhering to best governance practices that lead to sound investment returns.

A multiyear program of diversifying the portfolio continued in line with TRS's focus on fundamental value and risk control. These ongoing efforts are a continuation of a disciplined investment process and long-term focus on retirement security. This focus has generated exceptionally stable returns through TRS's history, and management has every confidence that it will do so in the future. TRS's investment program continues to be recognized as a leader in the public pension community for governance structure, trustee education and cost effectiveness.

As a measure of this, the long-term performance of TRS's investment staff above the average of other pension plans has resulted in an additional $3 billion in the pension fund alone in the last 11 years, as measured by the public fund index of Aon, TRS's independent investment consultant.

For the fiscal year ended June 30, 2019, the market value of TRS's investment program increased a gross 5.9% and a net 5.56% in the Retirement Annuity Trust pushing total plan assets for all trusts to a record of $21.9 billion. A one-year period is not determinative for a long-term investor such as TRS; this performance was in line with other pension plans.

The fiscal year was characterized by a rebound in U.S. equity markets from a December downturn as well as strong bond markets and declining interest rates in response to the Federal Reserve Open Market Committee's easing monetary policy.

For longer periods, TRS's investment performance was in the top decile of public plans with more than $1 billion under management for the three-, five- and 10-year periods. Moreover, during the last 30 years, TRS investment returns of 8.13% have bettered the long-term assumed rate of return of 7.5%. Net returns exceeded the assumed rate as well for the three-, and 10-year periods. This record validates policy changes adopted by the board and implemented by the Investment Committee over the last several years. TRS's commitment to best practices, stringent risk controls and fundamental value philosophy in investing helps ensure long-term retirement security for Kentucky's teachers.

TRS's investment portfolio experienced an increase in value during the 2019 fiscal year as the market value went from to $21.63 billion from $20.95 billion. The increase in value of the portfolio was the result of market conditions and additional funding provided in the biennial budget for TRS. Interest income, dividends and employer and employee contributions also provided significant income to the portfolio.

Investment income totaled $1.16 billion compared to $2.03 billion for the prior year. The net appreciation in fair value of investments was $719.1 million compared to $1.64 billion at June 30, 2018.

To continue in the effort for above-average returns, TRS successfully pursued a change to a provision of the originally enacted SB 2 that was preventing TRS from having access to top tier partnership investments because of the application of standards that weren't appropriate for the investment. House Bill 489 (2019 RS) changed the standard to the federal Investment Advisers Act of 1940. The bill became law with overwhelming bipartisan support.

Benefits Administration

To improve the administration of benefits, TRS sought changes in a return-to-work administrative regulation to ensure compliance with federal tax law. This rule, approved after the end of the fiscal year, takes effect in January.

Internal and External Reviews and Recognition

Independent outside reviews of the retirement system by the APA, other independent accountants, the Public Pension Coordinating Council and the Government Finance Officers Association provide the board and TRS staff with important feedback.

TRS responds to legislative and administration inquiries and mandates throughout the year. In connection with pension legislation, TRS received - and responded to - numerous requests from legislators, the executive branch, constituent groups and others to provide accurate information about the experience of TRS. Many of these involved presentations to the Public Pension Oversight Board (PPOB) and, during the 2019 Regular Session of the General Assembly, to the special Public Pension Work Group. Among those were presentations on actuarial assumptions, quarterly investment returns and cash flow updates, responding to questions regarding compliance with Senate Bill 2 (2017 RS) and testimony by me at the March PPOB meeting.

As mentioned previously, during much of the fiscal year, the APA conducted the annual audit for TRS as is required at least every five years. TRS received an unqualified opinion on the audited financial statements of the system for the fiscal years ended June 30, 2019 and June 30, 2018. The annual financial audit was a clean audit and had no findings.

The Government Finance Officers Association of the United States and Canada (GFOA) awarded TRS the Certificate of Achievement for Excellence in Financial Reporting for its Comprehensive Annual Financial Report (CAFR) for the fiscal year ended June 30, 2018. The Certificate of Achievement is a prestigious national award recognizing conformance with the highest standards for preparation of state and local government financial reports.

To be awarded a one-year Certificate of Achievement, a government unit must publish an easily readable and efficiently organized comprehensive annual financial report, whose contents conform to program standards. Such CAFRs must satisfy both generally accepted accounting principles and applicable legal requirements.

TRS has received the Certificate of Achievement for the last 31 consecutive years (fiscal years 1988-2018). TRS believes the current report, which is being submitted to GFOA, continues to conform to the Certificate of Achievement program requirements. I anticipate this trend will continue.

The Public Pension Coordinating Council (PPCC) recognized TRS with the Public Pension Standards Award for Funding and Administration for 2019. The award is based on compliance with principles judged to underlie exemplary retirement system achievements in the areas of benefits, actuarial valuation, financial reporting, investments, funding and disclosure. Those principles widely are acknowledged to be marks of excellence in the public pension industry.

The PPCC is a coalition of three national associations that represent public retirement systems and administrators. Combined, these associations serve retirement systems that provide pension coverage for most of the nation's 16 million employees of state and local government. The associations that form the PPCC are the National Association of State Retirement Administrators, the National Council on Teacher Retirement and the National Conference on Public Employee Retirement Systems.

Information Technology
The annual audit conducted by the APA included a review of TRS's information technology infrastructure and that audit validated management's assessment on the success of Pathway information technology system with no findings or comments regarding it. Pathway allows members secure online access to account information — anytime from anywhere.

Communications and Outreach
To reach members more easily, TRS continued using Facebook and Twitter accounts to communicate information about the system on a timelier basis. In less than three years, the Facebook account has received almost 3,150 likes, and posts often reach more than 1,000 users - led this past year by more than 17,900 users who saw a post that sought to dispel misinformation about health care benefits.

Also, TRS continued informational offerings for members. Regarding active members alone, about 286 attended seminars in addition to more than 523 people who participated in webinars. More than 240 members were seen at locations around the state for retirement counseling sessions. The 19 TRS counselors saw more than 7,100 visitors in the office and completed more than 16,500 retirement estimates. This is in addition to the hundreds of retirees spoken to during presentations to retiree groups regarding pension and medical benefits.

The executive secretary and staff members delivered communications to members, retirees, the education community, political leaders and the public regarding the value of TRS. This included illustrations of the top-decile performance of TRS's investing; what that meant in dollars for Kentucky teachers' pensions compared to the average pension plan; the success of Shared Responsibility; TRS's low investment fees and administrative costs; and how a 33-year history of TRS shows investment returns - not contributions from active members - are what pays the bulk of retiree benefits.

General Administration
TRS implemented the new option of electronic voting in trustee elections using existing technology available in Pathway. This is the most significant change in the method of voting since the first election in 1939.

Funding Progress

Retirement Annuity Trust
Teachers saw the continued benefits of increased funding. Where the 2016-2018 biennium saw nearly full funding, TRS experienced the first year of full funding in this most recent fiscal year, with another year of full funding in the second half of the 2018-2020 budget to follow.

This funding contained in the Executive Branch Budget (2018 RS HB 200) represents the first full retirement annuity funding in a decade and consists of about $2 billion in total and includes the full $1.09 billion requested in additional funding to address the unfunded liability.

The most recent financial and actuarial reports show, thanks to this funding and investment returns on it, that the funded ratio of the retirement annuity improved for the third straight year and the fiduciary net position of all TRS funds improved more than $4.2 billion over that timeframe since June 30, 2016.

Based on recommendations of the board, the General Assembly establishes, by statute, the contribution levels that are to be made by members and employers to fund TRS's liabilities. Each year, an independent actuary performs a valuation to determine whether the current levels of contribution will be sufficient to cover the cost of benefits earned by members.

From fiscal year 2009 through the end of the most recent biennium, the state had not paid the full recommended annual employer contribution necessary to prefund the benefit requirements of members of the retirement system as determined by the actuary. Over this period, because of not making the additional appropriation beyond salary-based contributions, the actuary says the state's annual additionally required employer contributions have grown significantly from $60.5 million (fiscal year 2009) to $579.2 million (fiscal year 2022). The following schedule details the growth of the additional annual employer contributions payable by the state:

Fiscal Year	Cumulative Increase as a % of Payroll	Cumulative Increase in Annual Retirement Appropriations Payable by the State
2009	1.88%	$60,499,800
2010	2.46	82,331,200
2011	3.59	121,457,000
2012	5.81	208,649,000
2013	7.27	260,980,000
2014	8.02	299,420,000
2015	10.42	386,400,000
2016	12.97	487,400,000
2017	13.80	520,372,000
2018	13.49	512,883,000
2019	14.61	553,597,000
2020	14.10	538,253,000
2021	14.27	551,092,000
2022	14.82	579,208,000

Source: Annual Valuation of the Retirement Annuity Trust

The board always has acted as required by state law and recommended annual employer contributions payable by the state that would ensure that the state meets the contractual obligations to members. Again, management is appreciative, and teachers can be as well, of the full funding provided in the 2018-2020 budget.

The latest actuarial valuation was for the period ending June 30, 2019. This report reflects TRS's actuarial value of assets totaling $20.15 billion and actuarially determined liabilities totaling $34.68 billion. The funded ratio of actuarial assets to liabilities is 58.1%, which is an increase from the previous year and is due primarily to market appreciation of investments, smoothing of investment returns and additional legislative appropriations. The actuary reports: "In our opinion … 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."

Annual required employer contributions for the defined benefit plan are provided in the Schedule of Employer Contributions in the Required Supplemental Information of the Financial Section of this report. Based on the 2019 valuation report, the actuary recommends a cumulative increase in employer contributions of 14.82% percent of pay for the 2022 fiscal year as detailed in the Contribution Rates tables in the Summary of Principal Results in the Actuarial Section of this report.

In relation to funding progress and based on my testifying at the March 25, 2019, PPOB meeting, the board's funding policy was amended to make the General Assembly aware of additional appropriations above the ADEC to the retirement annuity that could more quickly resolve the state's obligation to pay the unfunded liability. As a result, the request for the 2020-2022 biennium included an optional $110 million each year that would pay off the unfunded liability about three years sooner than the current amortization period and would save more than $4 billion in contributions over the period.

Health Insurance Trust

The Shared Responsibility solution for funding retiree health care, which went into effect on July 1, 2010, provides a method of prefunding retiree health care over the next 21 years. In only nine years, the Health Insurance Trust has reached 46% funding compared to pay-as-you-go status before the law took effect (with the most recent year being a gain of 9.7 percentage points). The results confirm that the

Health Insurance Trust is on schedule to be funded fully and that the 2010 solution is working. The shared responsibility solution for funding retiree health care will help ensure the retirement security of the state's teachers. An actuarial valuation of the Health Insurance Trust for the fiscal year ended June 30, 2019, indicated that the trust has an unfunded liability of $1.69 billion. Annual required employer contributions for the Health Insurance Trust are provided in the Schedule of Employer Contributions in the Required Supplemental Information of the Financial Section.

The actuary's opinion is that "if the contributions to the Health Insurance Trust continue at the current statutorily required levels, the funded ratio of the retiree medical plan will continue to increase, and the ability of the (Health Insurance Trust) to fund the benefits called for under the retiree medical plan will improve."

A surplus in the state's fiscal year 2019 budget resulted in a $70 million appropriation for retiree health insurance that continues the record of full funding for retiree medical since Shared Responsibility was implemented in 2010.

Additionally, the board is pursuing steps to realize true cost containment at both the state and national levels, and teachers and taxpayers will continue to benefit from those efforts.

National Involvement

NCTR Executive Committee

I am past-president of the National Council on Teacher Retirement (NCTR). NCTR is a national, nonprofit organization with a mission to promote effective governance and benefits administration in state and local public pension systems in order that adequate and secure retirement benefits are provided to educators and other plan participants. NCTR membership includes 69 state, territorial, local and university pension systems with combined assets in excess of $2 trillion, serving more than 18 million active and retired teachers, non-teaching personnel and other public employees.

Public Sector HealthCare Roundtable

Additionally, I serve on the board of directors and as president of the Public Sector HealthCare Roundtable. The roundtable is a national coalition of public sector health care purchasers that was formed to ensure that the interests of the public sector are represented properly during the formulation, debate and implementation of federal health care policies. Membership is open to any statewide, regional or local governmental unit that provides health care coverage for public employees and retirees.

Acknowledgments

The preparation of this report reflects the combined efforts of the TRS staff, under the leadership of the board. The report is intended to provide complete and reliable information that serves as a basis for making management decisions and for determining compliance with legal provisions. It also is used to determine responsible stewardship of the assets contributed by TRS members and their employers.

This report is located at the TRS web address https://trs.ky.gov/financial-reports-information/#CAFR and is made available to all system employers. The cooperation of these employers continues to contribute significantly to TRS's success and forms the vital link between TRS and its active members.

TRS management and staff are committed to the continued operation of an actuarially sound and efficient retirement system. Again, thanks to you and the General Assembly for your support for full pension funding that ensures retirement security for teachers. Your support is an essential part of this commitment, and we look forward to working with you.

Respectfully submitted,

Gary L. Harbin, CPA
Executive Secretary

Board of Trustees

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

Administrative Staff

Gary L. Harbin, CPA
Executive Secretary

Robert B. Barnes, JD
General Counsel and
Deputy Executive Secretary
Operations

Eric Wampler, JD
Deputy Executive Secretary
Finance & Administration

Tom Siderewicz, CFA
Chief Investment Officer

Professional Consultants

Actuary

Cavanaugh Macdonald Consulting, LLC
3550 Busbee Parkway, Suite 250
Kennesaw, GA 30144

Auditor

Kentucky Auditor of Public Accounts
209 St. Clair Street
Frankfort, KY 40601

See the Schedules of Contracted Investment Management Expenses, Transaction Commissions and Professional Service Providers on pages 107, 110, 113, 119 and 120 for a list of investment fees and external asset managers.

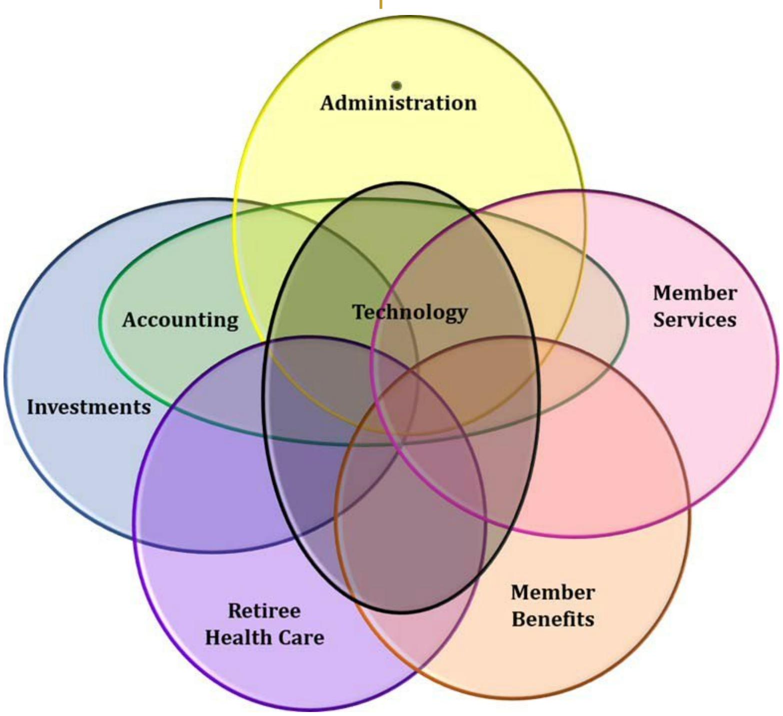
Teachers' Retirement System

Organizational Chart

Board of Trustees

Alison Wright, Chair
Hollis Gritton, Vice Chair
William Alverson
John Boardman
Frank Collecchia
Brenda McGown
Lynn Patterson, Ed.D.
Laura Schneider
Josh Underwood
Allison Ball
Wayne Lewis, Ph.D.

Internal Auditor



Administration

Executive Secretary
Gary L. Harbin, CPA

Deputy Executive Secretary of Finance
Eric Wampler, JD

Deputy Executive Secretary of Operations and General Counsel
Robert B. Barnes, JD

Internal Auditor
Nate Van Sickel

Investments
Tom Siderewicz, CFA

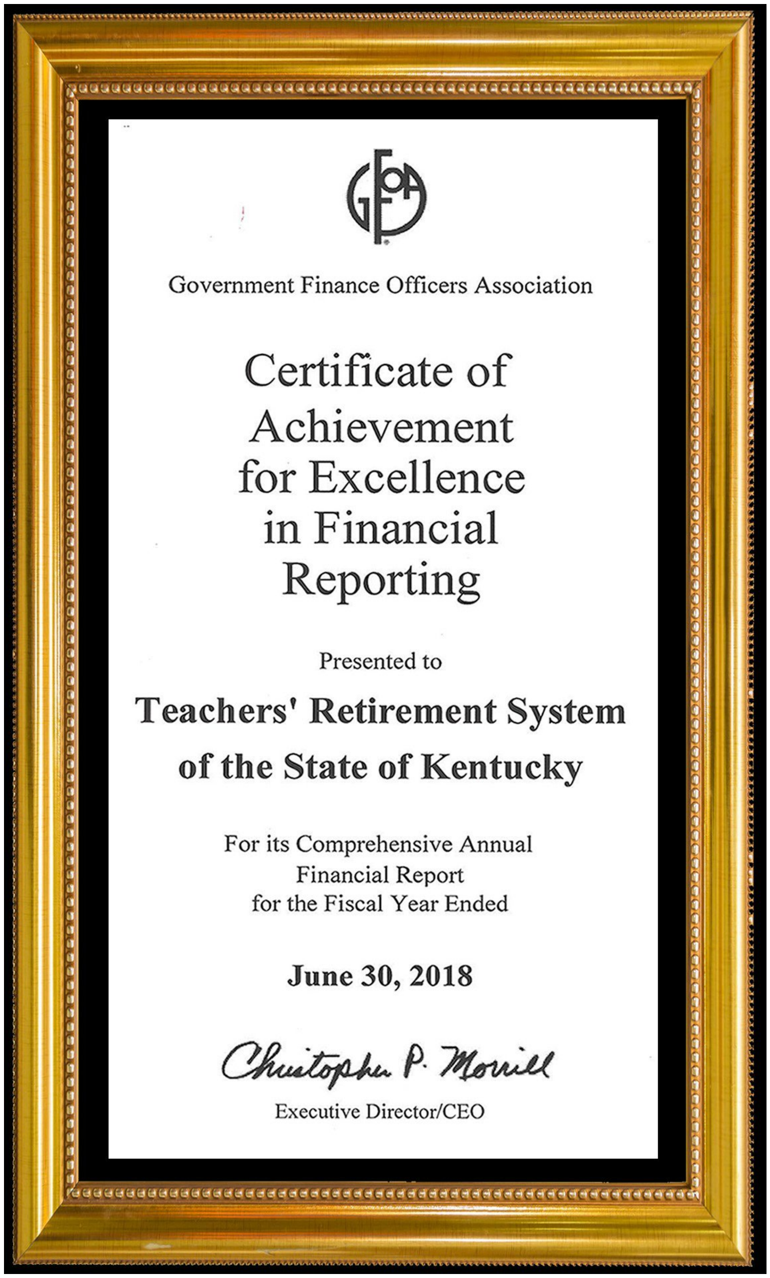
Accounting
Mark E. Whelan, CPA

Retiree Health Care
Jane C. Gilbert, CPA

Technology
Jon Cordray

Member Services Member Benefits
Becky Niece

GFOA Certificate of Achievement



Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Teachers' Retirement System of the State of Kentucky

For its Comprehensive Annual Financial Report for the Fiscal Year Ended

June 30, 2018

Christopher P. Morrill

Executive Director/CEO

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Teachers' Retirement System of the State of Kentucky. The TRS has received the Certificate of Achievement for the last 31 consecutive years (fiscal years ended 1988-2018).

PPCC Public Pension Standards Award

PPCC

Public Pension Coordinating Council

Public Pension Standards Award
For Funding and Administration
2019

Presented to

Teachers' Retirement System of the State of Kentucky

In recognition of meeting professional standards for
plan funding and administration as
set forth in the Public Pension Standards.

Presented by the Public Pension Coordinating Council, a confederation of

National Association of State Retirement Administrators (NASRA)
National Conference on Public Employee Retirement Systems (NCPERS)
National Council on Teacher Retirement (NCTR)

Alan H. Winkle
Program Administrator

The Public Pension Coordinating Council awarded a Public Pension Standards Award for Funding and Administration to the Teachers' Retirement System of the State of Kentucky for 2019 for implementing and maintaining high professional standards in administering the affairs of TRS. The award is based on compliance with principles judged to underlie exemplary retirement system achievements in the areas of benefits, actuarial valuation, financial reporting, investments, funding and disclosure. Those principles widely are acknowledged to be marks of excellence for retirement systems. It represents the highest standards of excellence in the public pension industry.

Page intentionally left blank

Financial Section

MIKE HARMON
AUDITOR OF PUBLIC ACCOUNTS

Board of Trustees
Teachers' Retirement System of the State of Kentucky
Frankfort, Kentucky

Independent Auditor's Report

Report on the Financial Statements

We have audited the accompanying financial statements of Teachers' Retirement System of the State of Kentucky (TRS), a component unit of the Commonwealth of Kentucky, as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise TRS's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

TRS's management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

209 ST. CLAIR STREET
FRANKFORT, KY 40601-1817

TELEPHONE 502.564.5841
FACSIMILE 502.564.2912
WWW.AUDITOR.KY.GOV

AN EQUAL OPPORTUNITY EMPLOYER M/F/D

Board of Trustees
Teachers' Retirement System of the State of Kentucky
(Continued)

Page 2

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the TRS, a component unit of the Commonwealth of Kentucky, as of June 30, 2019, and the changes in fiduciary net position for the year then ended in conformity with accounting principles generally accepted in the United States of America.

Emphasis-of-Matter

Reporting Entity

As discussed in Note 1, the financial statements present only the TRS, and are not intended to present fairly the financial position of the Commonwealth of Kentucky, or the results of its operations in conformity with accounting principles generally accepted in the United States of America.

Comparative Financial Statements

The financial statements of TRS for the year ended June 30, 2018 were audited by other auditors whose report dated November 15, 2018 expressed unmodified opinions on those statements.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Management's Discussion and Analysis (pages 19 through 22), Schedule of Changes in Net Pension Liability – Retirement Annuity Trust (and related notes) (pages 76 through 78), Schedule of Changes in Net OPEB Liability – Health Insurance Trust (and related notes) (pages 79 through 81), and Schedule of Changes in Net OPEB Liability – Life Insurance Trust (and related notes) (pages 82 through 84) be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Board of Trustees
Teachers' Retirement System of the State of Kentucky
(Continued)

Page 3

Supplementary Information

Our audit was conducted for the purpose of forming an opinion on the financial statements that collectively comprise TRS's basic financial statements. The 2019 information on the additional supporting schedules (pages 84 through 85) is presented for the purposes of additional analysis and is not a required part of the basic financial statements. The Schedule of Administrative Expenses, Schedule of Professional Services and Contracts, and Schedule of Contracted Investment Management Expenses are the responsibility of management and were derived from and relate directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the Schedule of Administrative Expenses, Schedule of Professional Services and Contracts, and Schedule of Contracted Investment Management Expenses are fairly stated, in all material respects, in relation to the basic financial statements as a whole. The 2018 information on the additional supporting schedules (pages 84 through 86) was subjected to the auditing procedures applied in the 2018 audit of the basic financial statements by other auditors, whose report on such information stated that it was fairly stated in all material respects in relation to the 2018 basic financial statements as a whole.

Other Information

The Introductory, Actuarial, Investment, and Statistical sections are presented for purposes of additional analysis and are not a required part of the financial statements. These sections have not been subjected to the auditing procedures applied in the audit of the financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated November 15, 2019 on our consideration of TRS's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering TRS's internal control over financial reporting and compliance.

Respectfully submitted,

Mike Harmon
Auditor of Public Accounts

November 15, 2019

Teachers' Retirement System of the State of Kentucky
Management's Discussion and Analysis

This discussion and analysis of the financial performance of Teachers' Retirement System of the State of Kentucky (TRS or system) provides an overview of the Retirement Annuity Trust, the Health Insurance Trust and the Life Insurance Trust for the fiscal years ended June 30, 2019, and 2018. It should be read in conjunction with the respective financial statements, which begin on page 24. TRS is the fiduciary of funds held in trust for its members.

Using This Financial Report

Because of the long-term nature of the retirement annuity, health insurance and life insurance trusts, financial statements alone do not provide the complete scope of TRS. The notes, required supplemental information, supporting schedules and other sections of this comprehensive annual financial report (CAFR) relating to investments, actuarial valuations and statistical measures complete that scope.

Information about the activities of the retirement annuity, health insurance and life insurance trusts and the 403(b) Tax-Sheltered Trust as a whole is provided in the Statement of Fiduciary Net Position and Statement of Changes in Fiduciary Net Position (on pages 24-27). The Notes to the Financial Statements are an essential part of the basic financial statements. They provide important background and detailed information about TRS, the plan and the basic financial statements themselves.

The Required Supplementary Information includes historical trend information about the funded status of the retirement annuity, health insurance and life insurance trusts presented as required by accounting standards. The Schedules of Employer Contributions present historical trend information about the required contributions of employers and the contributions made by employers in relation to the requirement. These schedules provide information that contributes to understanding the changes over time in the funded status of the plans. Separate reports prepared by the actuary using a board-adopted funding policy provide a long-term, ongoing plan perspective and the progress made in accumulating sufficient assets to pay benefits and insurance premiums when due.

Teachers' Retirement System as a Whole

In the fiscal year ended June 30, 2019, the system's combined fiduciary net position increased by $615.4 million — from $21.3 billion in 2018 to $21.9 billion in 2019. In 2017, the combined net position totaled $19.8 billion. The following summaries focus on the fiduciary net position and changes in fiduciary net position of TRS's retirement annuity, health insurance and life insurance trusts.

Summary of Fiduciary Net Position
(In millions)

	Retirement Annuity Trust			Health Insurance Trust			Life Insurance Trust		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Assets									
Cash and investments	$ 20,295.0	$ 19,885.8	$ 18,649.0	$1,371.2	$ 1,140.7	$ 922.6	$ 85.4	$ 83.7	$ 86.6
Receivables	104.3	110.8	135.0	54.7	59.0	44.6	0.5	0.8	1.2
Capital assets	14.1	16.3	18.1						
Total assets	20,413.4	20,012.9	18,802.1	1,425.9	1,199.7	967.2	85.9	84.5	87.8
Liabilities	(41.6)	(31.3)	(94.4)	(11.9)	(9.4)	(8.8)			
Net position	$ 20,371.8	$ 19,981.6	$ 18,707.7	$1,414.0	$ 1,190.3	$ 958.4	$ 85.9	$ 84.5	$ 87.8

Trust Totals* **

(In millions)

	2019	2018	2017
Assets			
Cash & Investments	$ 21,751.6	$ 21,110.2	$ 19,658.2
Receivables	159.5	170.6	180.8
Capital Assets	14.1	16.3	18.1
Total Assets	21,925.2	21,297.1	19,857.1
Liabilities	(53.5)	(40.7)	(103.2)
Net Position	$ 21,871.7	$ 21,256.4	$ 19,753.9

*Trust Totals excludes Other Funds, which consists of the 403(b) Tax-Sheltered Trust, the Supplemental Benefit Fund and the Losey Scholarship Fund. Other Funds had a combined fiduciary net position of $1.2 million for 2019, $1.1 million for 2018 and $1 million for 2017.
**Amounts above may not agree to the financial statements due to rounding.

The fiduciary net position of the Retirement Annuity Trust increased by 2% ($20.4 billion compared to $20 billion in 2018). The fiduciary net position in 2017 was $18.7 billion. The increases primarily are due to additional employer contributions from the state and improvements in market conditions. Net investment income was approximately $1.1 billion in 2019 and $2 billion in 2018. This compares to $2.5 billion in 2017.

The fiduciary net position of the Health Insurance Trust increased by 18.8% ($1.4 billion compared to $1.2 billion in 2018) primarily due to investment income and contributions from members and employers due to Shared Responsibility legislation passed in 2010. This compares to 2017 when fiduciary net position was $958.4 million.

The Summary of Changes in Fiduciary Net Position is presented below followed by discussion of the activities within the different trusts.

Summary of Changes in Fiduciary Net Position

(In millions)

	Retirement Annuity Trust			Health Insurance Trust			Life Insurance Trust		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Additions									
Member contributions	$ 321.2	$ 319.1	$ 313.6	$ 131.7	$ 130.8	$ 128.8	$	$	$
Employer contributions	1,123.0	1,048.7	1,060.7	183.1	187.1	180.3	1.4	1.1	1.0
Net investment increase (decrease)	1,085.2	1,953.2	2,475.8	74.4	76.8	95.5	5.1	1.1	1.0
Total additions	2,529.4	3,321.0	3,850.1	389.2	394.7	404.6	6.5	2.2	2.0
Deductions									
Benefit payments	2,094.3	2,004.6	1,918.6				5.2	5.5	5.2
Refunds	32.4	31.1	26.3						
Administrative expense	12.4	11.4	10.3	1.8	1.7	1.5			
Insurance expenses				163.7	161.1	178.5			
Total deductions	2,139.1	2,047.1	1,955.2	165.5	162.8	180.0	5.2	5.5	5.2
Net increase (decrease)	$ 390.3	$ 1,273.9	$ 1,894.9	$ 223.7	$ 231.9	$ 224.6	$ 1.3	$ (3.3)	$ (3.2)

Trust Totals* **
(In millions)

	2019	2018	2017
Additions			
Member contributions	$ 452.9	$ 449.9	$ 442.4
Employer contributions	1,307.5	1,236.9	1,242.0
Net investment increase (decrease)	1,164.7	2,031.1	2,572.3
Total additions	2,925.1	3,717.9	4,256.7
Deductions			
Benefit payments	2,099.5	2,010.1	1,923.8
Refunds	32.4	31.1	26.3
Administrative expense	14.2	13.1	11.8
Insurance expenses	163.7	161.1	178.5
Total deductions	2,309.8	2,215.4	2,140.4
Net increase (decrease)	$ 615.3	$ 1,502.5	$ 2,116.3

*Trust Totals excludes Other Funds, which consists of the 403(b) Tax-Sheltered Trust, the Supplemental Benefit Fund and the Losey Scholarship Fund.
**Amounts above may not agree to the financial statements due to rounding.

Retirement Annuity Trust Activities

Retirement contributions are calculated by applying a percentage factor to salary with member and employer contributions withheld from each pay check. Members also may pay contributions to repurchase previously refunded service credit or to purchase various types of elective service credit.

In 2019, employer contributions totaled $1.12 billion, a net increase of $74 million from the prior fiscal year. The increase was due to employer contributions paid by the state being more than the prior year. In 2018, employer contributions decreased $12 million compared 2017 primarily due to amounts received from the state.

In 2019, the Retirement Annuity Trust experienced net investment income of $1.09 billion compared to the previous year of $1.95 billion. For 2017, net investment income totaled $2.5 billion. The increases in net investment income are due to favorable market conditions. Increases in deductions of $92 million in 2019 and $91.8 million in 2018 can be attributed to increases in the number of benefit recipients. Members and beneficiaries on the retiree payroll as of June 30, 2019, increased by 1,236 compared to a prior year increase of 1,411.

Other Postemployment Benefit (OPEB) Activities

During 2019, the Health Insurance Trust member contributions increased $1 million from 2018 and $2 million from 2017. Also during 2019, employer contributions decreased $4 million from 2018 and $6.8 million from 2017. The member, employer and state contributions increased primarily due to the Shared Responsibility law.

In 2019, the Health Insurance Trust experienced net investment income of $74.4 million compared to the previous year of $76.8 million. For 2017, net investment income totaled $95.5 million. The increases in net investment income are due to favorable market conditions.

The Life Insurance Trust experienced net investment income of $5.1 million in 2019, $1.1 million in 2018 and $1 million in 2017. Life insurance benefits paid for 2019, 2018 and 2017 were $5.2 million, $5.5 million and $5.2 million respectively.

Funding

For the 2018-2020 biennium, the state budgeted $1.09 billion of additional employer contributions for the unfunded liability of the Retirement Annuity Trust. The plan fiduciary net position as a percentage of total pension liability measured in accordance with Governmental Accounting Standards Board (GASB) Statement No. 67 was 58.8% as of June 30, 2019, compared to 2018's 59.3%. The separately issued actuary's valuation shows progress of the trust's funded status over the amortization period set by the board funding policy. The additional funding provided in the budget resulted in 100% of the actuarially determined employer contribution (ADEC) being made for 2019 and 97% for 2018. Assuming that contributions to the retirement trust are made by the state from year to year in the future as recommended by the actuary, TRS should have sufficient assets to provide all benefits due as defined by law to members.

The funding of the health insurance and life insurance trusts is presented in notes 8 and 9 of these financial statements and the Required Supplementary Information in accordance with GASB Statement No. 74. Although the Health Insurance Trust continues to have a large net OPEB liability, current obligations are being met by current funding. Shared Responsibility continues to prefund retiree health benefits. The Schedule of Employer Contributions presented in the Required Supplementary Information provides the ADEC of the health and life insurance trusts.

Historical Trends

Accounting standards require that the Statement of Fiduciary Net Position present assets at fair value; include only benefits and refunds due to plan members and beneficiaries; and report accrued investment and administrative expenses as of the reporting date. Detailed information regarding the funded status — including the key actuarial assumptions, target allocations and the sensitivity of the discount rate — can be found for the Retirement Annuity Trust in Note 4 of the financial statements, for the Health Insurance Trust in Note 8 and for the Life Insurance Trust in Note 9. The schedules of employer contributions are provided in the Required Supplementary Information.

TRS's independent consulting actuaries are members of the American Academy of Actuaries and experienced in performing valuations for public retirement systems. As mandated by state law, the valuations of the retirement annuity and health insurance trusts are prepared in accordance with principles of practice prescribed by the Actuarial Standards Board consistent with accepted actuarial procedures. Actuarial assumptions used in the valuations are internally consistent and reasonable based on the actual experience of the trusts. An actuarial audit was completed in 2015, which confirmed the accuracy of actuarial procedures and the reasonableness of assumptions. A five-year experience study was completed in 2016, which also confirmed the reasonableness of assumptions based upon the actual experience of the trusts. The actuarial assumptions may be reasonably relied upon as reflected in the results.

This financial report is designed to provide citizens, participating employers, plan members and other users with an overview of TRS's fiscal practices. Direct questions or requests for additional information to TRS Chief Financial Officer Mark Whelan.

Page intentionally left blank

Basic Financial Statements

Statement of Fiduciary Net Position
As of June 30, 2019

	Retirement Annuity Trust	Health Insurance Trust	Life Insurance Trust	Other Funds	Total
Assets					
Cash	$ 85,986,592	$ 35,499,235	$ 261,416	$ 239,187	$ 121,986,430
Prepaid expenses	67,059				67,059
Receivables					
Contributions	38,277,522	22,738,889	19,353		61,035,764
Due from other trusts	1,835,025				1,835,025
State of Kentucky		826,203	120,308		946,511
Investment income	51,446,307	2,420,395	325,174	3,345	54,195,221
Investment sales receivable	12,620,835	1,081,560			13,702,395
Other receivables	163,007	27,671,716			27,834,723
Total receivables	104,342,696	54,738,763	464,835	3,345	159,549,639
Investments at fair value					
Short-term investments	678,260,542	74,104,999	13,451,102	355,729	766,172,372
Fixed income	3,227,674,773	112,630,744	19,859,044	268,672	3,360,433,233
Equities	12,288,549,261	768,005,547	48,261,798	334,537	13,105,151,143
Alternative investments	1,359,374,419	102,153,229	48,510		1,461,576,158
Real estate	1,223,062,000	75,296,027	2,107,202		1,300,465,229
Additional categories	1,432,019,602	203,521,400	1,354,418		1,636,895,420
Total investments	20,208,940,597	1,335,711,946	85,082,074	958,938	21,630,693,555
Capital assets	26,527,263				26,527,263
Accumulated depreciation	(12,439,961)				(12,439,961)
Net capital assets	14,087,302				14,087,302
Total assets	20,413,424,246	1,425,949,944	85,808,325	1,201,470	21,926,383,985
Liabilities					
Accrued expenses and other liabilities	6,474,507	5,920,066	19,654		12,414,227
Due to other trusts		1,803,191	30,392	1,442	1,835,025
Investment purchases payable	35,039,834	4,206,631			39,246,465
Total liabilities	41,514,341	11,929,888	50,046	1,442	53,495,717
Net position restricted for pension and other postemployment benefits	$ 20,371,909,905	$ 1,414,020,056	$ 85,758,279	$ 1,200,028	$ 21,872,888,268

The Combining Statement of Fiduciary Net Position — Other Funds is presented on page 29.

The accompanying notes are an integral part of these financial statements.

Statement of Fiduciary Net Position
As of June 30, 2018

	Retirement Annuity Trust	Health Insurance Trust	Life Insurance Trust	Other Funds	Total
Assets					
Cash	$ 104,214,766	$ 58,452,151	$ 432,786	$ 186,882	$ 163,286,585
Prepaid expenses	105,795	19,600			125,395
Receivables					
Contributions	30,237,329	18,012,814	13,374		48,263,517
Due from other trusts	1,779,623				1,779,623
State of Kentucky	16,199,596	10,277,791	35,965		26,513,352
Investment income	44,151,888	2,061,568	732,657	3,043	46,949,156
Investment sales receivable	18,104,128	424,710			18,528,838
Other receivables	361,346	28,260,451			28,621,797
Total receivables	110,833,910	59,037,334	781,996	3,043	170,656,283
Investments at fair value					
Short-term investments	403,309,780	56,993,634	3,724,036	373,549	464,400,999
Fixed income	2,983,975,575	89,681,931	47,825,436	247,914	3,121,730,856
Equities	12,544,141,125	605,705,867	29,895,479	312,013	13,180,054,484
Alternative investments	1,282,830,325	81,232,638			1,364,062,963
Real estate	1,150,694,282	62,962,565	541,107		1,214,197,954
Additional categories	1,416,514,873	185,613,170	1,300,000		1,603,428,043
Total investments	19,781,465,960	1,082,189,805	83,286,058	933,476	20,947,875,299
Capital assets	26,513,139				26,513,139
Accumulated depreciation	(10,188,492)				(10,188,492)
Net capital assets	16,324,647				16,324,647
Total assets	20,012,945,078	1,199,698,890	84,500,840	1,123,401	21,298,268,209
Liabilities					
Accrued expenses and other liabilities	2,280,864	5,177,013	7,605		7,465,482
Due to other trusts		1,747,561	30,979	1,083	1,779,623
Investment purchases payable	29,031,118	2,493,508			31,524,626
Total liabilities	31,311,982	9,418,082	38,584	1,083	40,769,731
Net position restricted for pension and other postemployment benefits	$ 19,981,633,096	$ 1,190,280,808	$ 84,462,256	$ 1,122,318	$ 21,257,498,478

The Combining Statement of Fiduciary Net Position — Other Funds is presented on page 29.
The accompanying notes are an integral part of these financial statements.

Statement of Changes in Fiduciary Net Position
For the Fiscal Year Ended June 30, 2019

	Retirement Annuity Trust	Health Insurance Trust	Life Insurance Trust	Other Funds	Total
Additions					
Contributions					
State of Kentucky	$ 1,051,451,775	$ 76,381,841	$ 1,209,055	$	$ 1,129,042,671
Others employers	71,583,048	106,764,314	212,172	267,554	178,827,088
Members	321,172,166	131,676,820			452,848,986
Total contributions	1,444,206,989	314,822,975	1,421,227	267,554	1,760,718,745
Investment income (loss)					
Net appreciation (depreciation) in fair value of investments	651,487,372	63,835,895	3,706,870	43,283	719,073,420
Interest	159,741,150	9,120,053	764,520	21,645	169,647,368
Dividends	304,120,073	6,724,667	727,547	6,365	311,578,652
Rental income, net	28,402,562				28,402,562
Securities lending, gross earnings	15,694,255		353,336	5,277	16,052,868
Gross investment income (loss)	1,159,445,412	79,680,615	5,552,273	76,570	1,244,754,870
Less: investment expense	61,166,252	5,295,133	172,703	15,830	66,649,918
Less securities lending expense	13,089,811		321,382	4,718	13,415,911
Net investment income (loss)	1,085,189,349	74,385,482	5,058,188	56,022	1,164,689,041
Total additions	2,529,396,338	389,208,457	6,479,415	323,576	2,925,407,786
Deductions					
Benefits	2,094,364,072		5,153,000	244,424	2,099,761,496
Refunds of contributions	32,403,149				32,403,149
Insurance expenses		163,666,017			163,666,017
Administrative expense	12,352,308	1,803,192	30,392	1,442	14,187,334
Total deductions	2,139,119,529	165,469,209	5,183,392	245,866	2,310,017,996
Net increase (decrease)	390,276,809	223,739,248	1,296,023	77,710	615,389,790
Net position restricted for pension and other postemployment benefits					
Beginning of year	19,981,633,096	1,190,280,808	84,462,256	1,122,318	21,257,498,478
End of year	$20,371,909,905	$ 1,414,020,056	$ 85,758,279	$ 1,200,028	$ 21,872,888,268

The Combining Statement of Changes in Fiduciary Net Position — Other Funds is presented on page 30.
The accompanying notes, are an integral part of these financial statements.

Statement of Changes in Fiduciary Net Position
For the Fiscal Year Ended June 30, 2018

	Retirement Annuity Trust	Health Insurance Trust	Life Insurance Trust	Other Funds	Total
Additions					
Contributions					
State of Kentucky	$ 969,698,496	$ 80,959,003	$ 896,974	$	$ 1,051,554,473
Others employers	78,972,705	106,143,410	161,355	325,950	185,603,420
Members	319,127,087	130,777,471			449,904,558
Total contributions	1,367,798,288	317,879,884	1,058,329	325,950	1,687,062,451
Investment income (loss)					
Net appreciation (depreciation) in fair value of investments	1,574,056,951	68,954,490	(1,270,937)	20,861	1,641,761,365
Interest	138,027,758	6,195,753	2,446,305	14,895	146,684,711
Dividends	262,669,598	5,633,011	40,895	5,898	268,349,402
Rental income, net	29,957,783				29,957,783
Securities lending, gross earnings	16,275,779		42,020	1,246	16,319,045
Gross investment income (loss)	2,020,987,869	80,783,254	1,258,283	42,900	2,103,072,306
Less: investment expense	55,500,376	3,942,742	113,453	16,346	59,572,917
Less securities lending expense	12,273,462		34,409	973	12,308,844
Net investment income (loss)	1,953,214,031	76,840,512	1,110,421	25,581	2,031,190,545
Total additions	3,321,012,319	394,720,396	2,168,750	351,531	3,718,252,996
Deductions					
Benefits	2,004,617,334		5,452,920	190,626	2,010,260,880
Refunds of contributions	31,072,421				31,072,421
Insurance expenses		161,081,700			161,081,700
Administrative expense	11,388,493	1,747,561	30,979	1,083	13,168,116
Total deductions	2,047,078,248	162,829,261	5,483,899	191,709	2,215,583,117
Net increase (decrease)	1,273,934,071	231,891,135	(3,315,149)	159,822	1,502,669,879
Net position restricted for pension and other postemployment benefits					
Beginning of year	18,707,699,025	958,389,673	87,777,405	962,496	19,754,828,599
End of year	$ 19,981,633,096	$ 1,190,280,808	$ 84,462,256	$ 1,122,318	$ 21,257,498,478

The Combining Statement of Changes in Fiduciary Net Position — Other Funds is presented on page 31.
The accompanying notes are an integral part of these financial statements.

Page intentionally left blank

Combining Statement of Fiduciary Net Position — Other Funds
As of June 30, 2019

	403(b) Tax-Sheltered Trust	Supplemental Benefit Fund	Losey Scholarship Fund	Total
Assets				
Cash	$	$ 239,187	$	$ 239,187
Receivables				
Investment income	580		2,765	3,345
Investments at fair value				
Short-term investments	310,008		45,721	355,729
Fixed income			268,672	268,672
Equities			334,537	334,537
Total investments	310,008		648,930	958,938
Total assets	310,588	239,187	651,695	1,201,470
Liabilities				
Due to other trusts	45	1,293	104	1,442
Total liabilities	45	1,293	104	1,442
Net position restricted for pension and other postemployment benefits	$ 310,543	$ 237,894	$ 651,591	$ 1,200,028

Combining Statement of Fiduciary Net Position — Other Funds
As of June 30, 2018

	403(b) Tax-Sheltered Trust	Supplemental Benefit Fund	Losey Scholarship Fund	Total
Assets				
Cash	$	$ 186,882	$	$ 186,882
Receivables				
Investment income	481		2,562	3,043
Investments at fair value				
Short-term investments	324,303		49,246	373,549
Fixed income			247,914	247,914
Equities			312,013	312,013
Total investments	324,303		609,173	933,476
Total assets	324,784	186,882	611,735	1,123,401
Liabilities				
Due to other trusts	54	927	102	1,083
Total liabilities	54	927	102	1,083
Net position restricted for pension and other postemployment benefits	$ 324,730	$ 185,955	$ 611,633	$ 1,122,318

The accompanying notes are an integral part of these financial statements.

Combining Statement of Changes in Fiduciary Net Position — Other Funds
For the Fiscal Year Ended June 30, 2019

	403(b) Tax-Sheltered Trust	Supplemental Benefit Fund	Losey Scholarship Fund	Total
Additions				
Contributions				
Other employers	$	$ 267,554	$	$ 267,554
Investment income (loss)				
Net appreciation in fair value of investments			43,283	43,283
Interest	6,820	4,730	10,095	21,645
Dividends			6,365	6,365
Securities lending, gross			5,277	5,277
Gross investment income (loss)	6,820	4,730	65,020	76,570
Less investment expense	13,592		2,238	15,830
Less securities lending expense			4,718	4,718
Net investment income (loss)	(6,772)	4,730	58,064	56,022
Total additions	(6,772)	272,284	58,064	323,576
Deductions				
Benefits	7,371	219,053	18,000	244,424
Administrative expense	44	1,292	106	1,442
Total deductions	7,415	220,345	18,106	245,866
Net Increase (Decrease)	(14,187)	51,939	39,958	77,710
Net position restricted for pension and other postemployment benefits				
Beginning of year	324,730	185,955	611,633	1,122,318
End of year	$ 310,543	$ 237,894	$ 651,591	$ 1,200,028

The accompanying notes are an integral part of these financial statements.

Combining Statement of Changes in Fiduciary Net Position — Other Funds
For the Fiscal Year Ended June 30, 2018

	403(b) Tax-Sheltered Trust	Supplemental Benefit Fund	Losey Scholarship Fund	Total
Additions				
Contributions				
Other employers	$	$ 325,950	$	$ 325,950
Investment income (loss)				
Net appreciation in fair value of investments			20,861	20,861
Interest	4,101	1,109	9,685	14,895
Dividends			5,898	5,898
Securities lending, gross			1,246	1,246
Gross investment income (loss)	4,101	1,109	37,690	42,900
Less investment expense	(13,592)		(2,754)	(16,346)
Less securities lending expense			(973)	(973)
Net investment income (loss)	(9,491)	1,109	33,963	25,581
Total additions	(9,491)	327,059	33,963	351,531
Deductions				
Benefits	9,651	162,975	18,000	190,626
Administrative expense	55	926	102	1,083
Total deductions	9,706	163,901	18,102	191,709
Net increase (decrease)	(19,197)	163,158	15,861	159,822
Net position restricted for pension and other postemployment benefits				
Beginning of year	343,927	22,797	595,772	962,496
End of year	$ 324,730	$ 185,955	$ 611,633	$ 1,122,318

The accompanying notes are an integral part of these financial statements.

Notes to Financial Statements

Note 1
Description of Retirement Annuity Trust

Reporting Entity

The Teachers' Retirement System of the State of Kentucky (TRS, or system) was created by the 1938 General Assembly, began operations July 1, 1940, and is governed by Kentucky Revised Statutes (KRS) chapter 161 sections 220 through 990. TRS is a blended component unit of the Commonwealth of Kentucky (commonwealth or state) and, therefore, is included in the commonwealth's financial statements. TRS is a cost-sharing multiple-employer defined benefit plan with a special funding situation established to provide retirement, health and life insurance benefits for specified employees of local school districts and other public educational agencies in the commonwealth.

KRS 161.250 provides that the general administration and management of TRS, and the responsibility for its proper operation, is vested in a board of trustees. The Board of Trustees consists of the chief state school officer, the state treasurer, two trustees appointed by the governor and seven elected trustees. Four of the elected trustees are active teachers, two are not members of the teaching profession, and one is an annuitant of the system.

Participants

As of June 30, 2019, a total of 207 employers participated in the plan. Employers are comprised of local school districts, Department of Education agencies, universities, the Kentucky Community and Technical College System and other educational organizations. The state under the Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 74 is recognized as a non-employer contributing entity providing the employer matching contributions for members employed by the local school districts and regional educational cooperatives.

According to KRS 161.220, any regular or special teacher, or professional occupying a position requiring certification or graduation from a four-year college or university is eligible to participate in the system. The following table illustrates the classifications of members.

	2019	2018
Active contributing members:		
Vested	48,562	47,375
Non-vested	24,085	24,830
Inactive members, vested	8,992	8,814
Retirees and beneficiaries currently receiving benefits	55,613	54,377
Total members, retirees and beneficiaries	137,252	135,396

Benefit Provisions

For Members Before July 1, 2008: Members become vested when they complete five years of credited service. To qualify for monthly retirement benefits, payable for life, members must either:

1. Attain age 55 and complete five years of Kentucky service, or
2. Complete 27 years of Kentucky service.

Non-university members receive monthly payments equal to 2% (service prior to July 1, 1983) and 2.5% (service after July 1, 1983) of their final average salaries for each year of credited service. Non-university members who became members on or after July 1, 2002, will receive monthly benefits equal to 2% of their final average salary for each year of service if, upon retirement, their total service is less than 10 years. New members after July 1, 2002, who retire with 10 or more years of total service will receive monthly benefits equal to 2.5% of their final average salary for each year of service, including the first 10 years. In addition, non-university members who retire July 1, 2004, and later with more than 30 years of service will have a multiplier for all years over 30 of 3%.

University employees receive monthly benefits equal to 2% of their final average salary for each year of credited service.

The final average salary is the member's five highest annual salaries except members at least age 55 with 27 or more years of service may use their three highest annual salaries. 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.

For Members On or After July 1, 2008: Members become vested when they complete five years of credited service. To qualify for monthly retirement benefits, payable for life, members must either:

1. Attain age 60 and complete five years of Kentucky service, or
2. Complete 27 years of Kentucky service, or
3. Attain age 55 and complete 10 years of Kentucky service.

The annual retirement allowance for non-university members is equal to: (a) 1.7% of final average salary for each year of credited service if their service is 10 years or less; (b) 2% of final average salary for each year of credited service if their service is greater than 10 years but no more than 20 years; (c) 2.3% of final average salary for each year of credited service if their service is greater than 20 years but no more than 26 years; (d) 2.5% of final average salary for each year of credited service if their service is greater than 26 years but no more than 30 years; (e) 3% of final average salary for years of credited service greater than 30 years.

The annual retirement allowance for university members is equal to: (a) 1.5% of final average salary for each year of credited service if their service is 10 years or less; (b) 1.7% of final average salary for each year of credited service if their service is greater than 10 years but no more than 20 years; (c) 1.85% of final average salary for each year of credited service if their service is greater than 20 years but less than 27 years; (d) 2% of final average salary for each year of credited service if their service is greater than or equal to 27 years.

The final average salary is the member's five highest annual salaries except members at least age 55 with 27 or more years of service may use their three highest annual salaries. 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.

Other Benefits

TRS provides postemployment medical insurance benefits to retirees as fully described in Note 8. TRS also provides disability benefits for vested members at the rate of 60% of the final average salary. A life insurance benefit payable upon the death of a member, also described in Note 9, is $2,000 for active contributing members and $5,000 for retired or disabled members.

Cost of living increases are 1.5% annually. Additional ad hoc increases and any other benefit amendments must be authorized by the General Assembly.

Note 2
Summary of Significant Accounting Policies

Basis of Accounting

The financial statements are prepared on the accrual basis of accounting. Member contributions and employer matching contributions are recognized in the fiscal year due. Benefits and refunds are recognized when due and payable in accordance with the terms of the plan.

Cash

TRS has seven cash accounts. At June 30, 2019, the retirement annuity cash account totaled $11.7 million, the control cash account totaled $74 million and the capital project cash account totaled $274,003 for a total of $86 million as carrying value of cash in the retirement trust. The medical insurance's Internal Revenue Code sec. 115 trust cash account totaled $23.6 million, the medical insurance 401(h) cash account totaled $11.8 million and the medical claims cash account totaled $115,598 for a total of $35.5 million as carrying value of cash in the Health Insurance Trust. The Life Insurance Trust cash account totaled $261,417. The Supplemental Benefit Fund cash account contained $239,187. Therefore, the carrying value of cash was $122 million, and the bank balance was $134.1 million. The variance is primarily due to outstanding checks and items not processed by the bank as of June 30, 2019.

At June 30, 2018, the retirement annuity cash account totaled $54.9 million, the control cash account totaled $49.3 million for a total of $104.2 million as carrying value of cash in the retirement trust. The medical insurance 115 trust cash account totaled $41.7 million, the medical insurance 401(h) cash account totaled $16.6 million and the medical claims cash account totaled $113,892 for a total of $58.5 million as carrying value of cash in the Health Insurance Trust. The Life Insurance Trust cash account totaled $432,786. The Supplemental Benefit Fund cash account contained $186,882. Therefore, the carrying value of cash was $163.3 million, and the bank balance was $161.4 million. The variance is primarily due to outstanding checks and items not processed by the bank as of June 30, 2018.

Capital Assets

Property and equipment are carried at cost, less accumulated depreciation. All costs of property and equipment $5,000 or greater are capitalized. Expenditures for maintenance and repairs are charged to operations as incurred. Depreciation is calculated using the straight-line method, with estimated lives ranging from five to 40 years in the following major classes: office furniture and equipment, five years; other equipment, five years; computer software, 10 years; and TRS office buildings, 40 years. Pathway replaced TRS's legacy computer system and is TRS's primary business information technology system. Pathway was capitalized and is being amortized or depreciated over 10 years.

Investments

Plan investments are reported at fair value. Fair value is the amount that a plan can reasonably expect to receive for an investment in a current sale between a willing buyer and a willing seller. Short-term securities are carried at cost, which approximates fair value. Fixed income and common and preferred stocks are generally valued based on published market prices and quotations from national security exchanges and securities pricing services. Real estate is primarily valued based on appraisals performed by independent appraisers. Other investments, such as private equity, timberland, real estate funds and other additional categories, are valued using the most recent general partner statement at net asset value. Examples of other additional categories are opportunistic credit, high yield bonds and direct lending.

Purchase and sales of debt securities, equity securities and short-term investments are recorded on the trade date. Real estate equity transactions are recorded on the settlement date. Upon sale of investments, the difference between sales proceeds and cost is reflected in the statement of changes in fiduciary net position. Investment expenses consist of investment manager and consultant fees along with fees for custodial services.

Compensated Absences

Expenses for accumulated vacation days and compensatory time earned by TRS's employees are recorded when earned. Upon termination or retirement, employees of TRS are paid for accumulated vacation time limited to 60 days and accumulated compensatory time limited to 240 hours. As of June 30, 2019 and 2018, accrued compensated absences were included in accrued expenses and other liabilities on the statements of fiduciary net position amounting to $1.2 million and $1.2 million, respectively.

Risk Management

Destruction of assets, theft, employee injuries and court challenges to administrative policy are among the various risks to which TRS is exposed. In order to cover such risks, TRS carries appropriate insurance policies, such as fire and tornado, employee bonds, fiduciary liability, worker's compensation and equipment insurance.

Other Receivables

In the Retirement Annuity Trust, other receivables consists primarily of installment contract receivables. TRS allows qualified purchases of service credit to be made by installment payments that are not to exceed a five-year period. Revenue is recognized in the initial year of the installment agreement. The June 30, 2019, other receivables in the retirement trust were $163,007 and $361,346 in 2018.

In the Health Insurance Trust, other receivables consists primarily of Medicare subsidies and formulary rebates accrued, but not received. The June 30, 2019, other receivables in the health trust were $27.7 million and $28.3 million in 2018.

Accrued Expenses and Other Payables

TRS's accrued expenses and other payables results primarily from the actual amount needed from the state for health insurance premiums for the current biennium being less than what was estimated when the 2018-2020 state budget was enacted. This amount will be netted against the state's share of retiree health costs requested in the 2020-2022 state budget submitted by TRS.

Use of Estimates

The preparation of financial statements in accordance with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates. The most significant estimates impacting the financial statements relate to the actuarial assumptions.

Income Taxes

The Retirement Annuity Trust is organized as a tax-exempt retirement plan under the Internal Revenue Code. The 403(b) Tax-Sheltered Trust no longer accepts contributions and will be fully terminated when all lifetime annuities have expired. TRS's management believes that it has operated the plans within the constraints imposed by federal tax law.

Recent Pronouncements

TRS implemented the provisions of GASB Statement No. 85 for the year ended June 30, 2018. GASB 85 addresses several issues identified during the implementation and application of certain GASB pronouncements. OPEB related issues applicable to TRS's medical and life insurance trusts addressed in this new standard include the presentation of payroll-related measures in the schedules of Required Supplementary Information by OPEB plans.

In January 2017, GASB issued Statement No. 84 that establishes criteria for identifying fiduciary activities and guidance on reporting those activities. This Statement provides guidance on four fiduciary funds that should be reported if applicable: pension (and other employee benefit) trust funds, investment trust funds, private purpose trust funds, and custodial funds. GASB 84 will be effective for periods beginning after December 15, 2018. TRS has not adopted GASB 84 and has not yet determined the impact of this standard on its financial statements and disclosures.

Reclassifications

In accordance with GASB Statement No. 28, additions and deductions related to securities lending transactions should be reported at their gross amounts. Previously, amounts related to gross borrower rebate expenses were reported net of securities lending gross earnings and have been reclassified to be reported as securities lending expense on the Statement of Changes in Fiduciary Net Position. The reclassification had no effect on total net position and change in net position.

Note 3
Contributions and Funds of the Plan

Contributions

Contribution rates are established by Kentucky Revised Statutes. Non-university members are required to contribute 12.855% of their salaries to the system effective July 1, 2015; university members are required to contribute 10.4% of their salaries effective July 1, 2015. KRS 161.565 allows each university to reduce the contribution of its members by 2.215%; therefore, university members contribute 8.185% of their salary to TRS. For members employed by local school districts, the state, as a non-employer contributing entity, contributes 13.105% of salary for those who joined before July 1, 2008, and 14.105% for those who joined thereafter.

Other participating employers are required to contribute the percentage contributed by members plus an additional 3.25% of members' gross salaries.

The member and employer contributions consist of retirement annuity contributions and OPEB contributions to the medical and life insurance trusts. The member postemployment medical contribution is 3.75% of salary. The employer postemployment medical contribution is 0.75% of member salaries. Also, employers (other than the state) contribute 3% of members' salaries and the state contributes the net cost of health insurance premiums for new retirees after June 30, 2010, in the non-Medicare eligible group. If a member leaves covered employment before accumulating five years of credited service, accumulated member contributions to the retirement trust are refunded with interest upon the member's request.

Funds of the Plan

Teacher Savings Fund: KRS 161.420(2) establishes the Teacher Savings Fund consisting of contributions paid by university and non-university members. The fund also includes interest authorized by the Board of Trustees from the Guarantee Fund (described below). The accumulated contributions of members that are returned upon withdrawal or paid to the estate or designated beneficiary in the event of death are paid from this fund. Upon retirement, the member's contributions and the matching state contributions are transferred from this fund to the Allowance Reserve Fund, the fund (also described below) from which retirement benefits are paid.

State Accumulation Fund: KRS 161.420(3) establishes the State Accumulation Fund, which receives state appropriations to the system. The state matches an amount equal to members' contributions. State appropriations during the year are based on estimates of members' salaries. At year-end when actual salaries are known, the required state matching also is realized by producing either a receivable from or a payable to the state.

Allowance Reserve Fund: KRS 161.420(4) establishes the Allowance Reserve Fund, which is the source for retirement, disability and survivor benefits paid to TRS members. These benefits are paid from the retired members' contributions until they are exhausted, at which time state matching contributions are used to pay the benefits. After an individual member's contributions and the state matching contributions have been exhausted, retirement benefits are paid from monies transferred from the Guarantee Fund (described below).

Guarantee Fund: KRS 161.420(6) establishes the Guarantee Fund to collect income from investments, state matching contributions of members withdrawn from the system, and state matching contributions for cost of living adjustments (COLAs). In addition, it receives money for which disposition is not otherwise provided. This fund provides interest to the other funds, benefits in excess of both members' and state matching contributions, monies for administrative expenses of TRS, and deficiencies not covered by the other funds.

Expense Fund: KRS 161.420(1) establishes the Expense Fund for administrative expenses. Investment income transferred to this fund from the Guarantee Fund is used to pay the administrative expenses of TRS. Administrative expenses are allocated among the funds based on benefits paid.

Note 4
Net Pension Liability of Employers

The net pension liability (i.e., the system's liability determined in accordance with GASB Statement No. 67 less the fiduciary net position) as of June 30, 2019 and 2018 follows.

Schedule of Net Pension Liability of Employers
(Dollars in thousands)

Fiscal Year Ending June 30	Total Pension Liability A	Plan Fiduciary Net Position B	Employers Net Pension Liability (A-B)	Plan Fiduciary Net Position as a % of Total Pension Liability (B/A)	Covered Payroll C	Net Pension Liability as a % of Covered Payroll [(A-B)/C]
2019	$ 34,666,795	$ 20,371,910	$ 14,294,885	58.8	$ 3,497,216	408.75
2018	33,708,555	19,981,633	13,726,922	59.3	3,455,660	397.23

Summary of Actuarial Assumptions

A summary of the actuarial assumptions as of the latest actuarial valuation follows.

Valuation date	June 30, 2018
Actuarial cost method	Entry age
Investment rate of return	7.5%, net of pension plan investment expense, including inflation.
Projected salary increases	3.5 - 7.3%, including inflation
Inflation rate	3%
Municipal bond index rate	3.5%
Single equivalent interest rate	7.5%

Mortality rates were based on the RP-2000 Combined Mortality Table for Males or Females, as appropriate, with adjustments for mortality improvements based on a projection of Scale BB to 2025, set forward two years for males and one year for females. The actuarial assumptions used in the June 30, 2018 valuation were based on the results of an actuarial experience study for the period July 1, 2010, to June 30, 2015, adopted by the board on September 19, 2016. The Municipal Bond Index Rate used for this purpose is the June average of the Bond Buyer General Obligation 20-year Municipal Bond Index published weekly by the Board of Governors of the Federal Reserve System.

Target Allocations

The long-term expected rate of return on pension plan investments was determined using a log-normal distribution analysis 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.

A summary of the target allocation and best estimates of arithmetic real rates of return for each major asset class, as provided by TRS's investment consultant, follows.

Asset Class	Target Allocation Percentage	Long-Term Expected Real Rate Percentage of Return
U.S. equity	40	4.2
International equity	22	5.2
Fixed income	15	1.2
Additional categories	7	3.2
Real estate	7	3.8
Private equity	7	6.3
Cash	2	0.9
Total	100	

Discount Rate

For 2019, the discount rate used to measure the total pension liability was 7.5%. The projection of cash flows used to determine the discount rate assumed that plan member contributions will be made in full at the current contribution rates and the employer contributions will be made at ADC rates for all future fiscal years. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

The following table presents TRS's net pension liability for 2019. TRS's 2019 net pension liability is calculated using the discount rate of 7.5%, as well as what the system's net pension liability would be if it were calculated using a discount rate that is 1 percentage point lower (6.5%) or 1 percentage point higher (8.5%) than the current rate.

2019

(In thousands)	1% Decrease (6.5%)	Current Discount (7.5%)	1% Increase (8.5%)
Net pension liability	$18,252,330	$14,294,885	$10,964,314

For 2018, the discount rate used to measure the total pension liability was 7.5%. The projection of cash flows used to determine the discount rate assumed that plan member contributions will be made in full at the current contribution rates and the employer contributions will be made at ADC rates, adjusted by 95%, for all future fiscal years. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

The following table presents TRS's net pension liability for 2018. TRS's 2018 net pension liability is calculated using the discount rate of 7.5%, as well as what the system's net pension liability would be if it were calculated using a discount rate that is 1 percentage point lower (6.5%) or 1 percentage point higher (8.5%) than the current rate.

2018

(In thousands)	1% Decrease (6.5%)	Current Discount (7.5%)	1% Increase (8.5%)
Net pension liability	$17,595,452	$13,726,922	$10,472,071

June 30, 2018, is the actuarial valuation date upon which the total pension liability (TPL) is based for 2019. An expected TPL is determined as of June 30, 2019, using standard roll forward techniques for the TPL using a discount rate of 7.5%. An expected TPL was also determined using the prior year TPL rolled forward to June 30, 2019. The roll-forward calculation adds the annual normal cost (also called the service cost), subtracts the actual benefit payments, refunds for the plan year and applies the assumed interest rate (SEIR) for the year. The difference between the two roll-forward amounts as of June 30, 2019, is the experience gain or loss.

TPL Roll Forward 2019

(Dollars in thousands)

	Expected	Actual
(a) Interest Rate	7.5%	7.5%
(b) TPL as of June 30, 2018	$33,708,555	$33,795,671
(c) Entry Age Normal Cost for the Year July 1, 2018 - June 30, 2019	542,970	542,970
(d) Actual Benefit Payments (including refunds) For the year July 1, 2018 - June 30, 2019	2,126,767	2,126,767
(e) TPL as of June 30, 2019 (b) x (1 + (a)) + (c) - (d) x (1 + 0.5 x (a))	34,573,145	34,666,795
(f) Difference between Expected and Actual Experience (Gain)/Loss		93,650

June 30, 2017, is the actuarial valuation date upon which the TPL is based for 2018. An expected TPL is determined as of June 30, 2018, using standard roll-forward techniques for the TPL using a discount rate of 7.5%. An expected TPL was also determined using the prior year discount rate of 4.49%, which was based on a municipal bond index rate as of that date equal to 3.56%. The roll forward calculation adds the annual normal cost (also called the service cost), subtracts the actual benefit payments and refunds for the plan year and then applies the assumed interest rate (SEIR) for the year. The difference between the two roll-forward amounts as of June 30, 2018, is the gain or loss due to changes in assumptions and other inputs.

In addition, we have determined an expected TPL as of June 30, 2018, based on the TPL roll forward in the 2017 GASB Statement No. 67 report. The difference between this amount and the roll-forward of the actual TPL using last year's assumptions is reflected as an experience gain or loss for the year. These procedures are shown in the following table.

TPL Roll Forward 2018
(Dollars in thousands)

	Expected	Actual Before Assumption Change	Actual After Assumption Change
(a) Interest rate	4.49%	4.49%	7.5%
(b) TPL as of June 30, 2017	$46,966,822	$46,753,909	$32,819,887
(c) Entry age normal cost for July 1, 2017 - June 30, 2018	1,104,102	1,104,102	539,205
(d) Actual benefit payments (including refunds) for July 1, 2017 - June 30, 2018	2,035,690	2,035,690	2,035,690
(e) TPL as of June 30, 2018 (b) x (1 + (a)) + (c) - (d) x (1 + 0.5 x (a))	48,098,343	47,875,870	33,708,555
(f) Difference between expected and actual experience (gain) loss		(222,473)	
(g) Difference due to change in assumptions and other inputs (gain) loss			(14,167,315)

Note 5
Deposits With Financial Institutions and Investments
(Including Repurchase Agreements)

Legal Provisions for Investments

The following disclosures are meant to help the users of the financial statements for the Teachers' Retirement System of the State of Kentucky (TRS or system) assess the risks TRS takes in investing member funds. The Board of Trustees and the Investment Committee are guided by asset allocation parameters that the board approves through its powers as defined in KRS 161.430.

TRS administers a Retirement Annuity Trust, Health Insurance Trust and Life Insurance Trust in accordance with state and federal law. TRS provides benefits for service and disability retirements; death and survivors; retiree health insurance; and life insurance for Kentucky public education employees and their beneficiaries.

The asset allocation parameters for the retirement annuity and life insurance trusts are set forth in 102 Kentucky Administrative Regulations (KAR) 1:175, sections 2 and 3 as follows:

- There shall be no limit on the amount of investments owned if the investments are guaranteed by the U.S. government.
- Not more than 35% of the assets at fair value shall be invested in corporate debt obligations.
- Not more than 10% of the assets at fair value shall be invested in foreign debt.
- Not more than 65% of the assets at fair value shall be invested in common stocks or preferred stocks.
- Not more than 25% of the assets at fair value shall be invested in a stock portfolio designed to replicate a general stock index.
- Not more than 30% of the assets at fair value shall be invested in the stocks of companies domiciled outside of the United States; any amounts so invested shall be included in the 65% limitation for total stocks.
- Not more than 10% of the assets at fair value shall be invested in real estate. This would include real estate equity, real estate lease agreements and shares in real estate investment trusts.
- Not more than 10% of the assets at fair value shall be invested in alternative investments. This category may include private equity, venture capital, timberland and infrastructure investments.
- Not more than 15% of the assets at fair value shall be invested in any additional category or categories of investments. The board shall approve by resolution such additional category or categories of investments.

The asset allocation parameters for the Health Insurance Trust fund are set forth in 102 KAR 1:178, section 2 as follows:

- In order to preserve the assets and produce the required rate of return while minimizing risk, assets shall be prudently diversified among various classes of investments.
- In determining asset allocation policy, the investment committee and the board shall be mindful of the trust’s liquidity and its capability of meeting both short and long-term obligations.

Cash and Cash Equivalents

For cash deposits and cash equivalents, custodial credit risk is the risk that, in the event of a bank failure, TRS's deposits may not be returned to the system. TRS's total cash balance held at J.P. Morgan Chase bank on June 30, 2019, was $134.1 million. TRS's total cash balance held at J.P. Morgan Chase on June 30, 2018, was $161.4 million.

Deposits are exposed to custodial credit risk if they are not covered by depository insurance and the deposits are:

a. uncollateralized,
b. collateralized with securities held by the pledging financial institution or
c. collateralized with securities held by the pledging financial institution's trust department or agent but not in the depositor-government's name.

As of June 30, 2019, TRS's cash balance of $134.1 million was not exposed to custodial credit risk because this amount was collateralized fully with a letter of credit in the amount of $200 million.

As of June 30, 2018, TRS's cash balance of $161.4 million was not exposed to custodial credit risk because this amount was collateralized fully with a letter of credit in the amount of $200 million as well as securities held by the Federal Reserve Bank of New York in the name of the Commonwealth of Kentucky — Teachers' Retirement valued at $52.3 million.

Investments

All of TRS's assets are invested in short-term and long-term debt (bonds and mortgages) securities, equity (stock) securities, real estate, alternative investments and additional categories as permitted by regulation. These assets are reported at fair value.

Investments are governed by the board's policies. The board and the Investment Committee execute their fiduciary responsibilities in accordance with the prudent person rule, as identified in KRS 161.430 (2)(b). The prudent person rule establishes a standard for all fiduciaries to act as a prudent person would be expected to act, with the "care, skill, prudence, and diligence under the circumstances then prevailing that a prudent person acting in a like capacity and familiar with these matters would use in the conduct of an enterprise of a like character and with like aims."

The following tables represent the fair values of TRS's investments for June 30, 2019, and 2018.

Schedules of Investments
Retirement Annuity Trust

	Fair Value June 30, 2019	Fair Value June 30, 2018
Short-term investments		
Cash and cash equivalents	$ 678,616,271	$ 403,683,329
Subtotal	678,616,271	403,683,329
Fixed Income		
U.S. government	1,297,994,618	1,145,850,222
Agency bonds	77,746,291	47,262,531
Mortgage-backed securities	101,618,762	90,483,215
Asset-backed securities	48,533,798	34,611,394
Commercial mortgage-backed securities	28,030,171	40,736,773
Collateralized mortgage obligations	22,172,884	17,929,295
Municipal bonds	284,472,393	335,376,929
Corporate bonds	1,367,374,528	1,271,973,130
Subtotal	3,227,943,445	2,984,223,489
Equities		
International	4,813,405,181	4,891,933,955
U.S.	7,475,478,617	7,652,519,183
Subtotal	12,288,883,798	12,544,453,138
Real estate equity	1,223,062,000	1,150,694,282
Alternative investments		
Private equity	1,176,784,326	1,095,289,506
Timberland	182,590,093	187,540,819
Subtotal	1,359,374,419	1,282,830,325
Additional categories		
Opportunistic credit	584,110,105	553,448,443
Corporate securities	170,314,441	156,745,262
Corporate bonds	360,634,916	329,872,567
Corporate loans	316,960,140	376,448,601
Subtotal	1,432,019,602	1,416,514,873
Total*	$ 20,209,899,535	$ 19,782,399,436

*This schedule includes the 403(b) Tax Shelter fund, and Losey Scholarship fund.

Health Insurance Trust

	Fair Value June 30, 2019	Fair Value June 30, 2018
Short-term investments		
Cash and cash equivalents	$ 74,104,999	$ 56,993,634
Subtotal	74,104,999	56,993,634
Fixed income		
U.S. government	30,905,025	28,274,922
Agency bonds	1,014,190	
Municipal bonds	3,200,070	3,013,547
Corporate bonds	77,511,459	58,393,462
Subtotal	112,630,744	89,681,931
Equities		
Global	732,597,127	571,646,533
U.S.	35,408,420	34,059,334
Subtotal	768,005,547	605,705,867
Real estate equity	75,296,027	62,962,565
Private equity	102,153,229	81,232,638
Additional categories		
Opportunistic credit	65,752,634	58,388,152
Corporate securities	45,424,820	41,956,341
Corporate bonds	53,552,150	47,429,471
Corporate loans	38,791,796	37,839,206
Subtotal	203,521,400	185,613,170
Total	$ 1,335,711,946	$ 1,082,189,805

Life Insurance Trust

	Fair Value June 30, 2019	Fair Value June 30, 2018
Short-term investments		
Cash and cash equivalents	$ 13,451,102	$ 3,724,036
Subtotal	13,451,102	3,724,036
Fixed income		
U.S. government	11,529,380	17,296,920
Mortgage-backed securities	577,168	752,789
Municipal bonds	2,601,460	8,720,060
Corporate bonds	5,151,036	21,055,667
Subtotal	19,859,044	47,825,436
Equities		
International	18,036,908	7,884,256
U.S.	30,224,890	22,011,223
Subtotal	48,261,798	29,895,479
Real estate equity	2,107,202	541,107
Private equity	48,510	
Opportunistic credit	1,354,418	1,300,000
Total	$ 85,082,074	$ 83,286,058

Custodial Credit Risk

Custodial credit risk for an investment is the risk that, in the event of the failure of a counterparty, TRS will not be able to recover the value of its investment or collateral securities that are in the possession of an outside party. Investment securities are exposed to custodial credit risk if the securities are uninsured, are not registered in the name of the system and are held by either:

a. the counterparty or
b. the counterparty's trust department or agent, but not in the system's name.

The cash reserve of TRS is maintained primarily in high quality short-term investments through the Dreyfus Institutional Cash Advantage Fund. This fund invests in a diversified portfolio of high quality, short-term debt securities, and the fund is rated AAA by S&P, Moody's and Fitch. The fund's portfolio is structured within the confines of Rule 2a-7 under the Investment Company Act of 1940. Commercial paper; U.S. Treasury and agency obligations; certificates of deposit; bankers' acceptances; repurchase agreements; time deposits; etc. all are permissible investments within this fund.

Whenever repurchase agreements are ordered by TRS under the terms of master repurchase agreements with various brokers, the terms are dictated by TRS. The repurchase agreements and their supporting collateral are held by the custodial agent's correspondent bank in an account identified by the custodian's name and TRS's nominee name. This account is unique to TRS. The master repurchase agreements require that the supporting collateral have a fair value of at least 102% of the value of the repurchase agreements.

As of June 30, 2019, cash collateral reinvestment securities acquired through securities lending for the Retirement Annuity Trust by TRS's custodian amounted to $1.17 billion in relation to the $1.15 billion securities lent consistent with the lending agreement with the custodian. Cash collateral reinvestment securities lending for the Life Insurance Trust by TRS's custodian amounted to $3.6 million in relation to the $3.5 million securities lent consistent with the lending agreement with the custodian. The custodian also is the lending agent and counterparty.

Interest Rate Risk

Interest rate risk on investments is the possibility that changes in interest rates will reduce the fair value of TRS's investments. In general, the longer the period until an investment matures, the greater the risk of a negative impact on fair value resulting from changes in interest rates.

As of June 30, 2019, and 2018, the Retirement Annuity Trust, Health Insurance Trust and Life Insurance Trust had the following investment fair values and weighted average maturities.

Retirement Annuity Trust

Investment Type	2019 Fixed Income	2019 Additional Categories	2019 Average Maturity (years)	2018 Fixed Income	2018 Additional Categories	2018 Average Maturity (years)
U.S. government	$ 1,297,994,618	$	9.77	$ 1,145,850,222	$	8.79
Agency	77,746,291		7.33	47,262,531		6.89
Mortgage-backed securities	101,618,762		19.33	90,483,214		16.95
Collateralized mortgage obligations	22,172,884		15.36	17,929,295		9.26
Asset-backed securities	48,533,798		12.01	34,611,394		15.20
Commercial mortgage-backed securities	28,030,171		22.26	40,736,773		21.54
Municipal	284,472,393		12.50	335,376,929		12.21
Corporate bonds and securities	1,367,374,528	530,949,357	8.42	1,271,973,131	486,617,830	7.85
Corporate loans*		316,960,140	4.54		369,365,652	4.60
Total	$ 3,227,943,445	$ 847,909,497	9.26	$ 2,984,223,489	$ 855,983,482	8.60

*Does not include $7,082,948 in 2018 cash held directly in the Barings European Loan Fund.

Health Insurance Trust

Investment Type	2019 Fixed Income	2019 Additional Categories	2019 Average Maturity (years)	2018 Fixed Income	2018 Additional Categories	2018 Average Maturity (years)
U.S. government	$ 30,905,025	$	8.39	$ 28,274,923	$	9.32
Municipal	3,200,070		7.38	3,013,547		8.35
Agency	1,014,190		4.19			
Corporate bonds and securities	77,511,459	98,976,970	6.30	58,393,462	89,385,812	6.30
Corporate loans		38,791,797	4.82		37,839,206	5.27
Total	$ 112,630,744	$ 137,768,767	6.34	$ 89,681,932	$ 127,225,018	6.54

Life Insurance Trust

Investment Type	2019 Fixed Income	2019 Additional Categories	2019 Average Maturity (years)	2018 Fixed Income	2018 Additional Categories	2018 Average Maturity (years)
U.S. government	$ 11,529,380	$	8.42	$ 17,296,920	$	8.86
Municipal	2,601,460		10.85	8,720,060		14.64
Mortgage-backed securities	577,168		13.90	752,789		13.50
Corporate bonds	5,151,036		8.67	21,055,667		5.29
Total	$ 19,859,044	$	8.96	$ 47,825,436	$	8.42

In addition to the above securities, TRS held short-term cash investments in the Dreyfus Institutional Cash Advantage Fund, at the Bank of New York Mellon (BNYM), with a total fair value of $766.2 million and a weighted average maturity of 15 days. Average maturity is used as a measure of a security's exposure to interest rate risk due to fluctuations in market interest rates. Mortgage-backed securities and collateralized mortgage obligations typically are amortizing investments with an average life and interest rate risk significantly less than suggested by the legal maturity. Mortgage-backed securities, which generally are prepayable, and other callable bonds are subject to adverse changes in average life in response to market interest rate changes. The schedule above reflects only the legal maturity of all such bonds.

Interest rate risk is the risk that changes in interest rates will affect adversely the fair value of an investment. This risk is managed by using the effective duration or option adjusted methodology to quantify the risk of interest rate changes. This methodology takes into account optionality on bonds and scales the risk of price changes on bonds depending upon the degree of changes in rates and the slope of the yield curve. The control of interest rate risk is not set forth in a particular policy; however, the system manages interest rate risk in practice by establishing appropriate benchmarks for its various portfolios.

Mortgage-backed securities are securities representing pass-through interests in the cash flows from pools of mortgage loans on single-family or multi-family residential properties. All of the mortgage-backed securities owned by TRS were securitized and are guaranteed by Fannie Mae, Freddie Mac or Government National Mortgage Association (GNMA). The average life of a mortgage-backed security depends upon the level of prepayments experienced in the underlying pool of loans. Market interest rates are a primary determinant of prepayment levels. Lower-than- anticipated market rates generally lead to higher-than-anticipated prepayments and a shorter average life; higher-than-anticipated market rates generally lead to lower-than-anticipated prepayments and a longer average life. The Retirement Annuity Trust held $101.6 million in mortgage-backed securities as of June 30, 2019, compared to $90.5 million as of June 30, 2018.

Collateralized mortgage obligations are bonds that are collateralized by whole loan mortgages, mortgage pass-through securities or stripped mortgage-backed securities. Income is derived from payments and prepayments of principal and interest generated from collateral mortgages. Cash flows are distributed to different investment classes in accordance with collateralized mortgage obligations' established payment order. The Retirement Annuity Trust held $22.2 million in collateralized mortgage obligations as of June 30, 2019, compared to $17.9 million as of June 30, 2018.

Asset-backed securities are bonds or notes backed by loan paper or accounts receivables originated by banks, credit card companies or other credit providers and are considered to be moderately sensitive to changes in interest rates. The originator of the loan or accounts receivable paper sells it to a specially created trust, which repackages it as securities. Asset-backed securities have been structured as passthroughs and as structures with multiple bond classes. The Retirement Annuity Trust held $48.5 million as of June 30, 2019, compared to $34.6 million as of June 30, 2018.

Commercial mortgage-backed securities represent interests in the cash flows from pools of mortgage loans on commercial properties. The interests in a securitized pool of loans are divided generally into various tranches based upon planned payment order and level of seniority. TRS's commercial mortgage-backed securities consist of highly rated, relatively senior tranches. The average maturity of TRS's commercial mortgage-backed securities in the schedule above reflects the legal maturity of these holdings. Most of the tranches held are earlier in the planned payment order than the legal maturity suggests. The Retirement Annuity Trust held $28 million in commercial mortgage-backed securities investments as of June 30, 2019, compared to $40.7 million as of June 30, 2018.

Credit Risk

Credit risk is the risk that an issuer or counterparty to an investment will not fulfill its obligations. The following schedules list TRS's fixed income investment fair values (net of cash equivalents) according to credit ratings as of June 30, 2019, and 2018.

2019 Retirement Annuity Trust

Rating	Fixed Income	Additional Categories	Total	Percent
U.S. government	$ 1,297,994,618	$	$ 1,297,994,618	31.84
AAA	157,995,569		157,995,569	3.88
AA	494,778,867		494,778,867	12.14
A	624,081,123		624,081,123	15.31
BBB	576,137,083	40,857,674	616,994,757	15.14
BB	10,673,125	335,427,734	346,100,859	8.49
B		411,265,618	411,265,618	10.09
CCC		32,622,499	32,622,499	0.80
D		799,464	799,464	0.02
Not rated	66,283,060	26,936,508	93,219,568	2.29
Total	$ 3,227,943,445	$ 847,909,497	$ 4,075,852,942	100.00

2018 Retirement Annuity Trust

Rating	Fixed Income	Additional Categories	Total	Percent
U.S. government	$ 1,145,850,222	$	$ 1,145,850,222	29.84
AAA	253,972,006	(91,711)	253,880,295	6.60
AA	474,173,415		474,173,415	12.35
A	569,839,193		569,839,193	14.84
BBB	522,885,079	38,886,604	561,771,683	14.63
BB	6,899,630	302,177,281	309,076,911	8.05
B		381,391,910	381,391,910	9.93
CCC		25,168,121	25,168,121	0.66
CC		2,032,593	2,032,593	0.05
D		63,853	63,853	
Not rated	10,603,944	106,354,831	116,958,775	3.05
Total	$ 2,984,223,489	$ 855,983,482	$ 3,840,206,971	100.00

2019 Health Insurance Trust

Rating		Fixed Income		Additional Categories		Total	Percent
U.S. government	$	30,905,025	$		$	30,905,025	12.34
AAA		3,567,130				3,567,130	1.43
AA		22,718,510				22,718,510	9.07
A		31,647,143				31,647,143	12.64
BBB		23,321,126		7,073,250		30,394,376	12.14
BB		471,810		61,043,391		61,515,201	24.57
B				63,774,983		63,774,983	25.47
CCC				4,591,525		4,591,525	1.83
Not rated				1,285,618		1,285,618	0.51
Total	$	112,630,744	$	137,768,767	$	250,399,511	100.00

2018 Health Insurance Trust

Rating		Fixed Income		Additional Categories		Total	Percent
U.S. government	$	28,274,923	$		$	28,274,923	13.04
AAA		5,287,825		(25,195)		5,262,630	2.43
AA		18,339,237				18,339,237	8.45
A		25,897,007				25,897,007	11.94
BBB		11,434,235		6,338,732		17,772,967	8.19
BB		448,705		56,379,687		56,828,392	26.20
B				59,084,935		59,084,935	27.24
CCC				3,725,529		3,725,529	1.72
CC				93,982		93,982	0.04
D				4,115		4,115	
Not rated				1,623,233		1,623,233	0.75
Total	$	89,681,932	$	127,225,018	$	216,906,950	100.00

2019 Life Insurance Trust

Rating		Fixed Income		Additional Categories		Total	Percent
U.S. government	$	11,529,380	$		$	11,529,380	58.06
AAA		499,110				499,110	2.51
AA		3,634,524				3,634,524	18.30
A		400,756				400,756	2.02
BBB		2,379,844				2,379,844	11.98
BB		1,415,430				1,415,430	7.13
Total	$	19,859,044	$		$	19,859,044	100.00

2018 Life Insurance Trust

Rating		Fixed Income		Additional Categories		Total	Percent
U.S. government	$	17,296,920	$		$	17,296,920	36.17
AAA		6,594,675				6,594,675	13.79
AA		12,120,689				12,120,689	25.34
A		3,932,440				3,932,440	8.22
BBB		5,548,537				5,548,537	11.60
BB		1,346,115				1,346,115	2.82
Not rated		986,060				986,060	2.06
Total	$	47,825,436	$		$	47,825,436	100.00

Total fair value of the Retirement Annuity Trust's fixed income portfolio was $4.08 billion on June 30, 2019. The Health Insurance Trust's fixed income portfolio was valued at $250.4 million on June 30, 2019. Total fair value of the Life Insurance Trust's fixed income portfolio was $19.9 million on June 30, 2019. Standard & Poor's (S&P) rating system is used in the above charts. For securities where an S&P rating is not provided, another nationally recognized system is used and translated to the S&P rating system.

In addition to the above categories, the Retirement Annuity Trust held $678.6 million in short-term investments through the Dreyfus Institutional Cash Advantage Fund. The Health Insurance Trust held $74 million in the Dreyfus Institutional Cash Advantage Fund. The Life Insurance Trust held $13.5 million in the Dreyfus Institutional Cash Advantage Fund. The credit risk associated with this fund is minimal as the securities held are required to maintain the highest possible short-term credit ratings by Moody's and S&P. In addition, investments in U.S. government and agency securities also are highly rated securities since they are backed by the U.S. government. Notation is made that the ratings of securities are subject to change.

The Retirement Annuity Trust's policy on credit rating is set forth in 102 KAR 1:175.

Concentration of Credit Risk

Concentration of credit risk is the risk of loss attributed to the magnitude of a government's investment in a single issuer. Losses from credit risk are heightened if a significant portion of resources are invested with a single issuer. In compliance with 102 KAR 1:175, the Retirement Annuity Trust has not invested more than 5% of assets at fair value in any single issuer.

Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates will affect adversely the fair value of an investment or a deposit. As of June 30, 2019, TRS's exposure to foreign currency risk consisted of $5.03 billion in the Retirement Annuity Trust, $384.8 million in the Health Insurance Trust and $18.1 million in the Life Insurance Trust.

The majority of foreign investments are held in commingled funds managed by UBS Global Asset Management, Baillie Gifford, Baring Asset Management and BlackRock. In addition to the commingled funds investing in foreign securities, the Retirement Annuity Trust held $760.5 million associated with foreign interests in American depositary receipt investments. These American depositary receipts are securities that are issued by a U.S. bank in place of the foreign stock shares held in trust by that bank, thereby facilitating the trading of foreign shares in U.S. markets. The cross-listed equities, in the amount of $565.8 million, represent securities domiciled in foreign countries, but are listed and traded on U.S. exchanges. Other foreign securities and investments consist of debt securities and alternative investment opportunities. Foreign holdings not readily identifiable to a specific country are listed in the various category, which includes investment receivables, payables and new issues.

The Retirement Annuity Trust's policy regarding foreign equities is that not more than 30% of the assets at fair value shall be invested in the stocks of companies domiciled outside of the United States. Any amounts so invested shall be included in the 65% limitation for total stocks under 102 KAR 1:175 Section 2(e).

The following tables represent the fair values of investments that are subject to foreign currency as a result of cash contributions to each portfolio manager as of June 30, 2019, and 2018.

Retirement Annuity Trust

	2019	2018
Commingled	$ 3,199,692,153	$ 3,267,245,812
Alternatives	136,944,558	123,779,954
American depository receipts	760,463,253	783,159,050
Cross-listed equities	565,794,759	539,646,891
Bonds	130,318,527	143,961,909
Additional categories (Fixed income)	103,230,600	83,826,303
Additional categories (Opportunistic)	130,321,049	127,886,400
Total	$ 5,026,764,899	$ 5,069,506,319

Health Insurance Trust

	2019	2018
Commingled	$ 320,682,241	$ 275,988,587
Alternatives	22,398,280	15,578,376
Bonds	3,517,240	5,363,945
American depository receipts	3,391,560	3,562,059
Additional categories (Fixed income)	18,293,421	15,875,004
Additional categories (Opportunistic)	16,542,883	14,391,605
Total	$ 384,825,625	$ 330,759,576

Life Insurance Trust

	2019	2018
Commingled	$ 17,681,466	$ 7,812,225
Bonds	399,380	2,939,250
American depository receipts	47,871	
Total	$ 18,128,717	$ 10,751,475

The categorized investments in the preceding tables include foreign currencies, the fair value of which are shown in the following tables.

Retirement Annuity Trust

Currency	2019	2018	Currency	2019	2018
Australian dollar	$ 60,131,536	$ 80,056,199	Mexican peso	$ 52,163,849	$ 78,431,730
Bermudian dollar	59,714,165	82,563,565	Netherlands Antillean guilder	15,682,676	26,993,189
Brazilian real	44,889,952	30,670,609	New Zealand dollar	2,122,452	1,706,541
British pound sterling	570,383,073	542,534,671	Norwegian krone	34,960,926	40,615,351
Canadian dollar	254,345,892	235,825,292	Pakistani rupee	160,131	294,114
Cayman Islands dollar	59,780,832	43,991,379	Panamanian balboa	30,452,885	27,813,694
Chilean peso	13,938,990	17,492,964	Papua new guinean kina		288,958
Chinese yuan	102,706,746	139,954,752	Philippine peso	3,501,301	3,301,664
Columbian peso	15,538,891	16,129,857	Polish zloty	3,499,312	3,614,767
Czech koruna	270,959	326,311	Qatari rial	1,655,090	1,473,771
Danish krone	62,647,510	70,488,935	Russian ruble	41,201,117	34,420,677
Egyptian pound	348,495	447,034	Saudi riyal	2,399,426	
Euro	1,800,364,413	1,840,824,814	Singapore dollar	30,545,118	29,249,156
Guernsey pound	7,233,485	13,630,804	Sol		101,565
Hong Kong dollar	323,234,458	264,619,956	South African rand	44,302,136	48,035,919
Hungarian forint	476,256	524,979	Swedish krona	118,933,415	137,087,835
Indian rupee	72,172,031	79,415,592	Swiss franc	200,349,094	201,063,978
Indonesian rupiah	15,757,628	9,063,489	Taiwan new dollar	53,353,133	49,926,329
Israeli new shekel	5,999,416	7,585,527	Thai baht	7,143,727	9,857,556
Japanese yen	725,825,349	713,224,851	Trinidadian dollar	311,309	580,613
Jersey pound	68,919,072	73,558,462	Turkish lira	992,210	10,651,999
Korean won	94,134,336	72,938,027	UAE dirham	1,129,455	1,152,862
Liberian dollar	2,018,147	1,968,400	Uruguayan peso		1,627,660
Macanese pataca		662,798	Various	9,358,612	7,049,047
Malaysian ringgit	11,715,893	15,668,077			
			Total	$ 5,026,764,899	$ 5,069,506,319

Health Insurance Trust

Currency	2019	2018	Currency	2019	2018
Argentine peso	$	$ 135,555	Malaysian ringgit	$ 1,898,836	$ 1,577,332
Australian dollar	17,518,159	14,952,558	Mexican peso	2,192,778	1,929,849
Bermudian dollar	213,781	2,086,554	Netherlands Antillean guilder	349,235	589,060
Brazilian real	6,506,631	3,688,755	New Zealand dollar	871,670	579,374
British pound sterling	40,816,859	33,230,738	Norwegian krone	1,914,237	1,598,858
Canadian dollar	29,218,274	24,439,457	Pakistani rupee	78,857	94,341
Cayman Islands dollar	3,803,707	994,258	Panamanian balboa		597,706
Chilean peso	806,468	745,806	Papua new guinean kina		97,332
Chinese yuan	1,934,720	18,830,555	Philippine peso	946,993	617,753
Columbian peso	905,394	296,733	Polish zloty	948,678	696,247
Czech koruna	121,370	106,784	Qatari rial	817,579	508,713
Danish krone	3,810,772	3,168,754	Russian ruble	2,240,456	2,079,235
Egyptian pound	166,457	146,934	Saudi riyal	1,185,212	
Euro	114,816,688	104,404,800	Singapore dollar	3,211,863	2,549,367
Guernsey pound		62,516	Sol		33,943
Hong Kong dollar	24,795,755	8,146,300	South African rand	4,874,710	4,046,539
Hungarian forint	237,747	168,560	Swedish krona	6,843,091	5,504,184
Indian rupee	8,190,359	6,048,862	Swiss franc	20,243,461	16,421,811
Indonesian rupiah	1,806,437	1,266,203	Taiwan new dollar	9,907,041	8,036,220
Israeli new shekel	1,089,373	1,364,123	Thai baht	2,717,338	1,514,111
Japanese yen	54,808,895	45,957,033	Trinidadian dollar	63,413	119,100
Jersey pound	83,475	253,049	Turkish lira	479,708	533,627
Korean won	10,845,060	9,730,528	UAE dirham	544,088	393,174
Liberian dollar		192,830	Various		
Macanese pataca		223,455			
			Total	$ 384,825,625	$ 330,759,576

Life Insurance Fund

Currency	2019	2018	Currency	2019	2018
Argentine peso	$ 13,630	$	Malaysian ringgit	$ 98,206	$ 46,475
Australian dollar	812,170	2,328,511	Mexican peso	113,425	57,007
Bermudian dollar	23,587	11,322	Netherlands Antillean guilder	4,928	
Brazilian real	334,292	109,096	New Zealand dollar	40,682	16,936
British pound sterling	2,121,683	1,808,287	Norwegian krone	100,646	44,961
Canadian dollar	1,153,330	524,742	Pakistani rupee	4,014	2,919
Cayman Islands dollar	15,032	1,159	Panamanian balboa	90	96
Chilean peso	43,545	21,887	Papua new guinean kina	4,740	2,868
Chinese yuan	1,138,624	514,591	Philippine peso	48,519	17,896
Columbian peso	25,520	8,629	Polish zloty	47,698	20,423
Czech koruna	7,027	3,238	Qatari rial	40,579	14,626
Danish krone	231,412	91,546	Russian ruble	159,886	61,397
Egyptian pound	8,814	4,437	Saudi riyal	60,142	
Euro	4,111,786	1,811,311	Singapore dollar	162,565	72,064
Guernsey pound	4,797	1,862	Sol	2,522	1,008
Hong Kong dollar	666,709	239,681	South African rand	253,881	119,374
Hungarian forint	11,937	5,210	Swedish krona	392,526	158,408
Indian rupee	427,653	178,964	Swiss franc	1,033,663	414,458
Indonesian rupiah	94,245	37,499	Taiwan new dollar	506,921	237,004
Israeli new shekel	83,831	38,914	Thai baht	140,767	44,335
Japanese yen	2,954,539	1,353,133	Turkish lira	24,870	15,313
Jersey pound	5,290	4,038	UAE dirham	30,206	11,441
Korean won	554,273	287,376	Uruguayan peso	606	
Macanese pataca	11,866	6,578	Various	1,043	455
			Total	$ 18,128,717	$ 10,751,475

Fair Value Measurement

A retiree pension defined benefit plan holds significant amounts of investments that are measured at fair value on a recurring basis. TRS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles (GAAP) in the United States of America. The hierarchy is based on the valuation inputs used to measure the fair value of the asset and is not necessarily indicative of risk.

Level 1 inputs are quoted prices (unadjusted) for identical assets or liabilities in active markets that a government can access at the measurement date. Level 2 inputs are inputs other than quoted prices included within Level 1 that are observable for an asset or liability. Level 2 inputs may include quoted prices for similar assets or liabilities in active markets; quoted prices for identical or similar assets of liabilities in non-active markets; and inputs other than quoted prices that are observable for the assets or liabilities, either directly or indirectly. Level 3 inputs are unobservable inputs for an asset or liability such as property appraisals, third-party valuations and public market comparables of similar assets where applicable. Investments measured at fair value using the net asset value (NAV) per share (or its equivalent) as a practical expedient are not classified in the fair value hierarchy. The fair value hierarchy gives the highest priority to Level 1 inputs and the lowest priority to Level 3 inputs.

Schedules of Fair Values

These category descriptions that immediately follow refer to the investments shown in the fair value level hierarchy schedules shown after these descriptions.

Cash and Cash Equivalents: Cash equivalents are short-term, highly liquid investments that readily are convertible to known amounts of cash and so near to their maturity that they present insignificant risk of changes in value because of changes in interest rates. This category is comprised of short-term investments via the Dreyfus Institutional Cash Advantage Fund and cash. Cash equivalents can be valued with inputs from quoted prices (unadjusted) for identical assets or liabilities in active markets that a government can access at the measurement date and, therefore, are classified as Level 1 assets.

Equity and Fixed Income Securities: Debt and equity securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets issued by pricing vendors for these securities. Debt and equity securities classified in Level 2 of the fair value hierarchy may use inputs such as market quotations, yields, maturities, call features and ratings or may be valued using a matrix pricing technique that values securities based on their relationship to benchmark quoted prices. Debt securities classified in Level 3 are securities whose stated market price is unobservable by the market place and, instead, are priced by the issuers or industry groups for these securities.

Real Estate: Real estate falls into the Level 3 classification of the fair value hierarchy. Much of TRS's real estate consists of owned properties leased to various commercial enterprises. The fair value measurement for real estate is determined by professional appraisals every five years.

Timberland: Timberland investments are managed investments regarding the acquiring, growing and disposing of timber on timberlands owned by TRS. Fair value determinations for Level 3 measurements of investments are the responsibility of the adviser, Molpus Woodlands Group. The adviser contracts with outside appraisers to generate annual fair value estimates. The outside appraisers utilized the cost, sales comparison and income capitalization approaches to estimate the fair value of the timber and timberlands. The adviser challenges the reasonableness of the assumptions used and reviews the methodology to ensure the estimated fair value complies with GAAP. These funds are not available for redemption; instead, they make distributions to TRS as the underlying assets are sold.

Additional Categories: Investments in this category do not fit the regular parameters for the Retirement Annuity Trust in 102 KAR 1:175. They fall into the allowable 15% of assets invested in any additional categories approved by the board. Corporate bonds falling within the Level 1 classification are valued using prices quoted in active markets issued by pricing vendors for these securities. Corporate bonds listed in Level 2 may use inputs such as market quotations, yields, maturities, call features and ratings or may be valued using a matrix pricing technique that values securities based on their relationship to benchmark quoted prices. Corporate loans at Level 3 are valued by third-party pricing vendors such as Markit or Reuters.

Commingled Funds: These funds hold European loans, international equities and domestic equities. Commingled funds are valued at the net asset value held at the end of the period based upon the fair value of the underlying investments.

Private Equity: Private equity funds invest in equity and debt securities issued by private and publicly held companies in connection with leveraged buyouts, recapitalizations and expansion opportunities. Three of these funds are redeemable, but the majority do not allow redemptions. Alternatively, TRS receives distributions as the underlying assets of the funds liquidate, usually over a five- to 10-year liquidation period. Exchange quotations are not available readily for these investments. The fair value for most of these funds is determined using the net asset value one quarter in arrears, plus current quarter cash flows.

Private Real Estate: Three private real estate investments are open-ended. The remaining investments are not redeemable; rather, TRS receives distributions as the underlying assets liquidate, usually over a five- to 10-year liquidation period. Exchange quotations for these investments are not available readily. Most private real estate fair values are determined using the net assets valued one quarter in arrears, plus current quarter cash flows.

Private Timber: TRS has one private timberland fund that is valued using the NAV as a practical expedient. Like most private funds, the fair value for this fund is determined using the net assets valued one quarter in arrears, plus current quarter cash flows.

Private Opportunistic Credit: One private opportunistic credit fund is redeemable. The remainder are closed funds that issue distributions as the underlying assets of the fund liquidate, usually over a five- to 10-year liquidation period. The fair value for most of these funds is determined using the net assets valued one month in arrears, plus current period cash flows.

Retirement Annuity Trust

Schedule of Investments at Fair Value Level 2019

	Level 1 Inputs	Level 2 Inputs	Level 3 Inputs	Fair Value
Cash and cash equivalents	$ 678,616,271	$	$	$ 678,616,271
Fixed income				
Asset-backed securities		48,533,798		48,533,798
Agency bonds		77,746,291		77,746,291
Commercial mortgage-backed securities		28,030,171		28,030,171
Collateralized mortgage obligations		22,172,884		22,172,884
Corporate bonds		1,367,374,528		1,367,374,528
Mortgage-backed securities		100,749,057	869,705	101,618,762
Municipal bonds		284,472,393		284,472,393
U.S. government	1,290,892,773	7,101,845		1,297,994,618
Subtotal	1,290,892,773	1,936,180,967	869,705	3,227,943,445
Equities				
International	1,304,147,775	1,846,353,781		3,150,501,556
U.S.	7,193,195,834			7,193,195,834
Subtotal	8,497,343,609	1,846,353,781		10,343,697,390
Real estate			424,559,554	424,559,554
Timberland			153,586,426	153,586,426
Additional categories				
Corporate bonds and securities	35,392	530,913,965		530,949,357
Corporate loans			216,920,140	216,920,140
Subtotal	35,392	530,913,965	216,920,140	747,869,497
Total investments at fair value level	$ 10,466,888,045	$ 4,313,448,713	$ 795,935,825	$ 15,576,272,583
At Net Asset Value (NAV)				
Commingled European loan funds				$ 100,040,000
Commingled international equity funds				1,662,903,625
Commingled domestic equity funds				282,282,783
Private equity funds				1,176,784,326
Private real estate funds				798,502,446
Private timber funds				29,003,667
Private opportunistic credit funds				584,110,105
Total investments measured at NAV				$ 4,633,626,952
Total investments at fair value				$ 20,209,899,535

Schedule of Investments at Net Asset Value (NAV) 2019

	June 30, 2019	Unfunded Commitments	Redemption Frequency	Redemption Notice
Commingled European loan	$ 100,040,000	$	Daily	30 days
Commingled international equities	1,662,903,625		Daily	1-30 days
Commingled domestic equities	282,282,783		Daily	1-30 days
Private equity				
Open-ended*	249,596,594	84,016,297	Quarterly, annually	90 days
Closed-ended	927,187,732	767,795,807	N/A	N/A
Private real estate				
Open-ended	474,326,009		Quarterly	45-90 days
Closed-ended	324,176,437	382,276,117	N/A	N/A
Private timber	29,003,667		Biennially	90 days
Private opportunistic credit				
Open-ended	367,578,268		Semiannually	75 days
Closed-ended	216,531,837	139,978,408	N/A	N/A
Total investments at NAV	$ 4,633,626,952			

*Regarding the open-ended private equity, a few restrictions remain that would prevent redemption at this time. One fund currently valued at $49,674,834 in the Retirement Annuity Trust has a three-year lock-up period that expires June 30, 2021.

Schedule of Investments at Fair Value Level 2018

	Level 1 Inputs	Level 2 Inputs	Level 3 Inputs	Fair Value
Cash and cash equivalents	$ 403,683,329	$	$	$ 403,683,329
Fixed income				
Asset-backed securities		34,611,394		34,611,394
Agency bonds		47,262,531		47,262,531
Commercial mortgage-backed securities		40,736,773		40,736,773
Collateralized mortgage obligations		17,929,295		17,929,295
Corporate bonds	2,404,473	1,269,568,657		1,271,973,130
Mortgage-backed securities		89,105,435	1,377,780	90,483,215
Municipal bonds		335,376,929		335,376,929
U.S. government	1,139,006,569	6,843,653		1,145,850,222
Subtotal	1,141,411,042	1,841,434,667	1,377,780	2,984,223,489
Equities				
International	1,306,678,614	1,999,811,083		3,306,489,697
U.S.	7,387,805,408	33,688		7,387,839,096
Subtotal	8,694,484,022	1,999,844,771		10,694,328,793
Real estate			420,940,001	420,940,001
Timberland			153,111,010	153,111,010
Additional categories				
Corporate bonds and securities	(91,711)	486,709,541		486,617,830
Corporate loans			186,153,181	186,153,181
Subtotal	(91,711)	486,709,541	186,153,181	672,771,011
Total investments at fair value level	$ 10,239,486,682	$ 4,327,988,979	$ 761,581,972	$ 15,329,057,633
At NAV				
Commingled European loan funds				$ 102,070,000
Commingled international equity funds				1,585,444,258
Commingled domestic equity funds				264,680,086
Private equity funds				1,095,289,506
Private loan fund				88,225,420
Private real estate funds				729,754,281
Private timber funds				34,429,809
Private opportunistic credit funds				553,448,443
Total investments measured at NAV				$ 4,453,341,803
Total investments at fair value				$ 19,782,399,436

Schedule of Investments at NAV 2018

	June 30, 2018	Unfunded Commitments	Redemption Frequency	Redemption Notice
Commingled European loan	$ 102,070,000	$	Daily	30 days
Commingled international equities	1,585,444,258		Daily	1-30 days
Commingled domestic equities	264,680,086		Daily	1-30 days
Private equity				
Open-ended	209,885,810	71,168,561	Quarterly, annually	90 days
Closed-ended	885,403,696	553,049,047	N/A	N/A
Private loan fund	88,225,420		Quarterly	30 days
Private real estate				
Open-ended*	417,556,034	22,944,664	Quarterly	45-90 days
Closed-ended	312,198,247	239,906,810	N/A	N/A
Private timber	34,429,809		Biennially	90 days
Private opportunistic credit				
Open-ended	336,849,775		Semiannually	75 days
Closed-ended	216,598,668	203,145,926	N/A	N/A
Total investments measured at the NAV	$ 4,453,341,803			

* Regarding the Open-ended private real estate funds, there are a few restrictions remaining that would prevent redemption at this time. One fund currently valued at $53,988,311 in the Retirement Annuity Trust and $10,797,661 in the Health Insurance Trust has a 2-year lock-up period that expires January 2019. Another fund currently valued at $27,055,336 in the Retirement Annuity Trust, $5,411,067 in the Health Insurance Trust, and $541,107 in the Life Insurance Trust has a 180 day lock-up period that expires October of 2018.

Health Insurance Trust

Schedule of Investments at Fair Value Level 2019

	Level 1 Inputs	Level 2 Inputs	Level 3 Inputs	Fair Value
Cash and cash equivalents	$ 74,104,999	$	$	$ 74,104,999
Fixed income				
Agency bonds		1,014,190		1,014,190
Corporate bonds		77,511,459		77,511,459
Municipal bonds		3,200,070		3,200,070
U.S. government	29,905,005	1,000,020		30,905,025
Subtotal	29,905,005	82,725,739		112,630,744
Equities				
Global		732,597,127		732,597,127
U.S.	35,408,420			35,408,420
Subtotal	35,408,420	732,597,127		768,005,547
Additional categories				
Corporate bonds and securities		98,976,969		98,976,969
Corporate loans			38,791,797	38,791,797
Subtotal		98,976,969	38,791,797	137,768,766
Total investments at fair value level	$ 139,418,424	$ 914,299,835	$ 38,791,797	$ 1,092,510,056
At NAV				
Private equity funds				$ 102,153,229
Private real estate funds				75,296,027
Private opportunistic credit funds				65,752,634
Total investments measured at NAV				$ 243,201,890
Total investments at fair value				$ 1,335,711,946

Schedule of Investments at NAV 2019

	June 30, 2019	Unfunded Commitments	Redemption Frequency	Redemption Notice
Private real estate				
Open-ended	$ 35,426,494	$	Quarterly	45-90 days
Closed-ended	39,869,533	61,800,630	N/A	N/A
Private equity				
Closed-ended	102,153,229	108,147,568	N/A	N/A
Private opportunistic credit				
Open-ended	46,789,856		Semiannually	75 days
Closed-ended	18,962,778	18,474,255	N/A	N/A
Total investments at NAV	$ 243,201,890			

Schedule of Investments at Fair Value Level 2018

	Level 1	Level 2	Level 3	Fair Value
Cash and cash equivalents	$ 56,993,634	$	$	$ 56,993,634
Fixed income				
Corporate bonds		58,393,462		58,393,462
Municipal bonds		3,013,547		3,013,547
U.S. government	27,301,552	973,370		28,274,922
Subtotal	27,301,552	62,380,379		89,681,931
Equities				
Global		571,646,533		571,646,533
U.S.	34,059,334			34,059,334
Subtotal	34,059,334	571,646,533		605,705,867
Additional categories				
Corporate bonds and securities	(25,195)	89,411,007		89,385,812
Corporate loans		252,711	37,586,495	37,839,206
Subtotal	(25,195)	89,663,718	37,586,495	127,225,018
Total investments at fair value level	$ 118,329,325	$ 723,690,630	$ 37,586,495	$ 879,606,450
At NAV				
Private equity funds				$ 81,232,638
Private real estate funds				62,962,565
Private opportunistic credit funds				58,388,152
Total investments measured at NAV				$ 202,583,355
Total investments at fair value				$ 1,082,189,805

Schedule of Investments at NAV 2018

	June 30, 2018	Unfunded Commitments	Redemption Frequency	Redemption Notice
Private real estate				
Open-ended	$ 28,142,915	$ 4,588,933	Quarterly	45-90 days
Closed-ended	34,819,650	30,271,003	N/A	N/A
Private equity				
Closed-ended	81,232,638	76,482,322	N/A	N/A
Private opportunistic credit				
Open-ended	41,599,592		Semiannually	75 days
Closed-ended	16,788,560	11,778,187	N/A	N/A
Total investments at NAV	$ 202,583,355			

Life Insurance Trust

Schedule of Investments at Fair Value Level 2019

	Level 1	Level 2	Level 3	Fair Value
Cash and cash equivalents	$ 13,451,102	$	$	$ 13,451,102
Fixed income				
Corporate bonds		5,151,036		5,151,036
Mortgage-backed securities		577,168		577,168
Municipal bonds		2,601,460		2,601,460
U.S. government	11,529,380			11,529,380
Subtotal	11,529,380	8,329,664		19,859,044
Equities				
International		18,036,908		18,036,908
U.S.	30,224,890			30,224,890
Subtotal	30,224,890	18,036,908		48,261,798
Total investments at fair value level	$ 55,205,372	$ 26,366,572	$	$ 81,571,944
At NAV				
Private equity funds				$ 48,510
Private opportunistic credit funds				1,354,418
Private real estate funds				2,107,202
Total investments measured at NAV				$ 3,510,130
Total investments at fair value				$ 85,082,074

Schedule of Investments at NAV 2019

	June 30, 2019	Unfunded Commitments	Redemption Frequency	Redemption Notice
Private equity				
Closed-ended	$ 48,510	$ 1,450,000	N/A	N/A
Private real estate				
Closed-ended		$ 1,500,000	N/A	N/A
Open-ended	2,107,202		Quarterly	45 days
Private opportunistic credit				
Open-ended	1,354,418		Semiannually	75 days
Total investments at NAV	$ 3,510,130			

Schedule of Investments at Fair Value Level 2018

	Level 1	Level 2	Level 3	Fair Value
Cash and cash equivalents	$ 3,724,036	$	$	$ 3,724,036
Fixed income				
Corporate bonds		21,055,667		21,055,667
Mortgage-backed securities		752,789		752,789
Municipal bonds		8,720,060		8,720,060
U.S. government	17,296,920			17,296,920
Subtotal	17,296,920	30,528,516		47,825,436
Equities				
International		7,884,256		7,884,256
U.S.	22,011,223			22,011,223
Subtotal	22,011,223	7,884,256		29,895,479
Total investments at fair value level	$ 43,032,179	$ 38,412,772	$	$ 81,444,951
At NAV				
Private real estate funds				$ 541,107
Private opportunistic credit funds				1,300,000
Total investments measured at NAV				$ 1,841,107
Total investments at fair value				$ 83,286,058

Schedule of Investments at NAV 2018

	June 30, 2018	Unfunded Commitments	Redemption Frequency	Redemption Notice
Private real estate				
Open-ended	$ 541,107	$ 458,893	Quarterly	45 days
Private opportunistic credit				
Open-ended	1,300,000		Semiannually	75 days
Total investments at NAV	$ 1,841,107			

Securities Lending

KRS 161.430 empowers the board with fiduciary responsibility for TRS funds. The system operates a securities lending program in which it temporarily lends securities to qualified agents in exchange for a net fee and high-quality collateral. The types of securities lent are U.S. government and agency securities; selected domestic bonds; and domestic and international stocks. TRS's custodian, BNYM, acts as lending agent in exchanging securities for collateral. The collateral has a value of not less than 102% of the fair value of the lent securities, plus any accrued, unpaid distributions. The collateral may consist of both cash and non-cash collateral. The non-cash collateral may include, but not be limited to, debt obligations and securities, equity securities, corporate bonds and convertible securities.

Securities lending transactions are accounted for in accordance with GASB Statement No. 28. During the fiscal year ended June 30, 2019, only the Retirement Annuity Trust fund had securities lending transactions. The following schedules detail the net income earned in the Retirement Annuity Trust fund from securities lending for the fiscal years ended June 30, 2019, and 2018.

Securities Lending Net Earnings

	Retirement Annuity*		Life	
	2019	**2018**	**2019**	**2018**
Gross earnings (interest and fees)	$ 15,699,532	$ 16,277,025	$ 353,336	$ 42,020
Gross borrower rebates	(11,978,600)	(10,559,667)	(307,690)	(31,148)
Bank fees	(1,115,929)	(1,714,768)	(13,692)	(3,261)
Net earnings	$ 2,605,003	$ 4,002,590	$ 31,954	$ 7,611

*This schedule includes the Losey Scholarship fund.

Cash collateral is invested in guaranteed, short-term obligations of the U.S. government, select government agencies and repurchase agreements with qualified agents. TRS cannot pledge or sell collateral securities received unless the borrower defaults. BNYM as the lending agent also indemnifies TRS from any financial loss associated with a borrower's default and collateral inadequacy. The Statement of Fiduciary Net Position does not report securities lending transactions collateralized by letters of credit or by securities that the governmental entity does not have the ability to pledge or sell, unless the borrower defaults.

As of June 30, 2019, the average days to maturity for loans in the Retirement Annuity Trust was one day, and the weighted average investment maturity of cash collateral investments was two days. The trust had no credit risk exposure to borrowers because the amounts owed to borrowers exceeded the amounts the borrowers owed the trust, and no losses resulted during the period.

Security lending programs can entail interest rate risk and credit risk. TRS minimizes interest rate risk by limiting the term of cash collateral investments to several days.

The credit risk is controlled by investing cash collateral in securities with qualities similar to the credit worthiness of lent securities.

The following table presents the fair values of the underlying securities and the value of the collateral pledged at June 30, 2019, and 2018.

Retirement Annuity Trust

2019

Type of Securities Lent	Fair Value	Cash Collateral Received	Non-Cash Collateral Value Received	Total Collateral Received
Fixed income	$ 191,232,211	$ 3,860,561	$ 192,188,154	$ 196,048,715
Equities	959,736,176	400,199,282	570,029,895	970,229,177
Total	$ 1,150,968,387	$ 404,059,843	$ 762,218,049	$ 1,166,277,892

2018

Type of Securities Lent	Fair Value	Cash Collateral Received	Non-Cash Collateral Value Received	Total Collateral Received
Fixed income	$ 121,361,471	$ 35,699,643	$ 88,466,188	$ 124,165,831
Equities	1,144,548,206	844,061,981	327,494,273	1,171,556,254
Total	$ 1,265,909,677	$ 879,761,624	$ 415,960,461	$ 1,295,722,085

Life Insurance Trust

2019

Type of Securities Lent	Fair Value	Cash Collateral Received	Non-Cash Collateral Value Received	Total Collateral Received
Fixed income	$ 2,996,246	$ 1,016,250	$ 2,093,253	$ 3,109,503
Equities	469,915		473,027	473,027
Total	$ 3,466,161	$ 1,016,250	$ 2,566,280	$ 3,582,530

2018

Type of Securities Lent	Fair Value	Cash Collateral Received	Non-Cash Collateral Value Received	Total Collateral Received
Fixed income	$	$	$	$
Equities	2,179,744	2,107,139	114,609	2,221,748
Total	$ 2,179,744	$ 2,107,139	$ 114,609	$ 2,221,748

Annual Money-Weighted Rate of Return

A money-weighted rate of return is an expression of investment performance that is net of TRS's investment fees and expenses, adjusted for the changing amounts actually invested. The following table reflects the money-weighted rates of return.

Annual Rate of Return Net of Investment Fees and Expenses

	2019	2018
Retirement Annuity Trust	5.56%	10.5%
Health Insurance Trust	6.11%	8.44%
Life Insurance Trust	6.49%	N/A

Note 6
Retirement Plans for TRS Employees

Full-time employees of TRS participate in either TRS or Kentucky Employees Retirement System (KERS). Both plans are multiple-employer cost-sharing defined benefit retirement annuity and other postemployment benefits plans. All TRS employees in positions requiring a four-year degree are covered under TRS. The contribution rates and required employer matching are the same as state agency employers in TRS. These rates, the plan description and funding policy are disclosed fully in the notes to the financial statements.

The annual required contributions for TRS employee members in TRS for the fiscal years 2019, 2018 and 2017 were $943,837, $961,413 and $893,635, respectively. TRS contributed 100% of the required contribution each year.

All other TRS employees are covered under the KERS non-hazardous employees' plan. The plan provides for retirement, disability and death benefits to plan members. Retirement benefits may be extended to beneficiaries of plan members under certain circumstances. Per KRS 61.565(3), contribution rates shall be determined by the KRS board on the basis of an annual actuarial valuation. Rates may be amended by the KRS board as needed.

Members of KERS who joined prior to July 1, 2008, are required to contribute 5% of their annual creditable compensation, and members who joined on or after July 1, 2008, contribute 6%. As the employer, TRS is required to contribute the annual actuarially determined rate of the creditable compensation (or the rate approved by legislators). The approved rate for the fiscal years 2019, 2018 and 2017 were 83.43%, 49.47% and 48.59%, and TRS's annual required contributions to KERS were $1.1 million, $673,457 and $675,300, respectively. TRS contributed 100% of the required contributions for each year.

Note 7
Description of Other Funds

403(B) Tax-Sheltered Annuity Plan

Plan Description

TRS has, in prior years, administered a salary deferral program as permitted by section 403(b) of the Internal Revenue Code. Under this program members were able to voluntarily defer a portion of their compensation within the limits established by the applicable laws and regulations. However, TRS's Board of Trustees determined that the cost of providing the necessary services to assure continuing compliance with these laws and regulations was not economically feasible due to the limited participation in the program by TRS's members. The board decided, therefore, to discontinue offering the program as of April 30, 1997. Members who were not receiving annuities from their account as of April 30, 1997, were able to transfer their respective accounts directly into other tax-sheltered plans on a tax-free basis. As of June 30, 2019, the six members who are receiving annuities will continue to receive distributions according to the terms of their respective elections.

Basis of Accounting
The Tax-Sheltered Annuity Plan financial statements are prepared using an accrual basis of accounting. Contributions are no longer being accepted into the plan; therefore, no receivables are recognized.

Method Used to Value Investments
The short-term investments are reported at cost, which approximates fair value.

Supplemental Benefit Fund

The Supplemental Benefit Fund is a qualified governmental excess benefit arrangement as described in Section 415 of the Internal Revenue Code. In accordance with KRS 161.611 and KRS 161.420(8), TRS is authorized to provide a supplemental retirement benefit fund for the sole purpose of enabling the employer to apply the same formula for determining benefits payable to all members of TRS employed by the employer, whose benefits under the system are limited by Section 415 of the Internal Revenue Code of 1986 as amended. Funding of benefits payable under this fund are provided by the employer and are segregated from funds that are maintained by TRS for payment of regular benefits.

Junita Losey Scholarship Fund

Junita Losey, a retired teacher, designated TRS as a residuary beneficiary of her estate and expressed a desire that TRS establish a scholarship program for Kentucky students studying to be teachers. Ms. Losey died in 1997, and her estate provided a scholarship bequest to TRS. The scholarship bequest has at all times been segregated from funds that are maintained by TRS for payment of regular benefits. The board's Scholarship Committee meets each December to consider scholarship standards and administration of the bequest.

Note 8
Other Postemployment Benefits (OPEB) — Health Insurance Trust

Plan Description
In addition to the retirement annuity plan described in Note 1, KRS 161.675 requires TRS to provide access to postemployment healthcare benefits for eligible members and dependents. The TRS Health Insurance Trust is funded by employer and member contributions. Changes made to the medical plans provided through the trust may be made by the TRS Board of Trustees, the Kentucky Department of Employee Insurance and the General Assembly.

Medical coverage through TRS is funded by a combination of contributions from employees, the state and other employers. Coverage is provided through an account established pursuant to 26 U.S.C. sec. 401(h) and a 115 trust fund that went into effect on July 1, 2010. The insurance trust fund includes employer and retired member contributions required under KRS 161.550 and KRS 161.675(4)(b).

To be eligible for medical benefits, the member must have retired either for service or disability and a required amount of service credit. The TRS medical plan offers members who are not eligible for Medicare and under age 65 coverage through the Kentucky Employees Health Plan (KEHP) administered by the Kentucky Department of Employee Insurance. Once retired members and eligible spouses attain age 65 and or are eligible for Medicare, coverage is obtained through the Medicare Eligible Health Plan (MEHP) administered by TRS.

Contributions are made on behalf of TRS retired members toward payment of health insurance premiums. The amount of the member's contribution is based on a table approved by the TRS board. Retired members pay premiums in excess of the monthly contribution. The amount of insurance premiums paid by retirees for fiscal years 2019 and 2018 were $57.7 million and $57.7 million, respectively. The Commonwealth of Kentucky bears risk for excess claims expenses that exceed the premium equivalents charged for the KEHP.

At June 30, 2019, TRS insurance covered 40,711 retirees and 7,569 dependents, and at June 30, 2018, TRS insurance covered 40,230 retirees and 7,595 dependents. The medical plan has 207 participating employers with 72,647 and 72,205 active members contributing at June 30, 2019, and 2018, respectively.

Retiree health care premiums and other income received reduces the amount of expenditures reported in the deductions section in the Statement of Changes in Fiduciary Net Position for the Health Insurance Trust. These expenditures are summarized in the following table.

	2019	2018
MEHP group expenditures	$ 191,245,906	$ 186,856,718
KEHP group expenditures	114,509,069	120,519,991
Subtotal	305,754,975	307,376,709
Less: Amounts paid by retirees	(57,731,317)	(57,683,452)
Less: Medicare subsidies and formulary rebates	(84,357,641)	(88,611,557)
Total insurance expenditures	$ 163,666,017	$ 161,081,700

Net OPEB Liability of Employers

The net OPEB liability [i.e., the system's liability determined in accordance with GASB Statement No. 74 less the fiduciary net position (FNP)] for the Health Insurance Trust as of June 30, 2019, and 2018 is shown in the following table.

Net OPEB Liability of Employers

(Dollars in thousands)

Fiscal Year Ending June 30	Total OPEB Liability (TOL)* A	Plan Fiduciary Net Position B	Employers Net OPEB Liability (NOL) (A-B)	Plan Fiduciary Net Position (FNP) as a % of Total OPEB Liability (B/A)	Covered Payroll C	Net OPEB Liability as a % of Covered Payroll [(A-B)/C]
2019	$ 4,340,807	$ 1,414,020	$ 2,926,787	32.6	$ 3,497,216	83.69
2018	4,659,996	1,190,281	3,469,715	25.5	3,455,660	100.41

*The TOL includes the additional consideration for the current treatment of KEHP implicit subsidies that may be needed in the future. This is an additional liability from Health Insurance Trust accrued liabilities.

Actuarial Assumptions

A summary of the actuarial assumptions as of the latest actuarial valuation follows.

Valuation date	June 30, 2018
Investment rate of return	8%, net of OPEB plan investment expense, including inflation
Projected salary increases	3.5 - 7.2%, including wage inflation
Inflation rate	3%
Real wage growth	0.5%
Wage inflation	3.5%
Municipal bond index rate	3.5%
Discount rate	8%
Single equivalent interest rate	8%, net of OPEB plan investment expense, including price inflation
Health care cost trends	
KEHP group	7.5% for fiscal year 2019 decreasing to an ultimate rate of 5% by fiscal year 2024
MEHP group	5.5% for fiscal year 2019 decreasing to an ultimate rate of 5% by fiscal year 2021
Medicare Part B premiums	2.63% for fiscal year 2019 with an ultimate rate of 5% by 2031

Mortality rates were based on the RP-2000 Combined Mortality Table projected to 2025 with projection scale BB, and set forward two years for males and one year for females is used for the period after service retirement and for dependent beneficiaries. The RP-2000 Disabled Mortality Table set forward two years for males and seven years for females is used for the period after disability retirement. The demographic actuarial assumptions for retirement, disability incidence, withdrawal, rates of plan participation, and rates of plan election used in the June 30, 2018, valuation were based on the results of the most recent actuarial experience studies for the system, which covered the five-year period ending June 30, 2015. The remaining actuarial assumptions used in the June 30, 2018, valuation of the health trust were based on a review of recent plan experience done concurrently with the June 30, 2018, valuation. The health care cost trend rate assumption was updated for the June 30, 2018, valuation and was shown as an assumption change in the total OPEB liability (TOL) roll forward while the change in initial per capita claims costs were included with experience in the TOL roll forward. The Municipal Bond Index Rate used for this purpose is the June average of the Bond Buyer General Obligation 20-year Municipal Bond Index published weekly by the Board of Governors of the Federal Reserve System.

Target Allocations

The long-term expected rate of return on OPEB investments was determined using a log-normal distribution analysis 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.

The target allocation and best estimates of arithmetic real rates of return for each major asset class, as provided by TRS's investment consultant, are summarized in the following table.

Asset Class	Target Allocation Percentage	30-Year Expected Geometric Real Rate Percentage of Return
Global equity	58	5.1
Fixed income	9	1.2
Real estate	6.5	3.8
Private equity	8.5	6.3
Additional categories	17	3.2
Cash	1	0.9
Total	100	

Discount Rate

The discount rate used to measure the TOL as of the measurement date was 8%. The projection of cash flows used to determine the discount rate was performed in accordance with GASB Statement No. 74. The projection's basis was an actuarial valuation performed as of June 30, 2018. In addition to the actuarial methods and assumptions of the June 30, 2018, actuarial valuation, the following actuarial methods and assumptions were used in the projection of cash flows:

- Total payroll for the initial projection year consists of the payroll of the active membership present on the valuation date. In subsequent projection years, total payroll was assumed to increase annually at a rate of 3.5%.
- The KEHP group retiree health care costs for members retired on or after July 1, 2010, were assumed to be paid by either the state or the retirees themselves.
- As administrative expenses, other than the administrative fee of $7.44 per member per month (PMPM) paid to KEHP by TRS, were assumed to be paid in all years by the employer as they come due, they were not considered.
- Cash flows occur midyear.
- Future contributions to the Health Insurance Trust were based upon the contribution rates defined in statute and the projected payroll of active employees. Per KRS 161.540(1)(c).3 and 161.550(5), when the health trust achieves a sufficient funded status, as determined by TRS's actuary, the following health trust statutory contributions are to be decreased, suspended or eliminated:
    - Employee contributions
    - Employer contributions
    - State contributions for KEHP premium subsidies payable to retirees who retire after June 30, 2010

  To reflect these adjustments, open group projections were used and assumed an equal, pro rata reduction to the current statutory amounts in the years if the health trust is projected to achieve a funded ratio of 100% or more. Here, the current statutory amounts are adjusted to achieve total contributions equal to the actuarially determined contribution, as determined by the prior year's valuation and in accordance with the health trust's funding policy (Schedule E). As the specific methodology to be used for the adjustments has yet to be determined, there may be differences between the projected results and future experience. This also may include any changes to retiree contributions for KEHP coverage pursuant to KRS 161.675(4)(b).
- In developing the adjustments to the statutory contributions in future years, the following was assumed:
    - Liabilities and cash flows are net of expected retiree contributions and any implicit subsidies attributable to coverage while participating in KEHP.
    - A 0% active member growth rate was assumed for the purposes of developing estimates for new entrants (membership dates beyond June 30, 2018).

Based on these assumptions, the Health Insurance Trust's FNP was not projected to be depleted.

The FNP projections are based upon the health trust's financial status on the valuation date, the indicated set of methods and assumptions, and the requirements of GASB Statement No. 74. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing basis, reflecting the impact of future members. Therefore, the results of these tests do not necessarily indicate whether or not the health trust will actually run out of money, the financial condition of the trust, or the trust's ability to make benefit payments in future years.

These paragraphs require disclosure of the sensitivity of the NOL to changes in the health care cost trend rates for the HIT and the discount rate for the HIT. The following exhibits present the NOL of the HIT, calculated using the health care cost trend rates, as well as what the HIT's NOL would be if it were calculated using a health care cost trend rate that is 1% lower or 1% higher than the current rate. Similarly, the exhibits present the NOL of the HIT, calculated using the SEIR, as well as what the HIT's NOL would be if it were calculated using a discount rate that is 1% lower or 1% higher than the current SEIR.

Schedule of Net OPEB Liability and Health Care Cost Trend Rates 2019
(In thousands)

		Health Care Cost Trend Rates		
		1% Decrease	Current	1% Increase
	1% Increase (9%)	$	$2,474,190	$
Discount Rate	Current (8%)	2,382,551	2,926,787	3,596,018
	1% Decrease (7%)		3,467,106	

Schedule of Net OPEB Liability and Health Care Cost Trend Rates 2018
(In thousands)

		Health Care Cost Trend Rates		
		1% Decrease	Current	1% Increase
	1% Increase (9%)	$	$2,970,711	$
Discount Rate	Current (8%)	2,877,113	3,469,715	4,200,835
	1% Decrease (7%)		4,068,745	

The TOL of the Health Insurance Trust for 2019 is based upon an actuarial valuation performed as of the valuation date, June 30, 2018. An expected TOL is determined as of June 30, 2019, using standard roll-forward techniques. The roll-forward calculation begins with the TOL, as of June 30, 2018, subtracts the actual benefit payments (net of retiree contributions, if applicable) for the year, applies interest at the discount rate for the year and then adds the annual normal cost (also called the service cost). If applicable, actuarial gains and losses arising from the difference between estimates and actual experience (excluding amounts related to benefit changes and changes in assumptions or other inputs) are reconciled to the TOL as of the measurement date. Last, any changes of assumptions or other inputs are reflected. The procedure used to determine the TOL of the health trust, as of June 30, 2019, is shown in the following table.

TOL Roll-Forward 2019
(In thousands)

		Expected	Actual
(a)	TOL as of June 30, 2018*	$ 4,659,996	$ 4,047,748
(b)	Actual benefit payments and refunds for July 1, 2018-June 30, 2019	(163,666)	(163,666)
(c)	Interest on TOL = [(a) x (0.08)] + [(b) x (0.04]	366,254	317,274
(d)	Service cost for July 1, 2018-June 30, 2019	93,792	93,792
(e)	Changes of benefit terms		
(f)	Changes of assumptions (updated health care trend)	45,659	45,659
(g)	TOL rolled forward to June 30, 2019 = (a) + (b) + (c) + (d) + (e) + (f)	5,002,035	4,340,807
(h)	Difference between expected and actual experience (gain) loss		$ (661,228)

*The TOL used in the roll-forward as of June 30, 2018, is calculated using the discount rate as of the prior measurement date.

The TOL of the Health Insurance Trust for 2018 is based upon an actuarial valuation performed as of the June 30, 2017, valuation date. An expected, TOL is determined as of June 30, 2018, using standard roll-forward techniques. The roll-forward calculation begins with the TOL, as of June 30, 2017, subtracts the actual benefit payments (net of retiree contributions, if applicable) for the year, applies interest at the discount rate for the year, and then adds the annual normal cost (also called the service cost). If applicable, actuarial gains and losses arising from the difference between estimates and actual experience (excluding amounts related to benefit changes and changes in assumptions or other inputs) are reconciled to the TOL as of the measurement date. Last, any changes of assumptions or other inputs are reflected. The procedure used to determine the TOL of the health trust, as of June 30, 2018, is shown in the following table.

TOL Roll-Forward 2018
(In thousands)

		Expected	Actual
(a)	TOL as of June 30, 2017*	$ 4,524,172	$ 4,329,311
(b)	Actual benefit payments and refunds for July 1, 2017-June 30, 2018	(161,082)	(161,082)
(c)	Interest on TOL = [(a) x (0.08)] + [(b) x (0.04]	355,491	339,902
(d)	Service cost for July 1, 2017-June 30, 2018	95,382	95,382
(e)	Changes of benefit terms		
(f)	Changes of assumptions (updated health care trend)	56,483	56,483
(g)	TOL rolled forward to June 30, 2018 = (a) + (b) + (c) + (d) + (e) + (f)	4,870,446	4,659,996
(h)	Difference between expected and actual experience (gain) loss		$ (210,450)

*The TOL used in the roll-forward as of June 30, 2017, is calculated using the discount rate as of the prior measurement date.

Note 9
Other Postemployment Benefits (OPEB) — Life Insurance Trust

Plan Description
TRS administers the Life Insurance Trust as provided by KRS 161.655 to provide life insurance benefits to retired and active members. This benefit is financed by actuarially determined contributions from the 207 participating employers. The benefit is $5,000 for members who are retired for service or disability, and $2,000 for active contributing members.

Net OPEB Liability of Employers
The net OPEB liability (NOL) (i.e., the system's liability determined in accordance with GASB Statement No. 74 less the fiduciary net position) for the life insurance fund as of June 30, 2019, and 2018 follows.

Schedule of Net OPEB Liability of Employers
(Dollars in thousands)

Fiscal Year Ending June 30	Total OPEB Liability (TOL) A	Plan Fiduciary Net Position B	Employers Net OPEB Liability (NOL) (A-B)	Plan Fiduciary Net Position (FNP) as a % of Total OPEB Liability (B/A)	Covered Payroll C	Net OPEB Liability as a % of Covered Payroll [(A-B)/C]
2019	$ 116,830	$ 85,758	$ 31,072	73.4	$ 3,497,216	0.89
2018	112,660	84,462	28,198	75	3,455,660	0.82

Actuarial Assumptions

A summary of the actuarial assumptions as of the latest actuarial valuation is shown below.

Valuation date	June 30, 2018
Investment rate of return	7.5%, net of OPEB plan investment expense, including inflation.
Projected salary increases	3.5 - 7.45%, including wage inflation
Inflation rate	3.0%
Real wage growth	0.5%
Wage inflation	3.5%
Municipal bond index rate	3.5%
Discount rate	7.5%
Single equivalent interest rate	7.5%, net of OPEB plan investment expense, including price inflation

Mortality rates were based on the RP-2000 Combined Mortality Table projected to 2025 with projection scale BB, and set forward two years for males and one year for females is used for the period after service retirement and for dependent beneficiaries. The RP-2000 Disabled Mortality Table set forward two years for males and seven years for females is used for the period after disability retirement. The demographic actuarial assumptions for retirement, disability incidence, withdrawal, rates of plan participation and rates of plan election used in the June 30, 2018, valuation were based on the results of the most recent actuarial experience studies for the system, which covered the five-year period ending June 30, 2015. The Municipal Bond Index Rate used for this purpose is the June average of the Bond Buyer General Obligation 20-year Municipal Bond Index published weekly by the Board of Governors of the Federal Reserve System.

Target Allocations

The long-term expected rate of return on OPEB investments was determined using a log-normal distribution analysis 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.

The target allocation and best estimates of arithmetic real rates of return for each major asset class, as provided by TRS's investment consultant, are summarized in the following table.

Asset Class	Target Allocation Percentage	Expected Geometric Real Rate Percentage of Return
U.S. equity	40	4.3
International equity	23	5.2
Fixed income	18	1.2
Real estate	6	3.8
Private equity	5	6.3
Additional Categories	6	3.2
Cash	2	0.9
Total	100	

Discount Rate

The discount rate used to measure the total OPEB liability (TOL) as of the measurement date was 7.5%. The projection of cash flows used to determine the discount rate was performed in accordance with GASB Statement No. 74. The projection's basis was an actuarial valuation performed as of June 30, 2018. In addition to the actuarial methods and assumptions of the June 30, 2018, actuarial valuation, the following actuarial methods and assumptions were used in the projection of the life insurance cash flows:

- Total payroll for the initial projection year consists of the payroll of the active membership present on the valuation date. In subsequent projection years, total payroll was assumed to increase annually at a rate of 3.5%.
- The employer will contribute the actuarially determined contribution (ADC) in accordance with the Life Insurance Trust's funding policy (Schedule E) determined by a valuation performed on a date two years prior to the beginning of the fiscal year in which the ADC applies.

- As administrative expenses were assumed to be paid in all years by the employer as they come due, they were not considered.
- Active employees do not contribute to the plan.
- Cash flows occur midyear.

Based on these assumptions, the Life Insurance Trust's fiduciary net position (FNP) was not projected to be depleted.

The FNP projections are based upon the Life Insurance Trust's financial status on the valuation date, the indicated set of methods and assumptions, and the requirements of GASB Statement No. 74. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing basis, reflecting the impact of future members. Therefore, the results of these tests do not necessarily indicate whether the Life Insurance Trust actually will run out of money, the financial condition of the trust, or the trust's ability to make benefit payments in future years.

These paragraphs require disclosure of the sensitivity of the NOL to changes the discount rate for the Life Insurance Trust. The schedules below presents the NOL of the trust calculated using the single equivalent interest rate (SEIR), as well as what the trust's NOL would be if it were calculated using a discount rate that is 1% lower or 1% higher than the current SEIR.

Schedule of Net OPEB Liability 2019
(In thousands)

1% Decrease (6.5%)	Current Discount Rate (7.5%)	1% Increase (8.5%)
$45,921	$31,072	$18,868

Schedule of Net OPEB Liability 2018
(In thousands)

1% Decrease (6.5%)	Current Discount Rate (7.5%)	1% Increase (8.5%)
$42,929	$28,198	$16,114

The TOL of the Life Insurance Trust for 2018 is based upon an actuarial valuation performed as of the valuation date, June 30, 2018. An expected TOL is determined as of June 30, 2019, using standard roll-forward techniques. The roll-forward calculation begins with the TOL, as of June 30, 2018, subtracts the actual benefit payments (net of retiree contributions, if applicable) for the year, applies interest at the discount rate for the year, and then adds the annual normal cost (also called the service cost). If applicable, actuarial gains and losses arising from the difference between estimates and actual experience (excluding amounts related to benefit changes and changes in assumptions or other inputs) are reconciled to the TOL as of the measurement date. Last, any changes of assumptions or other inputs are reflected. The procedure used to determine the TOL of the Life Insurance Trust, as of June 30, 2019, is shown in the following table.

TOL Roll-Forward 2019
(In thousands)

		Expected	Actual
(a)	TOL as of June 30, 2018*	$ 112,660	$ 112,471
(b)	Actual benefit payments and refunds for July 1, 2018-June 30, 2019	(5,153)	(5,153)
(c)	Interest on TOL = [(a) x (0.075)] + [(b) x (0.0375]	8,256	8,241
(d)	Service cost for July 1, 2018-June 30, 2019	1,271	1,271
(e)	Changes of benefits terms		
(f)	Changes of assumptions		
(g)	TOL rolled forward to June 30, 2019 =(a)+(b)+(c)+(d)+(e)+(f)	$ 117,034	$ 116,830
(h)	Difference between expected and actual experience gain (loss)		(204)

*The TOL used in the roll-forward as of June 30, 2018, is calculated using the discount rate as of the prior measurement date.

The TOL of the Life Insurance Trust for 2018 is based upon an actuarial valuation performed as of the June 30, 2017, valuation date. An expected TOL is determined as of June 30, 2018, using standard roll-forward techniques. The roll-forward calculation begins with the TOL, as of June 30, 2017, subtracts the actual benefit payments (net of retiree contributions, if applicable) for the year, applies interest at the discount rate for the year and then adds the annual normal cost (also called the service cost). If applicable, actuarial gains and losses arising from the difference between estimates and actual experience (excluding amounts related to benefit changes and changes in assumptions or other inputs) are reconciled to the TOL as of the measurement date. Last, any changes of assumptions or other inputs are reflected. The procedure used to determine the TOL of the trust, as of June 30, 2018, is shown in the following table.

TOL Roll-Forward 2018

(In thousands)

		Expected	Actual
(a)	TOL as of June 30, 2017*	$ 109,736	$ 109,069
(b)	Actual benefit payments and refunds for July 1, 2017-June 30, 2018	(5,453)	(5,453)
(c)	Interest on TOL = [(a) x (0.075)] + [(b) x (0.0375]	8,026	7,976
(d)	Service cost for July 1, 2017-June 30, 2018	1,068	1,068
(e)	Changes of benefits terms		
(f)	Changes of assumptions		
(g)	TOL rolled forward to June 30, 2018 = (a)+(b)+(c)+(d)+(e)+(f)	$ 113,377	$ 112,660
(h)	Difference between expected and actual experience gain (loss)		(717)

*The TOL used in the roll-forward as of June 30, 2017, is calculated using the discount rate as of the prior measurement date.

Required Supplementary Information

Retirement Annuity Trust

Schedule of Changes in Net Pension Liability
(In thousands)

	2019	2018	2017	2016	2015	2014
Total pension liability						
Service cost	$ 542,970	$ 1,104,102	$ 1,332,587	$ 1,120,893	$ 1,015,080	$ 1,002,338
Interest	2,448,387	2,063,109	1,964,107	2,027,457	2,029,372	1,956,610
Difference between expected and actual experience	93,650	(222,473)	199,471	(58,035)		
Changes of assumptions		(14,167,315)	(2,321,327)	4,030,834	1,511,960	(353,043)
Benefit payments	(2,094,364)	(2,004,617)	(1,918,612)	(1,833,199)	(1,741,456)	(1,654,376)
Refunds of contributions	(32,403)	(31,073)	(26,305)	(27,748)	(23,033)	(25,462)
Net change in total pension liability	958,240	(13,258,267)	(770,079)	5,260,202	2,791,923	926,067
Total pension liability - beginning	33,708,555	46,966,822	47,736,901	42,476,699	39,684,776	38,758,709
Total pension liability - ending (a)	34,666,795	33,708,555	46,966,822	47,736,901	42,476,699	39,684,776
Plan net position						
Contributions - state	1,051,452	969,698	981,417	484,987	480,073	483,330
Contributions - other employers	71,583	78,973	79,303	80,468	79,506	79,996
Contributions - members	321,172	319,127	313,625	313,044	308,160	304,982
Net investment income	1,085,189	1,953,214	2,475,753	(245,215)	862,179	2,803,249
Benefit payments	(2,094,364)	(2,004,617)	(1,918,612)	(1,833,199)	(1,741,456)	(1,654,376)
Administrative expense	(12,352)	(11,388)	(10,314)	(8,636)	(8,869)	(7,956)
Refunds of contributions	(32,403)	(31,073)	(26,305)	(27,748)	(23,033)	(25,462)
Net change in plan net position	390,277	1,273,934	1,894,867	(1,236,299)	(43,440)	1,983,763
Plan net position - beginning	19,981,633	18,707,699	16,812,832	18,049,131	18,092,571	16,108,808
Plan net position - ending (b)	20,371,910	19,981,633	18,707,699	16,812,832	18,049,131	18,092,571
Net pension liability - ending (a)-(b)	$ 14,294,885	$ 13,726,922	$ 28,259,123	$ 30,924,069	$ 24,427,568	$ 21,592,205

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Net Pension Liability

The total pension liability contained in the following schedule was provided by TRS's actuary, Cavanaugh Macdonald Consulting. The net pension liability is measured as the total pension liability less the amount of the fiduciary net position of the system.

Changes of Benefit Terms. None.

Changes of assumptions. In the 2016 valuation, rates of withdrawal, retirement, disability, mortality and rates of salary increase were adjusted to more closely reflect actual experience. In the 2016 valuation and later, the expectation of retired life mortality was changed to the RP-2000 Mortality Tables projected to 2025 with projection scale BB, set forward two year for males and one year for females rather than the RP-2000 Mortality Tables projected to 2020 with projection scale AA, which was used prior to 2016.

In the 2011 valuation, rates of withdrawal, retirement, disability and mortality were adjusted to more closely reflect actual experience. In the 2011 valuation and later, the expectation of retired life mortality was changed to the RP-2000 Mortality Tables projected to 2020 with projection scale AA, set back one year for females rather than the 1994 Group Annuity Mortality Tables which was used prior to 2016. For the 2011 valuation through the 2013 valuation, an interest smoothing methodology was used to calculate liabilities for purposes of determining the actuarially determined contributions.

Schedule of Net Pension Liability

(Dollars in thousands)

	2019	2018	2017
Total pension liability	$34,666,795	$33,708,555	$46,966,822
Plan net position	20,371,910	19,981,633	18,707,699
Net pension liability	14,294,885	13,726,922	28,259,123
Ratio of plan net position to total pension liability	58.76%	59.28%	39.83%
Covered payroll	$ 3,497,216	$ 3,455,660	$ 3,415,432
Net pension liability as a percentage of covered payroll	408.75%	397.23%	827.40%

	2016	2015	2014
Total pension liability	$47,736,901	$42,476,699	$39,684,776
Plan net position	16,812,832	18,049,131	18,092,571
Net pension liability	30,924,069	24,427,568	21,592,205
Ratio of plan net position to total pension liability	35.22%	42.49%	45.59%
Covered payroll	$ 3,390,539	$ 3,455,008	$ 3,317,422
Net pension liability as a percentage of covered payroll	912.07%	707.02%	650.87%

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Schedule of Employer Contributions
(Dollars in thousands)

Fiscal Year Ended June 30	Covered Payroll	Actual Employer Contributions	Actuarially Determined Employer Contributions	Annual Contribution Excess (Deficiency)	Actual Contributions as a % of Covered Payroll
2019	$ 3,497,216	$ 1,123,035	$ 1,123,035	$	32.11
2018	3,455,660	1,048,671	1,083,466	(34,795)	30.35
2017	3,415,432	1,060,720	1,076,617	(15,897)	31.06
2016	3,390,539	565,455	999,270	(433,815)	16.68
2015	3,455,008	559,579	913,654	(354,075)	16.20
2014	3,317,422	563,326	823,446	(260,120)	16.98
2013	3,310,710	568,233	802,985	(234,752)	17.16
2012	3,310,176	557,340	757,822	(200,482)	16.84
2011	3,283,749	1,037,936	678,741	359,195	31.61
2010	3,321,614	479,805	633,938	(154,133)	14.44

See accompanying independent auditor's report.

Actuarial Methods and Assumptions

The actuarially determined contribution rates in the Schedule of Employer Contributions are calculated as of June 30 on the three years prior to the end of the fiscal year in which contributions are reported. The following actuarial methods and assumptions were used to determine contribution rates reported in the most recent year of the schedule.

Actuarial cost method	Entry age
Amortization period	Level percentage of payroll, closed
Remaining amortization period	28.1 years
Asset valuation method	5-year smoothed market value
Inflation	3%
Salary increase	3.5 to 7.3%, including inflation
Investment rate of return	7.5%, net of pension plan investment expense, including inflation

Schedule of Investment Returns

Percentage shown is annual money-weighted rate of return, net of investment expense.

2019	2018	2017	2016	2015	2014
5.56%	10.5%	15%	(1.32)%	4.96%	17.95%

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Health Insurance Trust

Schedule of Changes in the Net OPEB Liability
(In thousands)

	2019	2018	2017
Total OPEB liability			
Service cost	$ 93,792	$ 95,382	$ 95,625
Interest	366,254	355,491	333,990
Changes of benefit terms			8,926
Difference between expected and actual experience	(661,228)	(210,450)	
Changes of assumptions	45,659	56,483	
Benefit payments	(163,666)	(161,082)	(178,500)
Net change in OPEB liability	(319,189)	135,824	260,041
Total OPEB liability - beginning	4,659,996	4,524,172	4,264,131
Total OPEB liability - ending (a)	4,340,807	4,659,996	4,524,172
Plan net position			
Contributions - state	76,382	80,959	75,497
Contributions - other employers	106,764	106,143	104,879
Contributions - active members	131,677	130,778	128,819
Net investment income	74,385	76,841	95,453
Benefit payments	(163,666)	(161,082)	(178,500)
Administrative expense	(1,803)	(1,748)	(1,539)
Other			
Net change in plan net position	223,739	231,891	224,609
Plan net position - beginning	1,190,281	958,390	733,781
Plan net position - ending (b)	1,414,020	1,190,281	958,390
Net OPEB liability - ending (a) - (b)	$ 2,926,787	$ 3,469,715	$ 3,565,782

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Net OPEB Liability — Health Trust

The net OPEB liability contained in the following schedule was provided by TRS's actuary, Cavanaugh Macdonald Consulting. The net OPEB liability is measured as the total OPEB liability less the amount of the fiduciary net position of the system.

Changes of benefit terms. None

Changes of assumptions. None

Schedule of Net OPEB Liability

(Dollars in thousands)

Valuation Year June 30	Total OPEB Liability	Plan Fiduciary Net Position	Net OPEB Liability	Plan Fiduciary Net Position as a % of Total OPEB Liability	Covered Payroll	Net OPEB Liability as a % of Covered Payroll
2019	$ 4,340,807	$ 1,414,020	$ 2,926,787	32.58	$ 3,497,216	83.69
2018	4,659,996	1,190,281	3,469,715	25.54	3,455,660	100.41
2017	4,524,172	958,390	3,565,782	21.18	3,415,432	104.40

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Schedule of Employer Contributions

(Dollars in thousands)

Valuation Year June 30	Actuarially Determined Employer Contribution	Contributions in Relation to the Actuarially Determined Contribution	Annual Contribution Deficiency/ (Excess)	Covered Payroll	Actual Contributions as a % of Covered Payroll
2019	$ 76,597	$ 183,146	$ (106,549)	$ 3,497,216	5.24
2018	118,837	187,102	(68,265)	3,455,660	5.41
2017	102,854	180,376	(77,522)	3,415,432	5.28
2016	97,983	221,967	(123,984)	3,390,539	6.55
2015	106,606	168,084	(61,478)	3,455,008	4.86
2014	159,583	162,568	(2,985)	3,317,422	4.90
2013	186,726	166,611	20,115	3,310,710	5.03
2012	470,217	177,748	292,469	3,310,176	5.37
2011	477,723	188,735	288,988	3,283,749	5.75
2010	457,054	173,380	283,674	3,321,614	5.22

See accompanying independent auditor's report.

Actuarial Methods and Assumptions

The actuarially determined contribution rates in the Schedule of Employer Contributions are calculated as of June 30, 2018. The following actuarial methods and assumptions were used to determine contribution rates reported in the most recent year of the schedule.

Actuarial cost method	Entry age normal
Amortization period	Level percentage of payroll
Amortization method	22 years, closed
Asset valuation method	5-year smoothed market value
Inflation	3%
Real wage growth	0.5%
Wage inflation	3.5%
Salary increase	3.5 to 7.2%, including wage inflation
Discount rate	8%
Health care cost trends	
KEHP group	7.5% at June 30, 2018, decreasing to an ultimate rate of 5% by June 30, 2024
MEHP group	5.5% at June 30, 2018, decreasing to an ultimate rate of 5% by June 30, 2021
Medicare Part B premiums	0% at June 30, 2018 with an ultimate rate of 5% by June 30, 2030
KEHP group claims	The current KEHP premium is used as the base cost and is projected forward using only the health care trend assumption (no implicit rate subsidy is recognized).

Schedule of Investment Returns

Percentage shown is annual money-weighted rate of return, net of investment expense.

2019	2018	2017	2016	2015	2014
6.11%	8.44%	14.4%	(2.20)%	1.38%	15.38%

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Life Insurance Trust

Schedule of Changes in the Net OPEB Liability

(In thousands)

	2019	2018	2017
Total OPEB liability			
Service cost	$ 1,271	$ 1,068	$ 1,067
Interest	8,256	8,026	7,761
Changes of benefit terms			
Difference between expected and actual experience	(204)	(717)	
Changes of assumptions			
Benefit payments	(5,153)	(5,453)	(5,151)
Net change in OPEB liability	4,170	2,924	3,677
Total OPEB liability - beginning	112,660	109,736	106,059
Total OPEB liability - ending (a)	116,830	112,660	109,736
Plan Net Position			
Contributions - state	1,209	897	882
Contributions - other employers	212	161	168
Contributions - active members			
Net investment income	5,058	1,111	915
Benefit payments	(5,153)	(5,453)	(5,151)
Administrative expense	(30)	(31)	(28)
Other			
Net change in plan net position	1,296	(3,315)	(3,214)
Plan net position - beginning	84,462	87,777	90,991
Plan net position - ending (b)	85,758	84,462	87,777
Net OPEB liability - ending (a) - (b)	$ 31,072	$ 28,198	$ 21,959

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Net OPEB Liability — Life Insurance

The net OPEB liability contained in the following schedule was provided by TRS's actuary, Cavanaugh Macdonald Consulting. The net OPEB liability is measured as the total OPEB liability less the amount of the fiduciary net position of the System.

Changes of benefit terms. None

Changes of assumptions. None

Schedule of Net OPEB Liability

(Dollars in thousands)

Valuation Year June 30	Total OPEB Liability	Plan Fiduciary Net Position	Net OPEB Liability	Plan Fiduciary Net Position as a % of Total OPEB Liability	Covered Payroll	Net OPEB Liability as a % of Covered Payroll
2019	$ 116,830	$ 85,758	$ 31,072	73.4	$3,497,216	0.89
2018	112,660	84,462	28,198	74.97	3,455,660	0.82
2017	109,736	87,777	21,959	79.99	3,415,432	0.64

Schedule is intended to show information for 10 years. Future years will be displayed as they become available.
See accompanying independent auditor's report.

Schedule of Employer Contributions

(Dollars in thousands)

Valuation Year June 30	Actuarially Determined Employer Contribution	Contributions in Relation to the Actuarially Determined Contribution	Annual Contribution Deficiency/ (Excess)	Covered Payroll	Actual Contributions as a % of Covered Payroll
2019	$ 1,082	$ 1,421	$ (339)	$ 3,497,216	0.04
2018	1,075	1,058	17	3,455,660	0.03
2017	1,065	1,050	15	3,415,432	0.03
2016	1,058	1,038	20	3,390,539	0.03
2015	1,050	1,020	30	3,455,008	0.03
2014	1,045	1,006	39	3,317,422	0.03
2013	1,740	1,680	60	3,310,710	0.05
2012	1,733	1,685	48	3,310,176	0.05
2011	1,726	1,669	57	3,283,749	0.05
2010	1,993	1,967	26	3,321,614	0.06

See accompanying independent auditor's report.

Actuarial Methods and Assumptions

The actuarially determined contribution rates in the schedule of employer contributions are calculated as of June 30, three years prior to the end of the fiscal year in which contributions are reported. The following actuarial methods and assumptions were used to determine contribution rates reported in the most recent year of the schedule.

Actuarial cost method	Entry age normal
Amortization method	Level percentage of payroll
Amortization period	30 years
Asset valuation method	5-year smoothed market
Inflation	3.0%
Real wage growth	0.5%
Wage inflation	3.5%
Salary increase	3.5 to 7.45%, including wage inflation
Discount rate	7.5%

Schedule of Investment Returns

Percentage shown is annual money-weighted rate of return, net of investment expense.

2019
6.49%

TRS began separate reporting of its Life Insurance Trust effective February 1, 2018. Previously, it was reported as part of the pension fund's gross and net performance. This schedule will show more history of the trust as it becomes available.
See accompanying independent auditor's report.

Additional Supporting Schedules

Schedule of Administrative Expenses
For the Year Ended June 30, 2019 and 2018

	2019	2018
Salaries	$ 7,364,326	$ 7,362,335
Other personnel costs	715,252	669,764
Professional services and contracts	668,483	796,286
Utilities	103,202	106,115
Rentals	23,114	25,175
Maintenance	102,570	66,229
Postage and related services	330,510	321,972
Printing	96,892	211,541
Insurance	194,601	190,420
Miscellaneous services	149,267	162,597
Telecommunications	20,255	21,002
Computer services	92,823	171,465
Supplies	45,050	40,962
Depreciation	2,251,469	2,168,364
Travel	49,890	45,427
Dues and subscriptions	56,860	82,987
Miscellaneous commodities	13,950	11,914
Office systems and equipment	1,870,795	796,885
Compensated absences	38,025	(83,324)
Total	$ 14,187,334	$ 13,168,116

See accompanying independent auditor's report.

Schedule of Professional Services and Contracts
For the Year Ended June 30, 2019 and 2018

	Nature of Service	2019	2018
Cavanaugh Macdonald Consulting	Actuarial	$ 238,199	$ 292,886
Mountjoy Chilton Medley	Auditing	36,454	69,704
Blue & Co.	Auditing	88,200	
Auditor of Public Accounts	Auditing	54,284	
Ice Miller	Attorney	31,388	111,020
Stoll Keenon and Ogden	Attorney	2,353	9,063
Attorney General	Attorney	8,344	313
Williams & Jensen	Attorney	12,000	
Aon Hewitt	Consulting	90,761	193,300
MulloyBorland	Communications	76,500	
Peritus	Communications	30,000	120,000
Total		$ 668,483	$ 796,286

See accompanying independent auditor's report.

Schedule of Contracted Investment Management Expenses
Year Ended June 30, 2019

	Retirement Annuity Trust*	Health Insurance Trust	Life Insurance Trust	Total
Equity managers	$ 16,437,286	$ 367,283	$ 10,532	$ 16,815,101
Fixed income managers	467,031			467,031
Real estate	10,239,260	1,155,465	9,731	11,404,456
Additional categories	9,040,647	1,103,845	12,567	10,157,059
Alternative investments	20,899,483	2,310,360	427	23,210,271
Custodian	539,741	81,648	28,623	650,012
Consultant	499,317			499,317
Legal and research	88,923			88,923
Other (administrative and operational)	2,954,564	276,532	110,823	3,341,920
Total	$ 61,166,252	$ 5,295,133	$ 172,703	$ 66,634,088

*Does not include expenses for the 403(b) Tax-Sheltered Trust and Losey Scholarship Fund.
See accompanying independent auditor's report.

Schedule of Contracted Investment Management Expenses
Year Ended June 30, 2018

	Retirement Annuity Trust*	Health Insurance Trust	Life Insurance Trust	Total
Equity managers	$ 14,693,395	$ 314,876	$	$ 15,008,271
Fixed income managers	443,036			443,036
Real estate	10,106,962	997,685	1,027	11,105,674
Additional categories	9,256,358	977,406	2,167	10,235,931
Alternative investments	17,051,168	1,313,059		18,364,227
Custodian	517,884	84,018	4,412	606,314
Consultant	506,093			506,093
Legal and research	59,131			56,131
Other (administrative and operational)	2,882,695	255,698	105,847	3,244,240
Total	$ 55,516,722	$ 3,942,742	$ 113,453	$ 59,572,917

*Includes expenses for the 403(b) Tax-Sheltered Trust and Losey Scholarship Fund.
See accompanying independent auditor's report.

MIKE HARMON
AUDITOR OF PUBLIC ACCOUNTS

Report On Internal Control Over Financial Reporting And
On Compliance And Other Matters Based On An Audit Of Financial
Statements Performed In Accordance With *Government Auditing Standards*

Independent Auditor's Report

Board of Trustees
Teachers' Retirement System of the State of Kentucky
Frankfort, Kentucky

We have audited, in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the Teachers' Retirement System of the State of Kentucky (TRS) as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise TRS's basic financial statements, and have issued our report thereon dated November 15, 2019.

Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered the TRS's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the TRS's internal control. Accordingly, we do not express an opinion on the effectiveness of the TRS's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct misstatements on a timely basis. A *material weakness* is a deficiency, or combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control over financial reporting was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control over financial reporting that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

209 ST. CLAIR STREET
FRANKFORT, KY 40601-1817
TELEPHONE 502.564.5841
FACSIMILE 502.564.2912
WWW.AUDITOR.KY.GOV

Report On Internal Control Over Financial Reporting And
On Compliance And Other Matters Based On An Audit Of Financial
Statements Performed In Accordance With *Government Auditing Standards*
(Continued)

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the TRS's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Respectfully Submitted,

Mike Harmon
Auditor of Public Accounts

November 15, 2019

Investment Section

Report on Investment Activity

This report is prepared by the investment staff of the
Teachers' Retirement System of the State of Kentucky.

Investment Committee

Hollis Gritton
Chair

Brenda McGown
Vice Chair

William Alverson
Member

John Boardman, III
Member

Frank Collecchia
Member

Josh Underwood
Member

Alison Wright
Member

Bevis Longstreth
Investment Advisor to TRS
Kentucky Investment Committee

George Philip
Investment Advisor to TRS
Kentucky Investment Committee

Executive Investment Staff

Gary L. Harbin, CPA
Executive Secretary

Tom Siderewicz, CFA
Chief Investment Officer

Philip L. Webb
Director of Investment Accounting

AON

October 1, 2019

To the Board of Trustees and participants of the Teachers' Retirement System of the State of Kentucky:

The Teachers' Retirement System of the State of Kentucky (TRS) investment program produced a total return of 5.9% for the 12-month period ended June 30, 2019 but lagged the return of the Policy Benchmark by 1.5 percentage points. On an absolute basis, the fixed income, real estate and private equity portfolios contributed to results with returns above 8%, while the international equity allocation was a drag on performance as this was the lowest returning asset classes during the fiscal year. The relative performance was mainly driven by the U.S. equity managers' returns relative to their given benchmarks. It has been a difficult year for active management as 79% of U.S. equity portfolios failed to outperform the broad U.S. stock market. Despite the short-term underperformance, the investment program has ranked in the top decile, relative to public pensions with assets greater than $1 billion, over the trailing three-, five-, and 10-year periods. Favorable asset allocation strategy and implementation, specifically a meaningful allocation to U.S. equity, propelled TRS to near the top of its peer universe rankings.

Over the first half of the fiscal year, the equity markets experienced volatility due to slowing global growth and ongoing trade wars. The prospects of looser monetary policy by major central banks led to a rebound in the equity markets in the second half of the fiscal year. The top performing region in the equity market was the United States. The U.S. equity portfolio advanced 6.5%, while the international equity component declined 0.7% for the fiscal year. From a style perspective, growth stocks continued to perform better than their value counterparts.

In the bond market, the 10-year U.S. Treasury yield ended the fiscal year at 2%, 85 basis points lower than the beginning of the fiscal year. The decline in interest rates resulted in a positive return of 8.6% for the fixed income portfolio, which outperformed the Bloomberg Barclays U.S. Government/Credit Index by about 10 basis points for the fiscal year. The additional categories asset class, which is generally comprised of alternative fixed income, private credit and below investment grade bonds, produced an absolute return of 7.5% for the fiscal year.

TRS's initiatives to diversify the real estate allocation also benefitted performance with the value-added and opportunistic portfolios producing double-digit gains as the returns on core real estate continued to moderate during the fiscal year. In addition to real estate, TRS has diversified its alternatives portfolio across private equity and infrastructure strategies over the past 10 years, resulting in a fiscal year return of 10.6% on a time-weighted basis.

We would like to thank the Board of Trustees, Investment Committee, and investment staff for their confidence. We appreciate the opportunity to assist TRS in meeting its investment goals.

Respectfully,

Patrick J. Kelly

Patrick J. Kelly, CFA, CAIA
Partner

Brandon J. Patterson, CAIA
Senior Consultant

Aon
200 E. Randolph Street, Suite 1500 | Chicago, IL 60601
t +1.312.381.1200 | f +1.312.381.1366 | aonhewitt.com
Investment advice and consulting services provided by Aon Hewitt Investment Consulting, Inc., an Aon Company

Retirement Annuity Trust

Investment Policy Summary

The TRS Board of Trustees has a statutory obligation under KRS 161.430 to invest the members' assets in a manner consistent with the fiduciary standards set forth in the prudent person rule. Consistent with this statute, 102 Kentucky Administrative Regulation (KAR) 1:175 establishes investment policies for this trust. In conjunction with these standards, the board has recognized certain principles that guide investment-related decisions. First, the board will preserve the long-term corpus of the fund. Second, the board will seek to maximize total investment return within prudent risk parameters. Third, the board will act in the exclusive interest of the members and beneficiaries of the system. This broad summary is a reference point for management of retirement assets and outlines the investment philosophy and practice of TRS.

Investment Objectives

TRS invests the members' funds in several diverse classes of assets, including equities, bonds and real estate. This diversification helps us earn the highest possible long-term rate of return within appropriate risk levels. In turn, this enables TRS to pay guaranteed benefits to members and their beneficiaries at the lowest possible cost to participating employers and taxpayers. Generally, the retirement system's liabilities will not be paid for as many as 30 to 40 years. Therefore, as a long-term investor, TRS holdings can withstand some short-term volatility. The Retirement Annuity Trust's long-term investment objective is to achieve an annualized rate of return of 7.5%.

Risk Controls

The TRS investment program faces various risks; however, the primary risk to TRS is that the assets will not support liabilities over long periods of time. In order to control this risk and any other risks, the board has taken the following steps on an ongoing basis:

- Actuarial valuations are performed each year to evaluate the funding objectives of TRS. In addition, every 10 years an external audit of the actuary is conducted to ensure that the assumptions made and calculation methods used are resulting in properly computed liabilities of the system.
- Asset-liability modeling studies are conducted approximately every five years. These studies ensure that the portfolio design is structured to meet the liabilities of TRS.
- In accordance with 102 KAR 1:175, the Investment Committee adopts and regularly reviews detailed investment strategies for implementation of the investment policy.

Asset Allocation

Operating within relevant regulatory limitations, TRS's investment consultant annually presents for approval to the Investment Committee target percentages and ranges for the system's various asset classes. These regulatory limitations include both the Retirement Annuity Trust and the Life Insurance Trust. Annually approved asset allocation parameters serve to balance TRS's liquidity requirements, volatility tolerance and return requirements to meet both short-term and long-term obligations. TRS's assets are diversified across a variety of asset classes, investment management styles and individual securities in order to reduce volatility and enhance the potential of the investment portfolio to achieve the system's long-term goals.

Asset allocation decisions for pension plans are highly dependent on the unique characteristics of a particular plan. Factors such as liability requirements, the level of funding and statutory investment restrictions are important considerations within the context of the asset allocation decision making process. Consequently, asset allocations may differ markedly between various pension plans due to their unique circumstances.

The information that follows shows the system's asset allocation by fair value for the Retirement Annuity Trust and the Life Insurance Trust as of June 30, 2019, and 2018, as well as the target and strategic range for each asset class for fiscal year 2019.

Retirement Annuity Trust

	June 30, 2019*	Percent	June 30, 2018**	Percent
Cash equivalents***	$ 359,010,254	1.8	$ 236,645,496	1.2
Fixed income	3,435,032,446	17.0	3,036,033,540	15.3
Domestic equities	7,971,948,673	39.4	8,164,946,090	41.3
International equities	4,427,770,148	21.9	4,502,791,612	22.7
Real estate	1,223,062,000	6.0	1,150,694,282	5.8
Private equity	1,176,784,326	5.8	1,095,289,506	5.5
Timberland	182,590,093	0.9	187,540,820	1.0
Additional categories	1,455,807,805	7.2	1,428,742,753	7.2
Totals	$ 20,232,005,745	100	$ 19,802,684,099	100

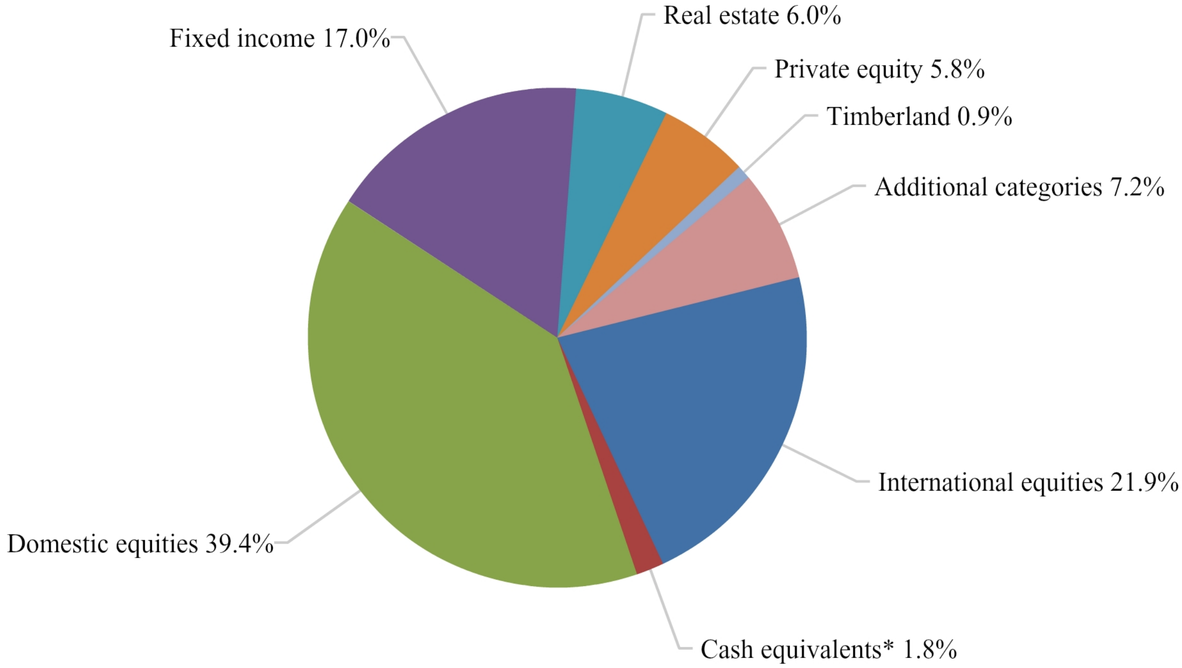
*Includes Tax Shelter Annuity value of $310,063 and 401(h) value of $22,754,728
**Includes Tax Shelter Annuity value of $337,897 and 401(h) value of $20,896,588
***Reflects only cash balances not allocated to other asset classes. Any uninvested manager cash balances are represented in the asset class of the respective managers.

Life Insurance Trust

	June 30, 2019	Percent	June 30, 2018	Percent
Cash equivalents*	$ 6,345,861	7.5	$ 3,110,722	3.7
Fixed income	26,556,641	31.2	48,373,370	58.1
Equities	48,669,442	57.1	29,960,859	36.0
Real estate	2,107,202	2.5	541,107	0.6
Alternative investments	48,510	0.1		
Additional categories	1,354,418	1.6	1,300,000	1.6
Totals	$ 85,082,074	100	$ 83,286,058	100

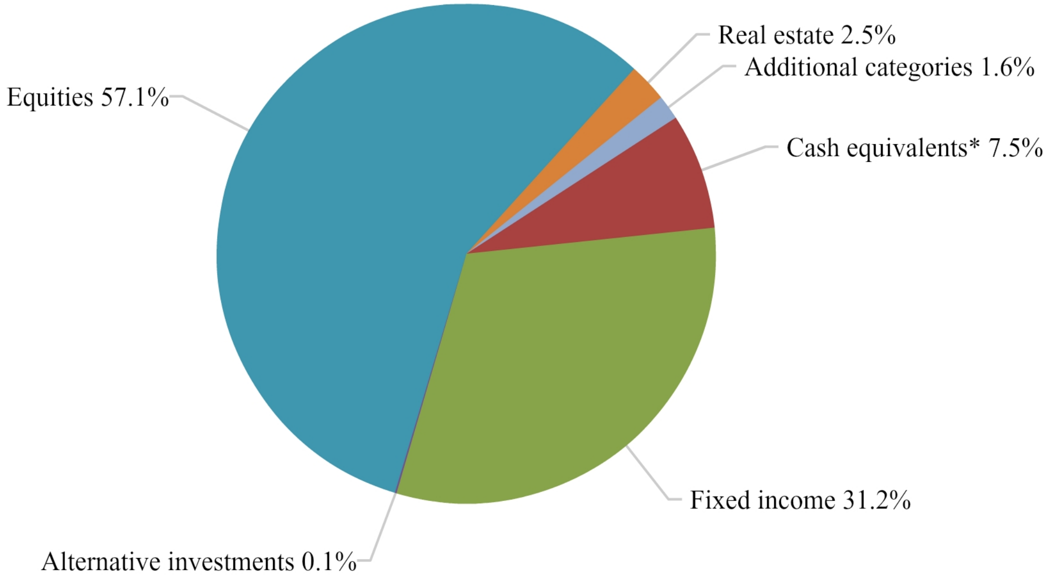
*Reflects only cash balances not allocated to other asset classes. Any uninvested manager cash balances are represented in the asset class of the respective managers.

Retirement Annuity Trust
Distribution of Investments — Fair Values as of June 30, 2019



*Reflects only cash balances not allocated to other asset classes. Any uninvested manager cash balances are represented in asset class of the respective managers.

Life Insurance Trust
Distribution of Investments — Fair Values as of June 30, 2019



*Reflects only cash balances not allocated to other asset classes. Any uninvested manager cash balances are represented in asset class of the respective managers.

Retirement Annuity Trust
Strategic Weightings by Asset Class

	Regulatory Limits (Fair Value)	Strategic Range (FV)	Target (FV)	June 30, 2019 (FV)*
Cash equivalents**		1-3%	2%	1.8%
Fixed income		12-19	15	17.0
Government/Agency/Other	Unlimited			10.1
Corporate	35%			6.9
Equity	65%	57-65	62	61.3
Domestic large cap		32-40	35	34.1
Domestic mid cap		1-5	3	3.3
Domestic small cap		1-3	2	2.0
International***	30%	18-25	22	21.9
Real estate	10%	4-10	7	6.0
Alternative investments*	10%	4-10	7	6.7
Additional categories	15%	4-10	7	7.2
Total			100%	100%

*Includes private equity and timberland.
**Reflects only cash balances not allocated to other asset classes. Any uninvested manager cash balances are represented in the asset class of the respective managers.
***As of June 30, 2019, 22.3% of total international equities were invested in emerging markets.

Portfolio Results

For the fiscal year, the Retirement Annuity Trust portfolio generated a total return of 5.9%, falling behind the policy benchmark return of 7.44%. Domestic equities returned 6.48% versus 9.32% for the Standard & Poor's 1500 Index, while international equities returned -0.64% versus 1.8% for the MSCI All Country World ex-U.S. Index. Fixed income investments outperformed, returning 8.61% versus 8.52% for the Bloomberg Barclay's U.S. Government/Credit Index. Less traditional asset classes such as real estate, private equity, timberland and alternative credit are beginning to contribute meaningfully to total return as those programs are expanded.

The table below details historical performance for the Retirement Annuity Trust and its component asset classes for the period ended June 30, 2019. The Retirement Annuity Trust returns were generated by the Segal Marco Advisors performance reporting system using a time-weighted rate of return calculation based upon fair values. TRS began separate reporting of its Life Insurance Trust effective Feb. 1, 2018. Previously, it was reported as part of the Retirement Annuity Trust's gross and net performance. Gross and net of fee performance reports for the Life Insurance Trust will be constructed for future CAFRs when the trust has enough history to warrant such schedules.

Retirement Annuity Trust
Schedule of Investment Results — Gross

	1-Year	3-Year*	5-Year*	10-Year*	20-Year*
Total Plan	**5.90**	**10.62**	**7.08**	**10.33**	**6.00**
Policy benchmark**	7.44	10.22	7.04	10.15	
Equities	**3.88**	**13.06**	**7.81**	**12.65**	**5.50**
Domestic equity	**6.48**	**13.97**	**9.63**	**14.41**	**6.27**
S&P 1500 Index	9.32	13.91	10.45	14.73	
All cap equities	**6.95**				
Russell 3000 Index	8.98				
Large cap equities	**7.30**	**14.20**	**9.76**	**14.25**	
S&P 500 Index	10.42	14.19	10.71	14.70	
Mid cap equities	**5.42**	**14.16**	**9.76**	**15.48**	
S&P 400 Index	1.36	10.90	8.02	14.64	
Small cap equities	**-3.34**	**11.87**	**8.38**	**15.56**	
S&P 600 Index	-4.88	11.97	8.41	14.99	
International equity	**-0.64**	**11.48**	**3.92**	**8.31**	
MSCI AC World ex U.S. Index	1.80	9.91	2.65	7.03	
Fixed income	**8.61**	**2.86**	**3.51**	**4.87**	**5.61**
Bloomberg Barclay's U.S. Government/Credit Index	8.52	2.41	3.11	4.09	5.03
Total real estate	**8.77**	**10.18**	**11.13**	**9.04**	**9.43**
In-house real estate equity	**7.97**	**10.69**	**9.87**	**8.84**	**8.96**
CPI plus 2%	3.69	4.10	3.51	3.78	4.17
Core real estate	**8.63**	**8.21**	**10.58**	**9.01**	
NCREIF ODCE Index (VW)	6.40	7.57	9.76	9.88	
Non-core real estate	**10.05**	**11.97**	**15.04**		
NCREIF Property Index	6.50	6.89	8.83		
Alternative investments					
Private equity	**12.00**	**14.74**	**12.10**	**13.41**	
Mature private equity	**9.92**	**11.62**	**9.84**		
S&P 500 Index plus 3%	13.73	17.61	14.03	18.14	
Private equity < 5 Years	**13.18**	**17.37**	**13.82**		
Timberland	**3.09**	**1.11**	**4.05**	**2.97**	
NCREIF Timberland Index	3.17	3.36	4.66	4.00	
Additional categories	**7.57**	**7.30**	**4.20**		
BofA Merrill Lynch U.S. High Yield Master II Index	7.58	7.54	4.70		
Cash (unallocated)	**2.25**	**1.41**	**0.91**	**0.52**	**1.99**
90-day Treasury Bill	2.31	1.37	0.85	0.47	1.75
Total 30-year trust return*	**8.13**				

*Returns are annualized for periods longer than one year.
**Overall fund performance is compared to a board-approved benchmark, first established in July 2008, that represents the returns of appropriate benchmarks for the various asset classes weighted by the midpoint of the strategic range for the current fiscal year.

Retirement Annuity Trust
Schedule of Investment Results — Net of Investment Fees and Expenses

2019	5.56%
2018	10.50
2017	15.00
2016	-1.32
2015	4.96
2014	17.95

Life Insurance Trust
Schedule of Investment Results — Net of Investment Fees and Expenses

2019	6.49%

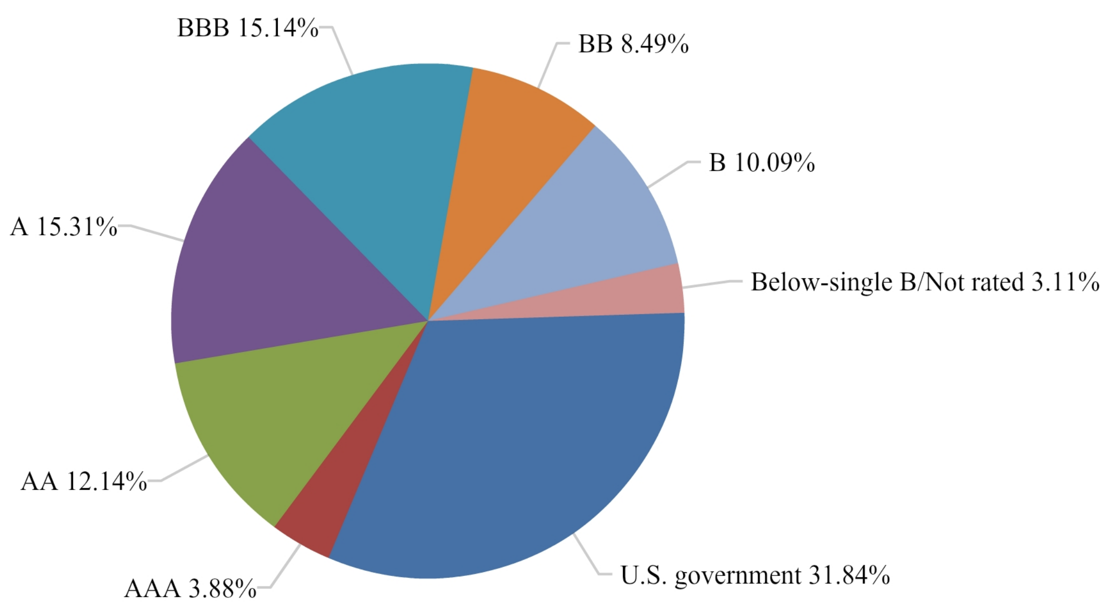
Fixed Income Investments

As of June 30, 2019, the Retirement Annuity Trust had about $3.44 billion, which is 17% of total assets, in fixed income. The fund's fixed income investments as of June 30, 2019, maintained the average investment grade rating required by administrative regulation.

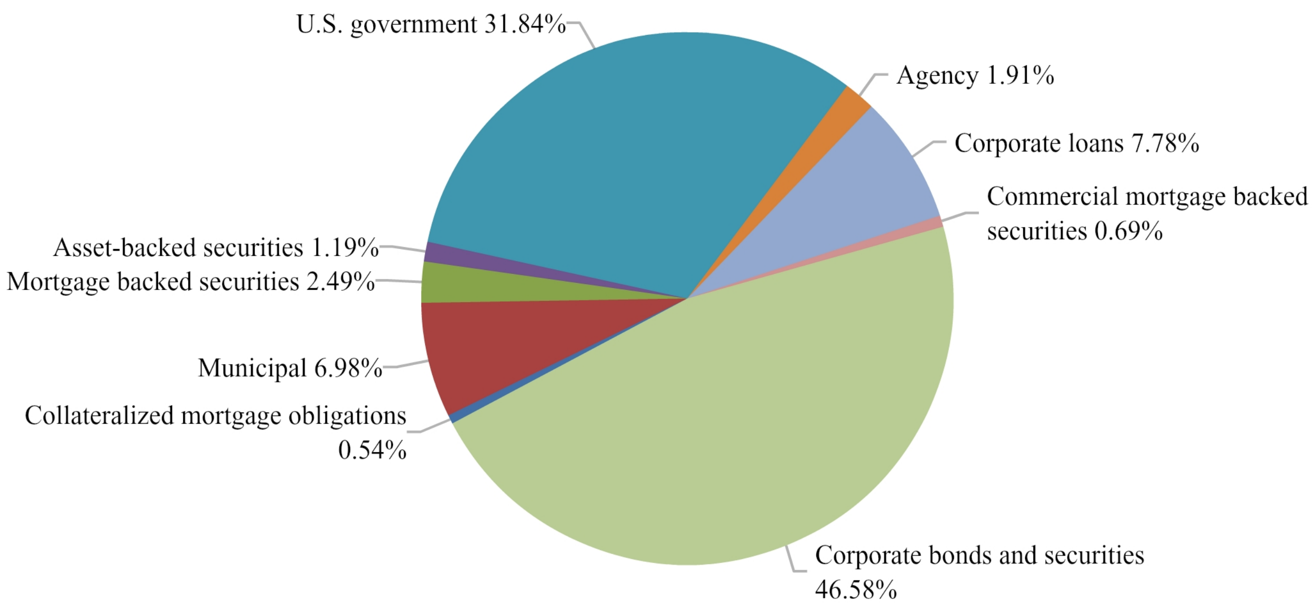
In addition, the annuity trust had $1.46 billion, which is 7.2% of total assets, in other debt-related investments under a regulatory provision that allows up to 15% of assets in additional categories approved by the board. Investments under this authorization included two high-yield bond portfolios and two syndicated bank loan portfolios. Several alternative credit portfolios also are under this additional categories provision, including a multi-strategy opportunistic credit portfolio, a distressed debt fund and a specialty lending fund.

The credit quality distribution for the annuity trust is illustrated below. This chart includes the fixed income category of investments as well as the high-yield bonds, international fixed income and the syndicated bank loan portfolios that are included in additional categories. Also illustrated below is the distribution of fixed income assets by sector, including, again, high yield bonds, international fixed income and the syndicated bank loan portfolios held under additional categories.

Fixed Income Quality Distribution By Rating



Fixed Income Sector Distribution



Fixed Income Market Overview

The Retirement Annuity Trust's investment-grade fixed income portfolios returned 8.61% for the year ended June 30, 2019. This compares favorably to the trust's fixed income benchmark, the Bloomberg Barclays U.S Government/Credit Index, which returned 8.52%. The outperformance was driven by the system's overweighting in corporate bonds, which provided a higher coupon than government bonds of similar duration.

The Federal Reserve's Open Market Committee (the Fed) targets an overall annual inflation rate of 2%, a pace it views as appropriate for economic growth and price stability. Inflation, as measured by the year-over-year change in consumer prices ended the fiscal year at a rate of 1.6%, and the Fed's preferred measure of inflation, the core personal consumption expenditures (PCE) measure, finished the year at a rate of 1.56%. With both measures running below the Fed's stated inflation objective, the Fed has been able to be patient in normalizing interest rates. The upper bound of the Fed's target for the rate remained at 2.5% as the fiscal year closed. A Fed favoring low interest rates and slowing economic growth, both domestically and abroad, continued to drive Treasury yields down during the last quarter of the fiscal year. In March, the yield curve inverted for the first time and remained inverted through the end of the fiscal year, bringing talks of a recession. Based on current Treasury yields, the market is expecting two to three more rate cuts by the end of calendar 2019.

Economic growth as measured by gross domestic product (GDP) was up 3.1%, in the first quarter of fiscal 2019; however, a closer look indicated much of the contribution was attributable to increased inventory, which is not a sustainable growth driver. The second fiscal quarter of 2019 was varied through the period, starting strong but slowing late. Growth continued to be aided by the healthy labor market and tax cuts. Retail sales increased 3.2% year-over-year from May 2018 to May 2019, which is lower than the 6% seen in the middle of 2018. Housing prices increased 2.5%; however, this is the lowest increase in house prices in seven years. Entering fiscal year 2020, low mortgage rates should spur an increase in housing activity and refinancing. Manufacturing measures mostly were lower at the end of the fiscal year, as companies trade talks with China made companies more cautious.

Global risk assets (non-U.S. Treasurys) continued to rally over the second half of the fiscal year. Gains across most risk assets occurred, despite slowing economic indicators along with negative headlines surrounding China trade talks, threats of tariffs on Mexico and growing tension with Iran.

Investment-grade corporate spreads, as measured by the Moody's BAA index, widened by 0.09% in fiscal year 2019 to 1.93% over U.S. Treasurys of same duration and are trading at long-term averages. Industrials and utilities outperformed the financial sector, while longer duration corporates had much higher returns that shorter duration corporates. In the last quarter of the fiscal year, the Bloomberg Barclay's U.S. Capital Aggregate Index had the second-best quarter since 2011 with a return of 3.1%.

With U.S. Treasury rates and risk premiums on corporate bonds both still relatively near the low end of their historical ranges, investment-grade fixed income is an asset class with moderately unfavorable risk-reward characteristics and below-average upside potential. TRS continues to adjust the structure of its fixed income portfolio to control risk and maintain required liquidity. Specifically, the system continues to increase liquidity and exposure to U.S. Treasury investments and limit interest rate risk by being slightly short benchmark durations.

Equity Investments

As of June 30, 2019, the Retirement Annuity Trust's public equity investments had a fair value of $12.4 billion, representing 61.3% of total assets. The trust's U.S. equity portfolio returned 6.48% for the fiscal year and underperformed its policy benchmark by 2.84 percentage points. The annuity trust divides its public equity into two broad categories: domestic and international.

The domestic portfolio had a fair value of $7.97 billion as of June 30, 2019, representing 39.4% of total assets. The benchmark for the domestic portfolio is the Standard & Poor's (S&P) 1500. The S&P 1500 is made up of three well-known component indices based upon market capitalization: the S&P 500 Large Cap, S&P 400 Mid Cap, and the S&P 600 Small Cap. Twelve portfolios comprise the trust's domestic equity holdings. Three are internal passively managed index portfolios benchmarked to the S&P 400, S&P 500 and S&P 600. The other nine portfolios are managed externally by five different asset managers, with each portfolio representing a specific strategy and measured against an appropriate benchmark. The collective array of portfolios provides diversification by market capitalization, manager, style and strategy.

The fair value of the international equity holdings as of June 30, 2019, was $4.42 billion, representing 21.9% of total assets. The Retirement Annuity Trust's international equity portfolio returned -0.64%, a 2.44% underperformance of its policy benchmark, the MSCI All Country World ex-U.S. Index that represents the markets of 22 developed countries and 26 emerging-market countries. Six external asset managers manage the Retirement Annuity Trust's international equities, one of which is a passively managed international index fund.

Equity Investments Overview

In the first quarter of the fiscal year, continued domestic economic expansion coupled with shifts in monetary policy moved domestic equities and interest rates higher, while growth in international markets showed signs of weakness partly due to trade war tensions. Domestic economic data continued to show signs of strength with the unemployment rate at its lowest level since 1969 and hourly earnings increasing 2.8% year over year. In contrast, international growth slowed in both developed and developing markets. The S&P 500 returned 7.7%, due in part to increased capital expenditures and share repurchases by firms utilizing last year's tax cut. The Federal Reserve increased the federal funds rate by a quarter of a percent, increasing the target range to 2% to 2.25%. This first quarter for the S&P 500 was the best single quarter return since 2013. Both growth- and value-oriented investment styles did well, with large-cap growth stocks being the strongest segment while small-cap value stocks posted their weakest performance. Internationally, the MSCI Europe, Australasia and Far East (EAFE) Index returned 1.4% in the first quarter - with growth outperforming value internationally but underperforming in emerging markets. Developed markets outperformed developing markets and small-cap stocks underperformed large-cap stocks internationally. The U.S. Dollar Total Weighted Index appreciated slightly.

During the second quarter, equity markets experienced a high level of volatility and negative returns due to a combination of macroeconomic trends - including expectations of inflation, corporate earnings and international growth forecasts - all showing signs of weakness. The S&P 500 recorded intraday swings of more than 1% four out of every five trading days on average. The second quarter for the S&P 500 was ranked among the worst 15 quarters the index has posted since 1970. The S&P 500 returned -13.5% while the MSCI EAFE returned -12.5%. Domestically, growth stocks outperformed value stocks and, internationally, value stocks outperformed growth stocks. In a somewhat controversial move, the Federal Reserve increased the discount rate, for the fourth time in 12 months, by another quarter percent. Domestic economic fundamentals remained strong, with unemployment increasing only 0.2% to 3.9%. The price of West Texas Intermediate (WTI) crude oil dropped to $45 after a peak in the previous quarter of over $75. While economic data in the fourth quarter remained relatively strong some leading indicators began to show signs of weakness. Declining oil prices and consumer confidence, along with a restrained housing market began to increase negative market sentiment. The housing sector dropped sharply in response to rising mortgage rates and moderating home price increases. In France, the "yellow vest" protests over rising fuel prices and a high cost of living, resulted in the French government scrapping a planned fuel tax increase. Germany, Europe's largest economy, entered into a bear market, and the standoff between Italy and the European Union on Italy's proposed budget deficit rocked the Italian stock market. Japan also entered a bear market. Developing equity markets outperformed developed equity markets. The U.S. Dollar Total Weighted Index appreciated

The third quarter began with a substantial global equity market rally in part driven by the Federal Open Market Committee developing a more supportive posture by keeping rates steady and limiting quantitative tightening. Volatility levels declined while equity prices rapidly recovered from December's activity. The S&P 500 returned an impressive 13.6%, which was the best third quarter return since 1998, but it was not enough to undo the effects of the second quarter. The yield curve briefly inverted between the three-month and the 10-year maturities, with a Wall Street Journal survey of economists indicating an increasing chance of a recession occurring within the next 12 months. Even so, the labor market continued to stay tight, with the unemployment rate down to 3.8% and average hourly earnings increasing. The quarter was led mostly in January and February with the technology-centered Nasdaq composite outperforming the S&P 500 and Dow Jones Industrial Average. Technology stocks outperformed while health care stocks underperformed. Mid-cap stocks outperformed both small- and large-cap stocks. Internationally, the MSCI EAFE returned 10% with growth stocks significantly outperforming value stocks and small-cap stock returns exceeding large-cap stock returns with all sectors showing positive returns. In Europe, the scheduled exit of the United Kingdom from the European Union (Brexit) was delayed, and the 10-year German bond had a negative yield for the first time since 2016. Despite trade war tensions and a slowing gross domestic product (GDP), China led developing markets to deliver similar returns to developed markets. The U.S. Dollar Total Weighted Index stayed constant.

In the fourth quarter, equity assets continued their price appreciation that began in the third quarter despite heightened volatility and geopolitical risks. S&P 500 returns in April were trending upward but then reversed in May, bringing the index to levels seen before the second quarter sell-off. Although interest rates had been steadily rising from record lows, many economists began forecasting multiple rate cuts, and the 10-year Treasury bond yield dropped below 2%. Trade disputes continued with the U.S. Department of Commerce restricted Huawei from doing business in the United States, adding to U.S.-China trade tensions. While temporary, this short-term resolution in the China-U.S. trade war helped calm the technology sector. The S&P 500 returned 4.3% with growth slightly outperforming value while large cap outperformed small cap. All sectors excluding energy had positive returns, with the financial sector having the highest return even with a flattened yield curve. The only major asset class to produce a negative return was commodities. Internationally, the MSCI EAFE lagged the S&P 500 and returned 3.7%. U.S. earnings growth remained positive while international profit growth turned negative. International stocks were like domestic stocks, with growth and large-cap stocks also outperforming value and small-cap stocks, respectively. The U.S. Dollar Total Weighted Index depreciated slightly.

In summary, the U.S. equity markets experienced periods of increased volatility relative to prior years. While the U.S. economy continued to extend this cycle, various cracks emerged. Talks of a recession increased as various points on the curve inverted for the first time this cycle. Inflation remained near the low end of the Fed's stated goals, driven by low commodities and wages. U.S. monetary policy reversed from a tone favoring increasing interest rates in the first half of the fiscal year to a stance more favoring lower interest rates. Internationally, the world's major central banks, acknowledging the weak global backdrop, shifted their tone more clearly toward an easing bias. Geopolitical risk was elevated as the escalation of U.S.-China trade tensions provided an additional source of concern about the global growth slowdown. Domestic equity valuations ended the year more attractive than global equities, but that divergence was diminished somewhat after global fundamentals and valuations improved.

Real Estate

The Retirement Annuity Trust's real estate investments had a $1.22 billion fair value as of June 30, 2019, representing 6% of total assets. The goals of the trust's real estate investments are providing attractive long-term returns, generating reliable cash flow and providing diversification to reduce volatility in the overall portfolio. The annuity trust's real estate portfolio outperformed its benchmarks for the fiscal year. The in-house category beat the consumer price index (CPI) plus 2% returning 7.97% vs. 3.69%; core funds outperformed the National Council of Real Estate Investment Fiduciaries (NCREIF) Fund Index Open End Diversified Core Equity (NFI-ODCE) 8.63% to 6.4%; and non-core funds bested the NCREIF Property Index 10.05% to 6.5%.

Sixteen portfolios comprise the annuity trust's real estate exposure. The fund maintains an internally managed portfolio of directly owned properties under long-term lease agreements with high credit-quality tenants. TRS Kentucky also is invested in two commingled, evergreen real estate funds managed by Prudential Real Estate Investors (PRISA) and TA Realty (TA Core Property Fund). These funds are core real estate equity funds that invest primarily in existing income-producing properties with strong cash flows and the potential for capital appreciation. The funds are diversified across several property types including office, retail, industrial, apartment, self-storage and hotel.

Additionally, the annuity trust is invested in Carlyle Property Investors, a core-plus commingled fund and 12 real estate limited partnerships: Carlyle Realty Partners VI, Carlyle Realty Partners VII, Carlyle Realty Partners VIII, Blackstone Real Estate Partners VII, Blackstone Real Estate Partners VIII, Rockwood Capital Real Estate Fund IX, Rockwood Capital Real Estate Fund X, TA Realty Associates Fund X, TA Realty Associates Fund XI, AG Net Lease Realty Fund III, Landmark Real Estate Partners VII and Landmark Real Estate Partners VIII.

Real Estate Overview

The real estate market once again generally remained steady. Risks present at this stage in the cycle include the general risk of recession. Economic growth has been slowing globally over recent months, and the pricing in the bond market indicates that market participants are concerned about a persistent low level of growth in the U.S. market.

The U.S. real estate market is divided into various sectors and geographies, each of which presents different risks and is at different cycle positions. Within that framework, however, a couple of basic geographic and sector-related themes are seen.

With respect to geography, demand generally is stronger in the southern half of the country. Census data indicates that a handful of states in the northern half are losing population, including New York, New Jersey, Connecticut and Illinois. By contrast, significant, steady increases are seen in the Southeast and Texas, among others. The change to limit the deduction of state and local income taxes from federal taxes has accelerated the trend.

In terms of sectors, beyond the population movements noted previously, the behavior of millennials and baby boomers continues to result in above-standard growth in specific housing sectors, including multifamily, manufactured housing, self-storage, active adult, lab/life science and medical office. Of increasing interest is the baby boomer population moving into its 70s. That population between 70 and 74 will grow over 4% annually in the coming decade.

While these sectors present stronger growth, compared to sectors linked to gross domestic product (GDP) - office hotel, retail and industrial, data also indicates that they potentially have lower volatility and, therefore, risk. The belief is that these sectors are less correlated with GDP; have higher operating margins and lower ongoing required capital expenditures; and present a longer average length of stay among their tenants, causing landlords to experience less frictional vacancy. Those conditions allow owners to experience more predictable cash flows and produce more pricing power (i.e., traction in rents).

Deep into the expansion, it can be prudent to focus on shorter-duration assets. These properties allow TRS to maintain its real estate allocation while increasing exposure to higher quality, income-producing properties with higher levels of liquidity and shorter commitment periods. To this end, a core and core-plus fund have been added to the portfolio recently.

If a recession were to occur, it would not be led by the real estate sector for several key reasons. First, construction levels remain generally muted and are forecasted to decelerate in several U.S. markets over the next 24 months. Total construction activity presents lower levels at this stage of the expansion when compared to almost any prior cycle. Second, debt levels remain below prior peaks in 2007. As a percentage of GDP, commercial real estate debt has not seen any material growth during the 2010-2019 period. Conditions were starkly different in the 1990 and 2007 real estate-led recessions when commercial real estate outstanding grew dramatically. Lastly, capital markets generally remain steady. An open question related to cap rates is whether they possibly could drop further with the recent drop in U.S. Treasury yields. TRS does not count on that as an investor, but attention is paid to whether that yield drop could lead to higher prices with core assets. That said, it is worth noting that private fundraising in the United States hit a five-year low in the fourth quarter of the fiscal year; and investor cash flows into NFI-ODCE funds were negative in the fourth fiscal quarter. (Redemptions exceeded contributions by about $850 million.) Even so, the possibility exists for a potential associated volume premium in the market for portfolios and platform investments. Larger transactions seem to be attracting fully priced bids, especially in sectors that present demographic tailwinds (self-storage, manufactured housing and active adult).

Compared to other asset classes, real estate returns appear to be normalizing. For instance, the retirement annuity's core real estate returns were in the high single digits over the past 12 months while the Standard & Poor's 500 was up 10.42%.

Alternative Assets
As of June 30, 2019, the Retirement Annuity Trust's alternative investments portfolio had a fair value of $1.36 billion, which represented 6.7% of total assets. The retirement annuity's current alternative investments portfolio consists of private equity investments and timberland.

Private Equity
The Retirement Annuity Trust has exposure to venture capital, buyout, infrastructure, energy, mezzanine and several other private equity sectors via participation in limited partnerships as well as investments in funds of funds. The annuity trust has a relatively young private equity investment program, which it intends to continue to grow with a disciplined plan of commitments each year. The trust looks to diversify its private equity portfolio by manager, country, strategy and vintage year. Vintage year diversification is achieved by building the portfolio with disciplined levels of commitments over time. A commitment to any given partnership shall not exceed 20% of the partnership's total commitments.

The board, Investment Committee and staff understand that private equity investments (along with many other forms of alternative assets) are illiquid and have a long-term holding period. When added to a portfolio with other publicly traded assets, this asset class can help to diversify and reduce risk for the Retirement Annuity Trust's overall portfolio while enhancing returns. Private equity returns for the first several years of a partnership's life are routinely negative due to the J-curve (initial losses followed by significant gains) effect. Positive returns typically are realized only several years into a partnership's existence, during the harvesting period.

Private Equity Market Overview
Private equity markets are positively affected by strong public equity markets. When public markets are strong, a high number of private equity portfolio companies are sold. The past fiscal year has seen an active initial public offering market as the public markets continued to perform well. However, as result of the strong public equity markets the entry price for private equity portfolio companies has risen forcing many managers to pay higher multiples for underlying portfolio companies or to put their dry powder to work at a much slower pace that in the past.

The past fiscal year was a period of continued heightened interest in the private equity markets as investors continued to search for return in a lower-rate environment. Investors continued to increase their commitment amounts while also paring the number of managers in their portfolios, investing with only the highest quality managers. The past fiscal year also has seen large buyout funds returning to the marketplace. TRS has begun to see opportunities in specialty funds such as information technology-focused and structured secondary funds, as well as continuing to build out the core private equity portfolio.

Timberland
In addition to private equity, the Retirement Annuity Trust has invested in timberland in the alternative investments class. As of June 30, 2019, the retirement annuity owns approximately 73,000 acres of timberland outright, has a 7.15% interest in a commingled fund that holds about 98,000 acres of timberland and is a member of a joint venture that purchased an interest in approximately 124,000 acres of timberland located across seven southern states. Timberland is, by nature, a long-term investment as the anticipated time horizon in this asset category generally is a minimum of 10 to 15 years. Timberland provides valuable diversification, current income and a balance against inflation. Due to the low correlation of returns with other asset classes, timberland investments typically lower the overall volatility of the retirement trust's portfolio. Timberland should earn real returns comparable to traditional equity investments with volatility between equities and fixed income over the long term.

The Retirement Annuity Trust diversifies its timberland investments by geography, species of trees and maturity of timber stands. Investment returns from timberland are driven primarily from net cash flow generated from the sale of trees (referred to as stumpage sales) and capital appreciation from the biological growth of the trees. These return factors depend, to some degree, upon the direction of forest commodity prices (paper goods and lumber products). Gains also can be seen from the timely sale of timberland through the conversion of timberland into higher and better uses, such as vacation property sales.

Timberland Market Overview
Abnormal weather conditions across the United States were a major factor for timberland investors in the last fiscal year. Precipitation spanning most of the last fiscal year was the highest recorded in U.S. history. Wet conditions hampered operations in some regions while also providing opportunities for increased pricing in others. Some pine-using facilities in the South experienced shortages of wood due to a reduction in harvest activity. Several mills offered premiums well above market pricing to sellers for wood to keep their facilities running.

The U.S.-China trade war negatively affected the export market, especially the hardwood segment. Softwood log and lumber exports to China were strong and growing before tariffs caused a sharp decline in the last fiscal year.

Timberland transaction activity increased significantly in the last fiscal year. Several large packages were brought to market and ultimately traded or are currently pending. Pricing on high-quality properties was promising with some trading at a significant premium to comparable sales. Lower-quality properties were less in demand and more difficult to transact.

Retirement Annuity Trust
Fair Values as of June 30, 2019

Internally Managed	
Cash equivalents (unallocated)	$ 359,010,254
Fixed income	
Broad Market Bond	739,897,253
Intermediate Bond	597,042,557
Internal Bond	176,129,759
Long Term Bond	759,999,548
403(b) Tax-Sheltered Trust	310,063
Equity	
S&P 400 Stock Index	298,464,745
S&P 500 Stock Index	2,342,231,061
S&P 600 Stock Index	224,507,258
In-house Real Estate	424,559,554
Subtotal	$ 5,922,152,052
Externally Managed	
Fixed income	
Galliard Capital Management Core Fixed Income	$ 580,968,817
Fort Washington Core Fixed Income	580,684,450
Domestic equity	
Fort Washington Focused Equity	334,604,620
State Street US Premier Growth Equity	707,304,054
Todd Asset Intrinsic Value Opportunity (Alpha)	457,812,433
Todd Asset Large Cap Intrinsic Value	1,202,589,897
UBS Alpha Equity	282,282,783
UBS Value Oriented (Global)	921,858,058
Wellington Large Cap Equity	640,221,131
Wellington Mid Cap Equity	368,888,502
Wellington Small Cap Equity	191,184,131
International equity	
Baillie Gifford EAFE	1,167,384,685
Barings All Country World Ex US	697,740,793
BlackRock MSCI ACWI Ex US IMI Index	678,969,096
Todd Asset International Intrinsic Value	829,250,167
Todd Asset International Intrinsic Value Opportunity	89,262,575
UBS All Country World Ex US Equity	965,162,832
Real estate	
Angelo Gordon Net Lease Realty III	48,027,490
Blackstone Partners VII	29,533,525
Blackstone Partners VIII	42,175,087
Carlyle Realty Partners VI	6,567,896
Carlyle Realty Partners VII	28,630,937
Carlyle Realty Partners VIII	4,061,468
Carlyle Property Investors	58,310,633
Landmark Real Estate Partners VII	25,695,725
Landmark Real Estate Partners VIII	9,895,722
Prudential PRISA	361,063,126
Rockwood Capital Real Estate IX	$ 17,579,948
Rockwood Capital Real Estate X	36,580,861
The Realty Associates X	23,369,639
The Realty Associates XI	52,058,140
TA Realty Core Property	54,952,249
Alternative investments	
Actis Global IV	50,648,348
Alinda Infrastructure II	22,675,347
Apax VIII	23,011,845
Apax IX	31,489,972
Apax Digital	11,582,144
Audax Mezzanine III	4,068,553
Audax Mezzanine IV	9,294,989
Audax Private Equity IV	13,038,842
Audax Private Equity V	20,456,390
CapitalSouth Partners III	802,878
Carlyle Asia V	3,709,680
Carlyle Europe Partners IV	52,908,961
Carlyle Europe Partners V	3,768,358
Carlyle Global Financial Services Partners II	26,277,011
Carlyle Global Financial Services Partners III	7,841,949
Chrysalis Ventures III	9,070,519
Fort Washington V	5,992,331
Fort Washington VI	17,124,950
Fort Washington VIII	25,911,065
Fort Washington IX	13,124,964
Fort Washington IX-K	14,775,263
Fort Washington X	3,395,598
Gavea Investments V	7,845,918
Hancock Bluegrass - Oregon	29,003,667
Hellman & Friedman VII	65,931,587
Hellman & Friedman VIII	52,233,271
IFM Global Infrastructure	128,841,170
J.P. Morgan Maritime	31,720,242
J.P. Morgan Maritime II	12,400,198
J.P. Morgan Global Transport Income	49,674,834
KKR 2006	7,686,759
KKR European III	6,939,052
KKR European IV	51,721,343
KKR Americas XII	21,075,163
Landmark Equity Partners XIV	5,154,350
Landmark Equity Partners XV	11,132,938
Landmark Equity Partners XVI	3,853,096
Lexington Capital Partners VII	7,658,200
Lexington Capital Partners VIII	25,555,038
Molpus Woodlands Lake Superior	100,332,371
Molpus Seven States	53,254,054

Continued on next page

NGP Natural Resources X	$ 19,348,037	Columbia High Yield Bond	$ 181,101,025
NGP Natural Resources XI	47,917,282	Fort Washington High Yield Bond	329,227,160
NGP Natural Resources XII	14,263,071	Highbridge Specialty Loan III	11,816,702
Oaktree European Principal III	17,897,164	Marathon European Credit Opportunities II	40,577,316
Oaktree European Principal IV	50,186,921	Marathon European Credit Opportunities III	55,947,717
Oaktree Mezzanine III	972,134	Marathon TRS Credit	367,578,268
Oaktree Mezzanine IV	17,339,806	Oaktree European Capital Solutions	31,901,489
Public Pension Capital	71,080,589	Oaktree European Dislocation	1,894,527
Riverstone/Carlyle E & P IV	15,207,953	Oaktree Opportunities IX	36,725,389
Riverstone E & P V	16,550,942	Oaktree Opportunities X	23,641,708
Riverstone E & P VI	32,500,987	Oaktree Opportunities Xb	6,191,124
Stepstone Pioneer Capital III	13,126,324	Shenkman Capital Management	261,329,515
Additional categories		**Subtotal**	$ 14,309,853,693
Avenue Special Situations VI	7,835,865		
Barings European Loan	100,040,000	**Total***	$ 20,232,005,745

*Includes 403(b) Tax Sheltered Trust of $310,063 and 401(h) value of $22,754,728.

Life Insurance Trust
Fair Values as of June 30, 2019

Internally Managed		Externally Managed	
Cash equivalents (unallocated)	$ 6,345,861	**Domestic equity**	
		Fort Washington Focused Equity	$ 506,344
Fixed income		**International equity**	
Broad Market Bond	26,556,641	BlackRock All Country World ex US IMI	17,017,947
		Baillie Gifford EAFE	1,018,962
Equity			
S & P 400 Stock Index	2,555,620	**Real estate**	
S & P 500 Stock Index	27,086,149	Carlyle Property Investors	1,008,157
S & P 600 Stock Index	484,420	TA Realty Core Property	1,099,045
Subtotal	$ 63,028,691		
		Alternative investments	
		Fort Washington X	48,510
		Additional categories	
		Marathon TRS/Credit	1,354,418
		Subtotal	$ 22,053,383
		Total	$ 85,082,074

Retirement Annuity Trust
Investment Summary — Fair Values*
as of June 30, 2019

	Fair Value June 30, 2018	Acquisitions	Appreciation (Depreciation)	Sales Redemptions, Maturities & Paydowns	Fair Value June 30, 2019
Cash equivalents	$ 424,190,022	$ 5,778,710,806	$	$ 5,501,885,200	$ 701,015,628
Fixed income	2,983,975,575	2,735,933,765	158,019,511	2,650,254,078	3,227,674,773
Real estate	1,150,694,282	131,869,693	47,848,479	107,350,454	1,223,062,000
Alternative	1,282,830,325	418,120,313	140,852,237	482,428,456	1,359,374,419
Equities	12,544,141,125	3,375,062,938	267,664,788	3,898,319,590	12,288,549,261
Additional categories	1,416,514,873	467,868,023	37,102,357	489,465,651	1,432,019,602
Total	$ 19,802,346,202	$ 12,907,565,538	$ 651,487,372	$ 13,129,703,429	$ 20,231,695,683

*Includes 401(h) value of $22,754,728

Life Insurance Trust
Investment Summary — Fair Values
as of June 30, 2019

	Fair Value June 30, 2018	Acquisitions	Appreciation (Depreciation)	Sales Redemptions, Maturities & Paydowns	Fair Value June 30, 2019
Cash equivalents	$ 3,724,036	$ 59,668,082	$	$ 49,941,016	$ 13,451,102
Fixed income	47,825,436	9,207,224	1,291,455	38,465,071	19,859,044
Equities	29,895,479	16,084,428	2,323,904	42,013	48,261,798
Real estate	541,107	1,500,023	72,543	6,471	2,107,202
Alternative investments		50,000	(501)	989	48,510
Additional categories	1,300,000	77,687	19,469	42,738	1,354,418
Total	$ 83,286,058	$ 86,587,444	$ 3,706,870	$ 88,498,298	$ 85,082,074

Retirement Annuity Trust
Schedule of Investment Counselor Fees and Administrative Expenses in Basis Points
Fiscal Year June 30, 2019
(Dollars in thousands)

Investment Counselor Fees	Assets Under Management	Expense	Basis Points*
Equity manager(s)	$ 9,534,516	$ 16,437	17.2
Fixed income manager(s)	1,161,653	467	4.0
Real estate	798,502	10,239	128.2
Additional categories	1,455,808	9,041	62.1
Alternative investments	1,359,374	20,899	153.7
Subtotal	$ 14,309,853	$ 57,083	39.9
Administrative Expenses**		4,083	2.0
Total		$ 61,166	30.2

*One basis point is one hundredth of 1% or the equivalent of 0.0001. Total basis points is weighted.
**Basis points for administrative expenses are calculated against the $20.2 billion in assets under management for the trust.

Life Insurance Trust
Schedule of Investment Counselor Fees and Administrative Expenses in Basis Points
Fiscal Year June 30, 2019
(Dollars in thousands)

Investment Counselor Fees	Assets Under Management	Expense	Basis Points*
Equity manager(s)	$ 18,543	$ 10	5.7
Real estate	2,107	10	
Alternative investments	49		88.0
Additional categories	1,354	13	92.8
Subtotal	$ 22,053	$ 33	15.1
Administrative Expenses**		140	16.4
Total		$ 173	20.3

*One basis point is one hundredth of 1% or the equivalent of 0.0001.
**Basis points for each type of administrative expense are calculated against the $85.1 million in assets under management for the trust.

Retirement Annuity Trust
Schedule of Investment Counselor Fees and Administrative Expenses
Fiscal Year Ended June 30, 2019

Investment Counselor Fees	
Fixed income	
Galliard Capital Management Core Fixed Income	$ 275,031
Fort Washington Core Fixed Income	192,000
Total fixed income	467,031
Domestic equity	
State Street US Premier Growth Equity	800,000
Fort Washington Focused Equity	1,073,562
Todd Asset Management	875,892
UBS Global Asset Management	1,667,690
Wellington Management Company	3,285,979
Total domestic equity	7,703,123
International equity	
Baillie Gifford EAFE	3,989,302
Barings All Country World ex US	2,821,240
BlackRock MSCI ACWI ex US IMI Index	378,704
Todd Asset Management	479,772
UBS All Country World ex US Equity	1,065,145
Total international equity	8,734,163
Real estate	
Angelo Gordon Net Lease Realty III	928,429
Blackstone Partners VII	349,868
Blackstone Partners VIII	750,000
Carlyle Realty Partners VI	164,045
Carlyle Realty Partners VII	475,984
Carlyle Realty Partners VIII	633,924
Carlyle Property Investors	368,933
Landmark Real Estate Partners VII	500,000
Landmark Real Estate Partners VIII	500,000
Prudential PRISA	2,686,040
Rockwood Capital Real Estate IX	521,450
Rockwood Capital Real Estate X	650,088
The Realty Associates X	475,508
The Realty Associates XI	1,012,915
TA Realty Core Property	222,076
Total real estate	10,239,260
Alternative investments	
Actis Global Fund IV	699,940
Alinda Infrastructure Fund II	171,870
APAX VIII	324,079
APAX IX	704,234
APAX Digital	1,855,013
Audax Mezzanine III	90,584
Audax Mezzanine IV	320,533
Audax Private Equity IV	
Audax Private Equity V	
CapitalSouth Partners III	2,671
Carlyle Asia Partners V	771,890
Carlyle Europe Partners IV	575,476
Carlyle Europe Partners V	543,097
Carlyle Global Financial Services Partners II	426,012
Carlyle Global Financial Services Partners III	750,000
Chrysalis Ventures III	146,035
Fort Washington V	58,549
Fort Washington VI	145,860
Fort Washington VIII	$ 126,000
Fort Washington IX	96,338
Fort Washington IX-K	96,338
Fort Washington X	29,838
Gavea Investments V	233,549
Hancock Bluegrass LLC - Oregon	238,359
Hellman & Friedman VII	106,352
Hellman & Friedman VIII	519,293
IFM Global Infrastructure	1,175,264
J. P. Morgan Maritime	567,483
J. P. Morgan Maritime II	207,329
J. P. Morgan Global Transport Income	323,299
KKR & Co Fund 2006	16,772
KKR & Co European III	3,129
KKR & Co European IV	436,637
KKR Americas XII	262,154
Landmark Equity Partners XIV	81,016
Landmark Equity Partners XV	300,000
Landmark Equity Partners XVI	1,266,438
Lexington Capital Partners VII	106,071
Lexington Capital Partners VIII	247,393
Molpus Woodlands Group Lake Superior Timberlands LLC	816,590
Molpus Seven States LLC	499,789
NGP Natural Resources X	392,825
NGP Natural Resources XI	684,168
NGP Natural Resources XII	686,985
Oaktree European Principal III	302,055
Oaktree European Principal IV	777,121
Oaktree Mezzanine III	23,184
Oaktree Mezzanine IV	285,218
Public Pension Capital LLC	1,281,879
Riverstone/Carlyle E & P IV	109,310
Riverstone E & P V	137,862
Riverstone E & P VI	744,036
Stepstone Pioneer Capital III	133,566
Total alternative investments	20,899,483
Additional categories	
Avenue Special Situations VI	
Barings European Loan	450,455
Columbia High Yield Bond	644,343
Fort Washington High Yield Bond	635,048
Highbridge Specialty Loan III	227,490
Marathon European Credit Opportunities II	595,172
Marathon European Credit Opportunities III	727,831
Marathon TRS Credit	3,363,085
Oaktree European Capital Solutions	353,053
Oaktree European Dislocation	33,816
Oaktree Opportunities IX	565,390
Oaktree Opportunities X	362,881
Oaktree Opportunities Xb	60,071
Shenkman Capital Management	1,022,012
Total additional categories	9,040,647
Total Investment Counselor Fees	$ 57,083,707

Continued on next page

Administrative Expenses		**Consultant**	
Custodian		Aon Hewitt	$ 413,850
The Bank of New York Mellon	$ 539,741	Bevis Longstreth	52,211
Legal and research		George Philip	33,256
Ice Miller	88,923	**Total Consultant**	499,317
Other		**Total Administrative Expenses**	$ 4,082,545
Other Administrative and Operational	2,954,564		
		Grand total	$ 61,166,252

Life Insurance Trust
Schedule of Investment Counselor Fees and Administrative Expenses
Fiscal Year Ended June 30, 2019

Investment Counselor Fees

Domestic equity	
Fort Washington Focused Equity	$ 1,708
International equity	
Baillie Gifford EAFE Alpha	2,741
BlackRock All Country World ex US IMI	6,083
Total international equity	8,824
Real estate	
Carlyle Property Investors	5,209
TA Realty Core Property Fund	4,522
Total real estate	9,731
Alternative investments	
Fort Washington X	427
Additional categories	
Marathon TRS Credit	12,567
Total Investment Counselor Fees	$ 33,257

Administrative Expenses

Custodian	
The Bank of New York Mellon	$ 28,623
Other	
Other Administrative and Operational	110,823
Total Administrative Expenses	$ 139,446
Grand total	$ 172,703

Retirement Annuity Trust
Ten Largest Stock Holdings Ranked by Fair Value*
June 30, 2019

		Fair Value	Percent of Equities
1	Microsoft Corp.	$ 207,490,912	1.67
2	Apple	197,103,976	1.59
3	Amazon.com	191,095,671	1.54
4	JP Morgan Chase and Co.	119,834,954	0.97
5	Facebook	115,929,117	0.93
6	United Health Group	101,349,798	0.82
7	The Walt Disney Co.	93,899,661	0.76
8	Alphabet Class C	86,065,297	0.69
9	Visa	84,067,620	0.68
10	Alphabet Class A	82,621,971	0.67

*Includes only actively managed separate accounts. Detailed information concerning the fair values of all TRS investments is available on the TRS website.

Retirement Annuity Trust
Ten Largest Fixed Income Holdings Ranked by Fair Value*
June 30, 2019

		Maturity	Coupon	Par Value	Fair Value	Percent of Fixed Income
1	U.S. Treasury Bond	Feb. 15, 2049	3.000	$ 70,981,000	$ 77,957,101	2.25
2	U.S. Treasury Note	Mar. 31, 2023	2.500	71,692,000	73,691,534	2.13
3	U.S. Treasury Note	May 15, 2028	2.875	65,000,000	69,796,289	2.01
4	U.S. Treasury Note	May 31, 2020	2.500	65,235,000	65,522,951	1.89
5	U.S. Treasury Note	Apr. 30, 2021	2.250	53,885,000	54,337,550	1.57
6	U.S. Treasury Note	Nov. 15, 2027	2.250	51,500,000	52,723,125	1.52
7	U.S. Treasury Note	Jan. 15, 2021	2.000	47,500,000	47,618,750	1.37
8	U.S. Treasury Note	Feb. 15, 2029	2.625	37,590,000	39,639,830	1.14
9	U.S. Treasury Bond	Aug. 15, 2023	6.250	31,900,000	37,584,680	1.08
10	U.S. Treasury TIPS	Jan. 15, 2029	0.875	35,597,938	37,469,004	1.08

*Detailed information concerning the fair values of all TRS investments is available on the TRS website.

Transaction Commissions Fiscal Year Ended June 30, 2019

Companies	Shares Traded	Commissions	Commission Per Share	Percent of Total
Abel Noser	14,766,575	$ 117,488	$ 0.008	9.27
Allen & Co.	28,088	658	0.023	0.05
Bank of America	101,658	2,027	0.020	0.16
Barclays	293,355	6,889	0.023	0.54
Blair, William & Co.	27,696	498	0.018	0.04
BMO Capital Markets	182,312	2,401	0.013	0.19
BTIG	167,468	4,953	0.030	0.39
Canaccord Genuity	31,004	642	0.021	0.05
Cantor Fitzgerald & Co.	20,708	615	0.030	0.05
CIBC Worldmarket	47,509	1,538	0.032	0.12
Citigroup Global	235,767	5,744	0.024	0.45
ConvergEx - Algos	16,584,760	83,643	0.005	6.60
ConvergEx - FS	2,014,505	19,118	0.009	1.51
ConvergEx - Transitions	5,264,500	48,128	0.009	3.80
ConvergEx ADR Conversions	11,920,364	168,707	0.014	13.30
Cornerstone	332,000	9,960	0.030	0.79
Cowen & Co.	355,189	4,538	0.013	0.36
Credit Suisse Securities	1,008,747	28,215	0.028	2.23
Cuttone & Co.	5,815	58	0.010	0.00
Deutsche Bank	249,575	5,194	0.021	0.41
Evercore Group	5,011	53	0.011	0.00
FBR Capital Markets	434	9	0.020	0.00
Fidelity Capital Markets	600	12	0.020	0.00
First Kentucky Securities Corp.	81,400	2,442	0.030	0.19
Freidman Billings	51,948	1,764	0.034	0.14
Goldman Sachs	1,412,050	16,188	0.011	1.28
Green Street Advisors	17,021	444	0.026	0.04
Guggenheim Capital Markets	3,184	74	0.023	0.01
HSBC	18,930	288	0.015	0.02
Instinet	56,736	487	0.009	0.04
Investment Tech Grp Transition	30,749,490	230,623	0.008	18.19
Investment Technology Group	11,011,955	100,581	0.009	7.93
ISI Algos	1,647,503	16,475	0.010	1.30
ISI Group	818,479	21,701	0.027	1.71
J.J.B. Hilliard, W.L. Lyons	195,700	5,871	0.030	0.46
Janney Montgomery Scott	5,300	106	0.020	0.01
Jefferies & Co.	785,376	8,960	0.011	0.71
JMP Securities	6,290	126	0.020	0.01
Jones & Associates	25,664	928	0.036	0.07
JP Morgan & Chase	499,083	9,380	0.019	0.74
Keefe Bruyette & Woods	4,339	130	0.030	0.01
Keybanc Capital	24,302	972	0.040	0.08
Leerink Swann & Co.	29,507	817	0.028	0.06
Liquidnet	6,344,475	57,581	0.009	4.54
Liquidnet Inc - Transition	3,609,387	18,047	0.005	1.42
Longbow Securities	742	22	0.030	0.00
Luminex Trading	1,900	10	0.005	0.00
MacQuarie Securities	560	17	0.030	0.00
Merrill Lynch	2,052,852	48,855	0.024	3.85
Merrill Lynch, Pierce & Fenner	19,939	407	0.020	0.03

Continued on next page

Companies	Shares Traded	Commissions	Commission Per Share	Percent of Total
Mizuho Securities USA	5,372	231	0.043	0.02
Morgan Stanley	300,648	7,445	0.025	0.59
Pershing	52,531	1,224	0.023	0.10
Piper Jaffray	29,211	979	0.034	0.08
RW Baird	125,655	4,001	0.032	0.32
Raymond James & Assoc.	1,468,593	44,222	0.030	3.49
RBC Capital Markets	9,577,234	51,308	0.005	4.05
Sanford C Bernstein	1,178,566	10,181	0.009	0.80
Seaport	14,643	293	0.020	0.02
Stephens	14,453	464	0.032	0.04
Stifel, Nicolaus & Co.	866,001	27,750	0.032	2.19
Suntrust Robinson	33,269	1,047	0.031	0.08
Telsey Advisory Group	1,610	32	0.020	0.00
Tradebook	2,090,793	10,045	0.005	0.79
UBS Financial Services	243,300	7,299	0.030	0.58
UBS/Paine Webber Securities	233,894	4,740	0.020	0.37
UBS/Paine Webber-Louisville	72,000	2,160	0.030	0.17
Virtu Americas	197,652	1,607	0.008	0.13
Wachovia/First Clearing Corp.	1,226	37	0.030	0.00
Wall Street Access	74,435	489	0.007	0.04
Wedbush Morgan Securities	3,226	97	0.030	0.01
Weeden & Co.	1,245,082	37,439	0.030	2.95
Wells Fargo Securities	27,642	507	0.018	0.04
Wolfe Research Securities	2,600	52	0.020	0.00
Totals*	130,977,388	$ 1,268,028	$ 0.010**	100%

*The acquisition of initial public offerings (IPOs) represented a portion of small-capitalization stock purchases. IPOs usually have a high commission rate; however, the security issuers and not the investors pay the commissions. In fiscal year 2019, the Retirement Annuity Trust bought small capitalization IPOs that generated $204,511 in commissions. Although these commissions were not paid by TRS, they resulted from the annuity trust's investment activities and are included in the total commissions. Typical stock transactions occur at lower commission rates than IPO transactions, frequently at $0.03 per share or less. Investment companies usually provide investment research for brokerage clients.
**Total commissions per share are calculated using total shares traded and total commissions.

Proxy Voting And Corporate Behavior

TRS regularly votes proxy statements associated with its equity ownership. The positions assumed by TRS are intended to represent the financial interests of the membership. The Board of Trustees has adopted a policy that directs the staff not to subjugate the financial concerns of TRS to social or political protests. At the same time, TRS expects the companies in which it acquires stock to be solid corporate citizens that abide by federal, state and local laws. The board has adopted the following position on corporate behavior.

The board's stated fiduciary duty is to obtain the highest return for the fund commensurate with acceptable levels of risk. This implies that non-financial considerations cannot take precedence to pure risk/return considerations in the evaluation of investment decisions. However, action taken by the fund as a share owner can be instrumental in encouraging action as a responsible corporate citizen by the companies in which the fund has invested.

The board expects the managements of the companies whose equity securities are held in the fund's portfolio to conduct themselves with propriety and with a view toward social considerations. A level of performance above minimum adherence to the law is generally expected. If any improper practices come into being, the board expects corporate management to move decisively to eliminate them and effect adequate controls to prevent recurrence.

On the other hand, the board does not intend to supplant the duties which are the responsibility of federal or state regulatory agencies, such as the Equal Employment Opportunity Commission, the Environmental Protection Agency, the Occupational Safety and Health Agency, the Nuclear Regulatory Commission, the Securities and Exchange Commission and others that are covered by U.S. and Kentucky laws.

Should satisfaction of the board's criteria by any company not be adequate, the board will consider what action to take, which may include, but not be limited to, correspondence with the company, meetings with company officials, sponsoring of shareholder resolutions or, as a last resort, liquidation of TRS's holdings in the company, if the sale is consistent with sound investment policy.

Security Lending

TRS operates its security lending program through its custodian, Bank of New York Mellon (BNYM), under contract. Securities lending occurs when TRS transfers a security to the borrower, such as a broker-dealer or bank, for cash collateral pursuant to an agreement to return the identical security in the future. Securities are borrowed for a variety of reasons including: settlement of short sales and to cover hedges, options, arbitrage positions and settlement fails. Consequently, the borrower receives custody of the transferred security. The borrower, however, is obligated to return the exact same security at the end of the loan period and to make the retirement system whole for dividends, interest and other distributions as if the security remained in the retirement system's portfolio.

The restrictions applying to loanable securities are as follows:

- There is no limit on the amount of government securities that can be loaned.
- There will be a limit of 30% of the equity portfolio. Securities may be loaned from any equity portfolio.
- A maximum of 50 corporate bonds may be on loan at any time.

TRS maintains with BNYM an approved borrowers list to which TRS will lend securities. The approved borrowers list is comprised of large, high-quality brokers, and TRS has discretion to add or remove names from the list.

BNYM acts as lending agent in exchanging securities for collateral. The collateral provided in exchange for securities may include cash or non-cash collateral. For a loan of U.S. securities, collateralization of 102% or greater of the fair value of the securities lent is required. For a loan of foreign securities, collateralization of 105% or greater of the fair value of the securities lent is required. BNYM bears the risk of loss of any cash or non-cash collateral.

Cash collateral may be invested in any of the following:

- Government securities
- Repurchase and reverse repurchase transactions with approved counterparties

Staff closely monitors the lending program to make sure that BNYM is in compliance with lending restrictions. BNYM provides a detailed listing of all securities that are on loan on a daily basis. They also provide a summary report that lists the fair value of securities on loan with a particular borrower and the collateral value that the borrower has provided to cover the loan. The collateralization percentage for each broker also is listed.

Kentucky Investments

The retirement system always is cognizant of its significant role in the commonwealth's economy. Over $2 billion in benefits are distributed to members and annuitants living in Kentucky annually. Approximately $256 million of the Retirement Annuity Trust's investments directly impact the commonwealth. These investments include: commercial real estate; bonds issued by public agencies of the commonwealth and those of local municipalities; pools of single-family mortgages in Kentucky; financing for multi-family housing; and investments in companies which have an impact on the commonwealth's economy but receive earnings from global operations. Fiduciary duty requires that investments be made solely for the benefit of the retirement system's members and annuitants. Investments which benefit the commonwealth's economy are made only when fully consistent with this fiduciary duty.

Professional Service Providers

Investment Consultant
Aon

Investment Custodian
Bank of New York Mellon

Fixed Income Managers
Fort Washington Investment Advisors
Galliard Capital Management

Domestic Equity Managers
Fort Washington Investment Advisors
State Street Global Advisors Trust Co.
Todd Asset Management
UBS Global Asset Management
Wellington Management Co.

International Equity Managers
Baillie Gifford Overseas Ltd.
Barings Asset Management
BlackRock Institutional Trust Co.
UBS Global Asset Management

Real Estate Managers
Angelo Gordon & Co.
Blackstone Real Estate Advisors
The Carlyle Group
Landmark Partners
Prudential Real Estate Investors
Rockwood Capital
TA Realty

Alternatives Managers
Actis
Alinda Capital Partners
Apax Partners
Audax Group
CapitalSouth Partners
The Carlyle Group
Chrysalis Ventures
Fort Washington Private Equity Investors
Gavea Investimentos
Hancock Natural Resources Group
Hellman & Friedman Capital Partners
IFM Investors
J.P. Morgan Asset Management
Kohlberg Kravis Roberts & Co.
Landmark Partners
Molpus Woodlands Group
Natural Gas Partners
Oaktree Capital Management
Public Pension Capital
Riverstone Holdings
Stepstone Group

Additional Categories Managers
Avenue Capital Group
Barings Asset Management
Columbia Threadneedle Investments
Fort Washington Investment Advisors
Highbridge Principal Strategies
Marathon Asset Management
Oaktree Capital Management
Shenkman Capital Management

Attorneys
Ice Miller
Reinhert, Boerner, Van Deuren

Health Insurance Trust

Investment Policy Summary

KRS 161.677 created the Health Insurance Trust on July 1, 2010, and obliges the board to "manage the assets of the fund in the same general manner in which it administers the retirement funds, except that the asset allocation may differ and separate accounting and financial reporting shall be maintained for the trust fund." KRS 161.430, which governs the investment of funds for the retirement trust, requires that members' assets be managed in a manner consistent with fiduciary standards set forth in the prudent person rule. Further, 102 KAR 1:178 establishes investment policies for the Health Insurance Trust. This regulation requires the board and Investment Committee to diversify assets prudently and to consider the fund's "liquidity and its capability of meeting both short and long-term obligations" in setting asset allocation policy.

Due to an imbalance of required distributions over contributions early in the fund's existence, liquidity needs historically dominated investment policy. This has evolved as contribution rate increases provided in statute have improved cash flow. As near-term liquidity needs recede in importance, the focus increasingly has been on establishing an investment policy that achieves the required rate of return and matches the health insurance liability.

Investment Objectives

The definitive objective of the health insurance fund is to provide for beneficiaries' health insurance benefit obligations, both short and long term. In support of this, investment policy is designed, on an ongoing basis, to meet all liquidity needs, achieve the actuarially assumed 8% rate of return over the long term and do so within appropriate risk levels.

Risk Controls

Any investment program faces various risks; as with the retirement funds, the primary risk is that the assets will not support liabilities long term. Risk control measures for the Health Insurance Trust mirror those of the Retirement Annuity Trust, but are customized to reflect the fund's unique liability. Primary risk control measures include:

- Actuarial valuations are performed each year to evaluate the funding objectives of the Health Insurance Trust. Every 10 years an external audit of the actuary is conducted to ensure that the assumptions made, and calculation methods used, are resulting in properly computed liabilities of the fund.
- Asset-liability studies are conducted about every five years. These studies ensure that the portfolio is designed to meet the fund's liabilities.
- In accordance 102 KAR 1:178, which governs investment policies for the fund, the Investment Committee adopts and regularly reviews an asset allocation policy designed to meet the fund's needs.

Asset Allocation

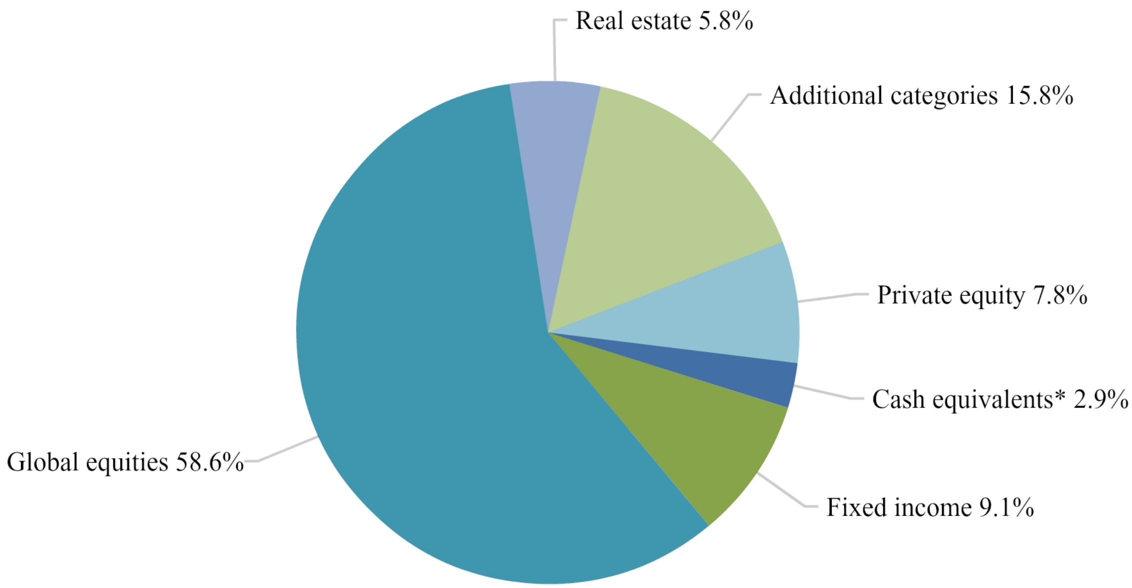
As of June 30, 2019, the Health Insurance Trust had $1.31 billion in assets. This included $119.4 million in investment-grade bonds. This trust also had $98.1 million in high-yield bonds, $769.8 million in public equity investments, $102.1 million in private equity, $43.9 million in bank loans, $65.8 million in alternative credit funds and $75.3 million in real estate.

Asset allocation is adjusted annually by the Investment Committee to reflect changing liquidity needs and actuarial funding status. Due to the trust being cash flow positive, liquidity needs are declining as funding status has improved. The information below shows the health insurance fund's asset allocation by fair value as of June 30, 2019 and 2018.

	June 30, 2019**	Percent	June 30, 2018***	Percent
Cash equivalents*	$ 38,615,515	2.9	$ 28,906,910	2.7
Fixed income	119,411,206	9.1	92,417,014	8.7
Global equities	769,850,833	58.6	607,134,943	57.2
Real estate	75,296,027	5.8	62,962,565	5.9
Additional categories	207,630,407	15.8	188,639,147	17.8
Private equity	102,153,229	7.8	81,232,638	7.7
Totals	$ 1,312,957,217	100	$ 1,061,293,217	100

*Reflects only cash balances not allocated to other asset classes. Uninvested cash balances allocated to various asset classes are represented in those classes.
**Does not include 401(h) value of $22,754,728
***Does not include 401(h) value of $20,896,588

Distribution of Investments — Fair Values
As of June 30, 2019



*Reflects only cash balances not allocated to other asset classes. Any uninvested manager cash balances are represented in the asset class of the respective managers.

Portfolio Results

For the year ended June 30, 2019, the Health Insurance Trust's portfolio returned 6.59% versus a policy index of 6.19%. The fund's public equities returned 4.78% versus 4.56% for the benchmark MSCI All Country World IMI Index. The trust's high-quality bond fund returned 7.93% versus 8.52% for the benchmark Bloomberg Barclays U.S. Government/Credit Index. This was the fourth year of managing the bond fund against this index; previously, it was managed against 90-day Treasury bills. While working to extend duration, it's prudent to be selective in entry points given the low-interest rate environment. Private equity and real estate contributed strong performance. Private equity gained 11.26%, core real estate returned 9.52%, and non-core real estate increased 11.04%. Additional categories returned 7.85% versus 7.58% for its benchmark, Bank of America Merrill Lynch U.S. High Yield Master II Index.

Trust return calculations were generated by the Segal Marco performance reporting system using a time-weighted rate of return calculation based upon fair values.

Schedule of Investment Results — Gross

	1-year	3-year*	5-year*
Total Plan	**6.59**	**10.06**	**5.85**
Policy benchmark**	6.19	9.90	
Equities	**4.78**	**11.58**	**6.35**
All cap equities	**5.06**		
Russell 3000	8.98		
Global equities	**4.75**	**11.73**	**6.43**
MSCI AC World IMI (Net)	4.56	11.42	6.03
Fixed income	**7.93**	**2.27**	**2.63**
Barclays Government Credit	8.52	2.41	3.11
Core real estate	**9.52**	**8.15**	
NCREIF ODCE (VW)	6.40	7.57	
Non-core real estate	**11.04**	**12.29**	
NCREIF Property Index	6.50	6.93	
Private equity	**11.26**	**17.23**	**15.11**
Mature private equity	**21.60**	**16.42**	**15.21**
S&P 500 plus 3%	13.73	17.61	14.03
Private equity < 5 Years	**10.08**	**17.22**	
Additional categories:	**7.85**	**7.60**	**4.14**
B of A Merrill Lynch High Yield Master II	7.58	7.54	4.70
Cash (unallocated)	**2.49**	**1.46**	**0.94**
90-day Treasury Bill	2.31	1.37	0.85

*Returns are annualized for periods longer than one year.
**Overall fund performance is compared to a board-approved benchmark, first established in July 2015, that represents the returns of appropriate benchmarks for the various asset classes weighted by the midpoint of the strategic range for the current fiscal year.

Schedule of Investment Results — Net of Investment Fees and Expenses

2019	6.11%
2018	8.44
2017	14.37
2016	-2.20
2015	1.38
2014	15.38

Portfolio Fair Values
as of June 30, 2019

Internally Managed	
Cash collections (unallocated)	$ 38,615,515
Fixed income	119,411,206
Internal Bond	
Subtotal	158,026,721
Externally Managed	
Domestic equity	
Fort Washington Focused Equity	37,253,706
International equity	
Blackrock B	732,597,127
Real estate	
Blackstone Partners VIII	8,435,014
Carlyle Realty Partners VII	5,726,192
Carlyle Realty Partners VIII	812,294
Carlyle Property Advisors	11,662,125
Landmark Real Estate Partners VII	5,188,100
Landmark Real Estate Partners VIII	1,979,144
Prudential PRISA	12,773,919
Rockwood Capital Real Estate X	7,317,162
The Realty Associates XI	10,411,627
TA Realty Core Property	10,990,450
Alternative investments	
Actis Global IV	5,064,835
APAX IX	6,297,997
Apax Digital	2,316,430
Audax Private Equity V	6,818,796
Carlyle Asia V	741,936
Carlyle Europe Partners IV	10,581,776
Carlyle Europe V	$ 730,302
Carlyle Global Financial Services Partners III	1,568,390
Fort Washington PE Opportunities III	2,831,761
Fort Washington VII	3,180,465
Fort Washington VIII	7,403,163
Fort Washington IX	3,749,849
Fort Washington IX-K	4,221,501
Fort Washington X	485,083
KKR & Co European IV	10,344,266
KKR Americas Fund XII	4,215,031
Landmark Equity Partners XV	1,857,363
Landmark Equity XVI	770,621
NGP Natural Resources XI	9,583,465
NGP Natural Resources XII	2,852,615
Oaktree European Principal IV	10,037,385
Riverstone E & P VI	6,500,199
Additional categories	
Columbia High Yield	48,395,108
Fort Washington High Yield Bond	49,624,505
Highbridge Principal Strategies III	1,181,670
Marathon European Credit Opportunities II	2,705,154
Marathon European Credit Opportunities III	7,459,696
Marathon TRS Credit	46,789,856
Oaktree European Capital Solutions	6,378,033
Oaktree Opportunities Xb	1,238,225
Shenkman Capital Management	43,858,160
Subtotal	$ 1,154,930,496
Total*	$ 1,312,957,217

*Does not include 401(h) value of $22,754,728.

Investment Summary — Fair Values as of June 30, 2019*

	Fair Value June 30, 2018	Acquisitions	Appreciation (Depreciation)	Sales Redemptions, Maturities & Paydowns	Fair Value June 30, 2019
Cash equivalents	$ 36,097,046	$ 433,013,082	$	$ 417,759,858	$ 51,350,270
Fixed income	89,681,931	33,045,759	5,910,122	16,007,068	112,630,744
Real estate	62,962,565	18,001,968	5,303,516	10,972,022	75,296,027
Equities	605,705,867	151,587,123	35,050,119	24,337,562	768,005,547
Alternative	81,232,638	34,053,642	11,880,377	25,013,428	102,153,229
Additional categories	185,613,170	71,730,373	5,691,761	59,513,904	203,521,400
Total	$ 1,061,293,217	$ 741,431,947	$ 63,835,895	$ 553,603,842	$ 1,312,957,217

*Does not include 401(h) value of $22,754,728.

Schedule of Investment Management Fees and Administrative Expenses
Fiscal Year June 30, 2019
(Dollars in thousands)

Investment Counselor Fees	**Assets Under Management**	**Expense**	**Basis Points***
Equity manager(s)	$ 769,851	$ 367	4.8
Fixed income manager(s)			
Real estate	75,296	1,155	153.5
Additional categories	207,630	1,104	53.2
Alternative investments	102,153	2,310	226.2
Subtotal	$ 1,154,930	$ 4,936	42.7
Administrative Expenses**		359	2.7
Total		$ 5,295	40.3

*One basis point is one hundredth of one percent or the equivalent of .0001. Total basis points is weighted.
**Basis points for administrative expenses are calculated against the $1.3 billion in assets under management for the trust.

Schedule of Investment Counselor Fees and Administrative Expenses
Fiscal Year Ended June 30, 2019

Investment Counselor Fees

Domestic equity	
Fort Washington Focused Equity	$ 125,539
Total domestic equity	125,539
International equity	
BlackRock Fund B	241,744
Total international equity	241,744
Real estate	
Blackstone Partners VIII	150,000
Carlyle Realty Partners VII	95,196
Carlyle Realty Partners VIII	126,784
Carlyle Property Advisors	73,788
Landmark Real Estate Partners VII	100,000
Landmark Real Estate Partners VIII	100,000
Prudential PRISA	95,132
Rockwood Capital Real Estate X	167,768
The Realty Associates XI	202,582
TA Realty Core Property	44,215
Total real estate	1,155,465
Alternative investments	
Actis Global IV	70,794
APAX IX	140,847
Apax Digital	371,002
Audax Private Equity V	
Carlyle Asia V	154,378
Carlyle Europe Partners IV	150,472
Carlyle Europe V	105,251
Carlyle Global Financial Services Partners	150,000
Fort Washington PE Opportunities III	23,460
Fort Washington VII	27,336
Fort Washington VIII	$ 36,000
Fort Washington IX	27,525
Fort Washington IX-K	27,525
Fort Washington X	4,263
KKR Americas XII	52,432
KKR & Co European IV	87,326
Landmark Equity Partners XV	50,000
Landmark Equity Partners XVI	253,288
NGP Natural Resources XI	136,834
NGP Natural Resources XII	137,396
Oaktree European Principal IV	155,424
Riverstone E & P VI	148,807
Total alternative investments	2,310,360
Additional categories	
Columbia High Yield Bond	172,199
Fort Washington High Yield Bond	93,508
Highbridge Specialty Loan III	22,748
Marathon European Credit Opportunities	47,807
Marathon European Credit Opportunities	88,915
Marathon TRS Credit	420,206
Oaktree European Capital Solutions	70,611
Oaktree Opportunities Xb	12,014
Shenkman Capital Management	175,837
Total additional categories	1,103,845
Total Investment Counselor Fees	$ 4,936,953

Administrative Expenses

Custodian	
The Bank of New York Mellon	$ 81,648
Other	
Other Administrative and Operational	276,532
Total Administrative Expenses	$ 358,180
Total	$ 5,295,133

Professional Service Providers

Investment Consultant
Aon

Investment Custodian
Bank of New York Mellon

Equity Managers
BlackRock Institutional Trust Co.
Fort Washington Investment Advisors

Additional Categories Managers
Columbia Threadneedle Investments
Fort Washington Investment Advisors
Highbridge Principal Strategies
Marathon Asset Management
Oaktree Capital Management
Shenkman Capital Management

Real Estate Managers
Blackstone Real Estate Advisors
The Carlyle Group
Landmark Partners
Prudential Real Estate Investors
Rockwood Capital
TA Realty

Alternatives Managers
Actis
Apax Partners
Audax Group
The Carlyle Group
Fort Washington Private Equity Investors
Kohlberg Kravis Roberts & Co.
Landmark Partners
Natural Gas Partners
Oaktree Capital Management
Riverstone Holdings

Attorneys
Ice Miller
Reinhert, Boerner, Van Deuren

Actuarial Section

Annual Valuation of the Retirement Annuity Trust

TEACHERS'
Retirement System

TRS

KENTUCKY

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

November 15, 2019

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, 2019. 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, 2022 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	36.30%
University members hired on or after July 1, 2008	37.30%
Non-University members hired before July 1, 2008	39.26%
Non-University members hired on or after July 1, 2008	40.26%

These rates represent an increase since the previous valuation in the total Pension actuarially determined employer contribution rates (ADEC) of 0.70% of payroll for the fiscal year ending June 30, 2022.

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

- a increase in the expected state special appropriation from 2.89% to 3.05%, or 0.16% of payroll
- an increase in the amount required for life insurance benefits from 0.06% to 0.07% of payroll
- the additional required increase of 0.55%, from 14.27% to 14.82%

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 3.5% 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.

Board of Trustees
November 15, 2019
Page 2

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.

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.

In our opinion, until recently the system has not been funded on an actuarially sound basis since the full actuarially determined contributions were not made by the employer from 2007 through 2018. However, an additional appropriation of $553.6 million was made during fiscal year 2019 which was enough to satisfy the actuarially determined contribution. Also, it is our understanding that the state budget includes an additional appropriation to the pension plan equal to the ADEC for fiscal year 2020. **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

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 (dollar amounts in thousands):

Valuation Date	June 30, 2019	June 30, 2018
Number of active members	72,647	72,205
Annual salaries	$ 3,648,428	$ 3,605,116
Number of annuitants and beneficiaries	55,613	54,377
Annual allowances	$ 2,124,452	$ 2,043,518
Assets		
Market value	$ 20,371,910	$ 19,981,633
Actuarial value	20,154,161	19,496,056
Actuarial accrued liability	$ 34,676,713	$ 33,795,671
Unfunded actuarial accrued liability (UAAL)	$ 14,522,552	$ 14,299,615
Funded ratio	58.1 %	57.7 %
Amortization period (years)	25.4	26.5

Contribution Rates for University Members

Valuation Date	June 30, 2019		June 30, 2018	
For fiscal year ending	June 30, 2022		June 30, 2021	
	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Retirement Annuity Trust:				
Normal	10.690%	10.690%	10.690%	10.690%
Actuarial accrued liability	25.610	26.610	24.910	25.910
Total	36.300%	37.300%	35.600%	36.600%
Member	7.625%	7.625%	7.625%	7.625%
State (ARC)	28.675	29.675	27.975	28.975
Total	36.300%	37.300%	35.600%	36.600%
Life Insurance Trust:				
State	0.070%	0.070%	0.060%	0.060%
Medical 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	41.920%	41.920%	41.210%	41.210%
Member statutory	10.400%	10.400%	10.400%	10.400%
State statutory	13.650	13.650	13.650	13.650
Required increase	14.820	14.820%	14.270	14.270
State special	3.050	3.050%	2.890	2.890
Total	41.920%	41.920%	41.210%	41.210%

Contribution Rates for Non-University Members

Valuation Date	June 30, 2019		June 30, 2018	
For fiscal year ending	June 30, 2022		June 30, 2021	
	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Retirement Annuity Trust:				
Normal	14.840%	14.840%	14.760%	14.760%
Actuarial accrued liability	24.420	25.420	23.800	24.800
Total	39.260%	40.260%	38.560%	39.560%
Member	9.105%	9.105%	9.105%	9.105%
State (ARC)	30.155	31.155	29.455	30.455
Total	39.260%	40.260%	38.56%	39.560%
Life Insurance Trust:				
State	0.070%	0.070%	0.060%	0.060%
Medical 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	46.830%	46.830%	46.120%	46.120%
Member statutory	12.855%	12.855%	12.855%	12.855%
State statutory	16.105	16.105	16.105	16.105
Required increase	14.820	14.820	14.270	14.270
State special	3.050	3.050	2.890	2.890
Total	46.830%	46.830%	46.120%	46.120%

2. The valuation includes only the assets and liabilities associated with the pension plan. The valuation of the Health Insurance Trust and the active and retired life insurance benefits will be prepared separately.
3. Comments on the valuation results as of June 30, 2019, are given in Section IV and further discussion of the contribution levels is set out in Sections V and VI.
4. Schedule B shows the development of the actuarial value of assets. The assumed investment rate of return is 7.5%. Schedule D of this report outlines the full set of actuarial assumptions and methods employed in the current valuation. There have been no changes since the previous valuation.
5. Provisions of the system, as summarized in Schedule F, were taken into account in the current valuation. There have been no changes since the previous valuation.
6. 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, 2019, on the basis of which the valuation was prepared.

Group	Number		Annual Salaries (In thousands)
University hired before July 1, 2008	1,414	$	106,761
University hired after July 1, 2008	1,670		88,226
Non-university full time hired before July 1, 2008	32,272		2,178,155
Non-university full time hired after July 1, 2008	25,153		1,202,576
Non-university part time hired before July 1, 2008	1,671		14,382
Non-university part time hired after July 1, 2008	10,467		58,328
Total	72,647	$	3,648,428

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, 2019

Group	Number		Annual Retirement Allowances[1] (In thousands)
Service retirements	48,608	$	1,938,152
Disability retirements	2,830		86,298
Beneficiaries of deceased members	4,175		100,002
Total	55,613	$	2,124,452

[1]Includes cost-of-living adjustments effective through July 1, 2019.

In addition, there are 8,992 terminated vested employees entitled to benefits in the future and 45,639 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, 2019, the market value of Retirement Annuity Trust assets for valuation purposes held by the system amounted to $20.37 billion. This value excludes assets in the Health Insurance Trust, the 403(b) Tax Sheltered Trust, and the Life Insurance Trust, which are not included in the assets used for Retirement Annuity Trust valuation purposes. The investment return for the plan year ending June 30, 2019, on a market value basis was 5.56%. Schedule C shows the receipts and disbursements for the year preceding the valuation date and a reconciliation of the asset balances for the Retirement Annuity Trust.
2. The five-year market related value of Retirement Annuity Trust assets used for valuation purposes as of June 30, 2019, was $20.15 billion. The estimated investment return for the plan year ending June 30, 2019, on an actuarial value of assets basis was 7.07%, compared to the assumed investment rate of return for the period of 7.5%. Schedule B shows the development of the actuarial value of assets as of June 30, 2019.

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, 2019. 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 $16.79 billion 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 $22.18 billion of which $736.9 million 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 $419.9 million. The total prospective liabilities of the system amounts to $39.39 billion. Against these liabilities, the system has present assets for valuation purposes of $20.15 billion. When this amount is deducted from the total liabilities of $39.39 billion, there remains $19.23 billion 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 10.69% of payroll for university and 14.84% of payroll for non-university are required.
4. Prospective normal employer and employee contributions have a present value of $4.71 billion. When this amount is subtracted from $19.23 billion, which is the present value of the total future contributions to be made by the employer, there remains $14.52 billion as the amount of future unfunded actuarial accrued liability contributions.
5. The unfunded actuarial accrued liability increased by approximately $222.9 million for the plan year ending June 30, 2019, however, the funding ratio increased from 57.7% to 58.1%. 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 10.4% 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 Retirement Annuity Trust 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 Retirement Annuity Trust and Life Insurance Trust. Of these amounts, 0.07% of payroll will be allocated to the Life Insurance Trust. Based on the results of the valuation, an additional 14.82% of payroll for both university and non-university will be required in order to maintain the amortization of the unfunded actuarial accrued liability of the Retirement Annuity Trust based on the funding policy adopted by the board. An additional special appropriation of 3.05% of total payroll will be made by the state. Therefore, the total actuarially determined employer contribution rate to the Retirement Annuity Trust is 28.675% for university members who become members before July 1, 2008, and 29.675% for university members who become members on or after July 1, 2008. The total actuarially determined employer contribution rate to the Retirement Annuity Trust is 30.155% for non-university members who become members before July 1, 2008, and 31.155% for non-university members who become members on or after July 1, 2008. The total member and employer contribution rates to the Retirement Annuity Trust are shown in the following tables.

Contribution Rates by Source
University

Member	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Statutory total	10.400%	10.400%
Statutory Medical Insurance Trust	(2.775)	(2.775)
Contribution to Retirement Annuity Trust	7.625%	7.625%
Employer		
Statutory matching total	10.400%	10.400%
Statutory Medical Insurance Trust	(2.775)	(1.775)
Supplemental funding	3.250	3.250
Subtotal	10.875%	11.875%
Life insurance	(0.070)%	(0.070)%
Additional to comply with board funding policy	14.820	14.820
Special appropriation	3.050	3.050
Contribution to Retirement Annuity Trust	28.675%	29.675%
Total contribution to Retirement Annuity Trust	36.300%	37.300%

Contribution Rates by Source
Non-University

	Members hired before July 1, 2008	Members hired on or after July 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	(0.070)%	(0.070)%
Additional to comply with board funding policy	14.820	14.820
Special appropriation	3.050	3.050
Contribution to Retirement Annuity Trust	30.155%	31.155%
Total contribution to Retirement Annuity Trust	39.260%	40.260%

4. The valuation indicates that normal contributions at the rate of 10.69% of active university members' salaries and 14.84% 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, is 25.61% for university members hired before July 1, 2008; 26.61% for university members hired on and after July 1, 2008; 24.42% for non-university members hired before July 1, 2008; and 25.42% for non-university members hired on and after July 1, 2008. These rates include special appropriations of 3.05% of payroll to be made by the state. These rates are shown in the following table.

Actuarially Determined Contribution Rates

	Percentage of Active Members' Salaries			
	University		Non-University	
Rate	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Normal	10.69%	10.69%	14.84%	14.84%
Accrued liability*	25.61	26.61	24.42	25.42
Total	36.30%	37.30%	39.26%	40.26%

**Includes special appropriations of 3.05% of payroll to be made by the state.*

5. 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
(Dollars in thousands)

	Original UAAL	Current UAAL	Remaining Amortization Period (years)	Amortization Payment
Legacy	$14,010,205	$15,097,125	25	$952,629
New incremental June 30, 2015	(351,610)	(346,270)	16	(29,421)
New incremental June 30, 2016	340,766	337,703	17	27,468
New incremental June 30, 2017	(428,468)	(427,120)	18	(33,370)
New incremental June 30, 2018	(192,240)	(192,192)	19	(14,465)
New incremental June 30, 2019	53,306	53,306	20	3,876
Total UAAL		$14,522,552		$906,717
Blended amortization period (years)				25.4

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 14.82%, 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. 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 14.82% of payroll for the fiscal year ending June 30, 2022, 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

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 $222.9 million in the unfunded actuarial accrued liability from $14.3 billion to $14.52 billion during the year ending June 30, 2019. The increase in the unfunded actuarial accrued liability was primarily due to demographic losses in turnover and retirement, as well as investment return on an actuarial value basis that was less than expected. These losses were partially offset by a gain in salary increases that were less than expected.

Analysis of Financial Experience
(In thousands)

Item	Amount of Increase/ (Decrease)
Interest (7.5%) added to previous unfunded accrued liability	$ 1,072,471
Expected accrued liability contribution	(955,395)
Experience:	
Valuation asset growth	83,127
Pensioners' mortality	(16,706)
Turnover and retirements	116,174
New entrants	44,822
Salary increases	(121,557)
Amendments	0
Assumption changes	0
Method changes	0
Total	$ 222,936

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, 2019

Group	Number
Retirees and beneficiaries currently receiving benefits	55,613
Terminated vested employees entitled to benefits but not yet receiving benefits	8,992
Inactive non-vested members	45,639
Active plan members	72,647
Total	182,891

2. The schedule of funding progress is shown below.

Schedule of Funding Progress
(Dollars in thousands)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b-a) /c)
June 30, 2010	$ 14,851,330	$ 24,344,316	$ 9,492,986	61.0%	$ 3,321,614	285.8%
June 30, 2011	14,908,138	25,968,692	11,060,554	57.4	3,451,756	320.4
June 30, 2012	14,691,371	26,973,854	12,282,483	54.5	3,479,567	353.0
June 30, 2013	14,962,758	28,817,232	13,854,474	51.9	3,480,066	398.1
June 30, 2014*	16,174,199	30,184,404	14,010,205	53.6	3,486,327	401.9
June 30, 2015	17,219,520	31,149,962	13,930,442	55.3	3,515,113	396.3
June 30, 2016*	17,496,894	32,028,227	14,531,333	54.6	3,537,226	410.8
June 30, 2017	18,514,638	32,819,887	14,305,249	56.4	3,563,584	401.4
June 30, 2018	19,496,056	33,795,671	14,299,615	57.7	3,605,116	396.6
June 30, 2019	20,154,161	34,676,713	14,522,552	58.1	3,648,428	398.0

* *Reflects change in assumptions and methods.*

3. The information presented above was determined as part of the actuarial valuation at June 30, 2019. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2019	Actuarial Assumptions:
Actuarial cost method	Entry age	Investment rate of return* 7.5%
Amortization method	Level percent of pay, closed	Projected salary increases** 3.5 - 7.3%
Remaining amortization period	25.4 years	
Asset valuation method	Five-year smoothed market	Cost-of-living adjustments 1.5% Annually

**Includes price inflation at 3%*

***Includes wage inflation at 3.5%*

Schedule of Employer Contributions

Fiscal Year Ended June 30	Actuarially Determined Employer Contributions	Actual Employer Contributions	Percentage Contributed
2010	$ 633,938,088	$ 479,805,088	76
2011	678,741,428	1,037,935,993 *	153
2012	757,822,190	557,339,552	74
2013	802,984,644	568,233,446	71
2014	823,446,156	563,326,249	68
2015	913,653,854	559,579,290	61
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

**Includes Pension Obligation Bond proceeds of $465,384,165.*

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 Nov. 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 U.S. 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 X — 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, 7.5%, together with an increase and a decrease of 1% in the discount rate. Under this scenario, the underlying price inflation rate assumption is held constant at 3% and the wage inflation assumption is held constant at 3.5%.
- **Table 2** - The price inflation assumption sensitivity analysis shows the valuation results with the baseline underlying price inflation rate assumption, 3%, together with decreases in the price inflation rate to 2.75% and 2.5%. Under this scenario, the decrease in the underlying price inflation rate assumption leads to corresponding decreases in the discount rate (7.25% and 7%, respectively), the wage inflation assumption (3.25% and 3%, 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, 3.5%, together with decreases in the wage inflation assumption to 2% and 0%. 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.

Table 1
Assumed Discount Rate Sensitivity Analysis
as of June 30, 2019
(Dollars in thousands)

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
Actuarial accrued liability	$ 38,660,559	$ 34,676,713	$ 31,334,121
Actuarial value of assets	20,154,161	20,154,161	20,154,161
Unfunded actuarial accrued liability	$ 18,506,398	$ 14,522,552	$ 11,179,960
Funded ratio	52.1%	58.1%	64.3%
Employer ADEC - university*	38.295%	29.675%	22.185%
Employer ADEC - non-university*	39.775%	31.155%	23.665%
Discount rate	6.5%	7.5%	8.5%
Wage inflation rate	3.5%	3.5%	3.5%
Price inflation rate	3%	3%	3%

* *Less 1% for members hired before July 1, 2008*

Table 2
Price Inflation Assumption Sensitivity Analysis
As of June 30, 2019
(Dollars in thousands)

	Valuation Results	Decrease Inflation Rate 0.25%	Decrease Inflation Rate 0.50%
Actuarial accrued liability	$ 34,676,713	$ 35,486,015	$ 36,329,517
Actuarial value of assets	20,154,161	20,154,161	20,154,161
Unfunded actuarial accrued liability	$ 14,522,552	$ 15,331,854	$ 16,175,356
Funded ratio	58.1%	56.8%	55.5%
Employer ADEC - university*	29.675%	31.745%	33.915%
Employer ADEC - non-university*	31.155%	33.225%	35.395%
Discount rate	7.5%	7.25%	7%
Wage inflation rate	3.5%	3.25%	3%
Price inflation rate	3%	2.75%	2.5%

** Less 1% for members hired before July 1, 2008*

Table 3
Wage Inflation Assumption Sensitivity Analysis
As of June 30, 2019
(Dollars in thousands)

	Valuation Results	Decrease Wage Inflation to 2%	No Wage Inflation
Actuarial accrued liability	$ 34,676,713	$ 34,676,713	$ 34,676,713
Actuarial value of assets	20,154,161	20,154,161	20,154,161
Unfunded actuarial accrued liability	$ 14,522,552	$ 14,522,552	$ 14,522,552
Funded ratio	58.1%	58.1%	58.1%
Employer ADEC - university*	29.675%	33.925%	70.295%
Employer ADEC - non-university*	31.155%	35.405%	41.775%
Discount rate	7.5%	7.5%	7.5%
Wage inflation rate	3.5%	2%	0%
Price inflation rate	3%	3%	3%

** Less 1% for members hired before July 1, 2008*

Schedule A

Valuation Balance Sheet
Showing the Present and Prospective Assets and Liabilities
As of June 30, 2019
(In thousands)

Actuarial Liabilities

(1)	Present value of prospective benefits payable on account of present active members				
	- Service retirement benefits	$	15,698,020		
	- Disability retirement benefits		696,591		
	- Death and survivor benefits		127,699		
	- Refunds of member contributions		263,121		
	Total			$	16,785,431
(2)	Present value of prospective benefits payable on account of present retired and disabled members, and beneficiaries of deceased members				
	- Service retirement benefits	$	20,525,920		
	- Disability retirement benefits		827,129		
	- Death and survivor benefits		828,655		
	Total			$	22,181,704
(3)	Present value of prospective benefits payable on account of inactive members and members entitled to deferred vested benefits			$	419,865
(4)	Total Actuarial Liabilities			$	39,387,000

Present and Prospective Assets

(5)	Actuarial value of assets			$	20,154,161
(6)	Present value of total future contributions = (4)-(5)	$	19,232,839		
(7)	Present value of future member contributions and employer normal contributions			$	4,710,287
(8)	Prospective unfunded accrued liability contributions = (6)-(7)			$	14,522,552
(9)	Total Present and Prospective Assets			$	39,387,000

Solvency Test
(Dollars in millions)

Valuation Date	Aggregate Actuarial Accrued Liability for (1) Active Member Contributions	(2) Retirants and Beneficiaries	(3) Active Members (Employer Financed Portion)	Valuation Assets	Portion of Accrued Liabilities Covered by Assets (1)	(2)	(3)
June 30, 2010	$3,196.3	$15,010.4	$6,137.6	$14,851.3	100 %	78 %	0 %
June 30, 2011	3,325.7	15,557.9	7,085.1	14,908.1	100	74	0
June 30, 2012	3,415.2	16,472.2	7,086.4	14,691.4	100	68	0
June 30, 2013	3,514.4	17,716.4	7,586.4	14,962.8	100	65	0
June 30, 2014	3,629.7	18,676.3	7,878.3	16,174.2	100	67	0
June 30, 2015	3,700.6	19,522.5	7,926.8	17,219.5	100	69	0
June 30, 2016	3,756.0	20,416.4	7,855.8	17,496.9	100	67	0
June 30, 2017	3,849.9	21,108.0	7,862.1	18,514.6	100	69	0
June 30, 2018	3,927.8	21,922.5	7,945.4	19,496.1	100	71	0
June 30, 2019	4,022.4	22,601.6	8,052.7	20,154.2	100	71	0

Schedule B

Development of Actuarial Value of Assets

(1)	Actuarial value of assets beginning of year		$ 19,496,055,514
(2)	Net position at market value at end of year		20,371,909,905
(3)	Net position at market value at beginning of year		19,981,633,096
(4)	Cash flow		
	a.	Contributions	1,444,206,989
	b.	Benefit payments	2,126,767,221
	c.	Administrative expense	12,352,308
	d.	Net: (4)a - (4)b - (4)c	(694,912,540)
(5)	Investment income		
	a.	Market total: (2) - (3) - (4)d	1,085,189,349
	b.	Assumed rate	7.5%
	c.	Amount for immediate recognition: [(3) x (5)b] + [(4)d x (5)b x 0.5]	1,472,563,262
	d.	Amount for phased-in recognition: (5)a - (5)c	(387,373,913)
(6)	Phased-in recognition of investment income		
	a.	Current year: 0.20 x (5)d	(77,474,783)
	b.	First prior year	115,121,921
	c.	Second prior year	247,314,724
	d.	Third prior year	(312,346,803)
	e.	Fourth prior year	(92,160,666)
	f.	Total recognized investment gain	(119,545,607)
(7)	Actuarial value of assets end of year: (1) + (4)d + (5)c + (6)f		$ 20,154,160,629
(8)	Difference between market & actuarial values: (2) - (7)		$ 217,749,276
(9)	Net investment rate of return on actuarial value		7.07%

Schedule C

Summary of Receipts & Disbursements*
(Market Value)

	For the Year Ending June 30, 2019	For the Year Ending June 30, 2018
Receipts for the Year		
Contributions		
Members	$ 321,172,166	$ 319,127,087
Employers	1,123,034,823	1,048,671,201
Total	1,444,206,989	1,367,798,288
Net investment income	1,085,189,349	1,953,214,031
Total	2,529,396,338	3,321,012,319
Disbursements for the Year		
Benefit payments	2,094,364,072	2,004,617,334
Refunds to members	32,403,149	31,072,421
Miscellaneous, including expenses	12,352,308	11,388,493
Total	2,139,119,529	2,047,078,248
Excess of Receipts over Disbursements	390,276,809	1,273,934,071
Reconciliation of Net Position		
Net position as of the beginning of the year	19,981,633,096	18,707,699,025
Excess of receipts over disbursements	390,276,809	1,273,934,071
Net position as of the end of the year	$ 20,371,909,905	$ 19,981,633,096
Net investment rate of return on market value	5.6%	10.5%

**Excludes assets for Medical Insurance Trust, the 403(b) Tax-Sheltered Trust 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, 2015, submitted to and adopted by the board on Sept. 19, 2016.

Investment Rate of Return: 7.5% per annum, compounded annually, including price inflation at 3% per annum.

Salary increases: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 3.5% per annum:

Age	20	25	30	35	40	45	50	55	60	65
Annual Rate	7.2%	6.4%	5.4%	4.7%	4.2%	3.8%	3.7%	3.5%	3.5%	3.5%

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

			Withdrawal			Retirement	
			Service			Before 27 Years of Service	After 27 Years of Service*
Age	Death	Disability	0 - 4	5 - 9	10+		
20	0.019 %	0.01%	11.00 %				
25	0.021	0.01	11.00	3.00%			
30	0.025	0.01	11.00	3.00	3.00%		
35	0.043	0.04	12.00	3.50	1.40		
40	0.060	0.09	12.00	4.50	1.40		
45	0.084	0.20	12.00	4.50	1.30		17.0%
50	0.119	0.30	14.00	4.50	1.90		17.0
55	0.202	0.58	15.00	4.50	2.40	5.0%	45.0
60	0.340	0.75	15.00	4.00	2.40	13.0	35.0
62	0.419	0.75	15.00	3.80	2.40	15.0	25.0
65	0.565	0.75	15.00	3.50	2.40	20.0	25.0
70	0.913	0.75	20.00	0.00	0.00	20.0	20.0
75	1.556	0.75	20.00	0.00	0.00	100.0	100.0

**Plus 7.5% in year when first eligible for unreduced retirement with 27 years of service.*

Females: Annual Rate of

			Withdrawal			Retirement	
			Service			Before 27 Years of Service	After 27 Years of Service*
Age	Death	Disability	0 - 4	5 - 9	10+		
20	0.007%	0.01%	9.00%				
25	0.008	0.01	9.00	4.00%			
30	0.010	0.03	12.00	4.00	1.65%		
35	0.018	0.06	12.00	4.00	1.50		
40	0.026	0.12	12.00	4.00	1.30		
45	0.042	0.25	13.00	4.00	1.20		15.0%
50	0.062	0.44	13.00	5.00	1.50		18.0
55	0.096	0.65	15.00	5.00	2.00	5.5%	50.0
60	0.157	0.85	15.00	5.00	2.00	14.0	40.0
62	0.197	0.85	15.00	4.60	2.00	14.0	40.0
65	0.287	0.85	15.00	4.00	2.00	22.0	35.0
70	0.495	0.85	15.00	0.00	0.00	20.0	35.0
75	0.831	0.85	15.00	0.00	0.00	100.0	100.0

**Plus 7.5% in year when first eligible for unreduced retirement with 27 years of service.*

Deaths After Retirement — The RP-2000 Combined Mortality Table projected to 2025 using scale BB (set forward two years for males and one year for females) is used for death after service retirement and beneficiaries. The RP-2000 Disabled Mortality Table (set forward two years for males and seven years for females) is used for death after disability retirement. There is a margin for future mortality improvement in the tables used by the system. Based on the results of the most recent experience study adopted by the board on Sept. 19, 2016, the numbers of expected future deaths are 15-19% less than the actual number of deaths that occurred during the study period for healthy retirees and 13-17% less than expected under the selected table for disabled retirees. Representative values of the assumed annual rates of death after service retirement and after disability retirement are shown in this table.

Annual Rate of Death After

	Service Retirement		Disability Retirement	
Age	Male	Female	Male	Female
45	0.1609%	0.1135%	2.3306%	1.2482%
50	0.2474	0.1718	2.9279	1.5650
55	0.4246	0.2658	3.4400	1.7807
60	0.6985	0.4409	3.5881	2.3164
65	1.1300	0.8100	3.8275	3.1687
70	1.8697	1.3739	4.7566	4.4032
75	3.2147	2.2899	6.3153	6.0857
80	5.5160	3.7551	8.3527	8.4679
85	9.5631	6.3873	10.9122	12.7572
90	17.2787	11.2476	17.2787	19.4718
95	27.1263	18.1190	27.1263	24.2074

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 7.5%. The amount recognized each year is 20% of the difference between market value and expected actuarial value.

Expense Load — None.

Percent Married — 100%, with females three years younger than males.

Loads — Unused sick leave: 2% of active liability.

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 (currently at 7.5%), 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

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, 2019. The following summary describes the main benefit and contribution provisions of the system as interpreted for the valuation.

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.

Benefits

Service Retirement Allowance for Members Before July 1, 2008

Condition for Allowance — Completion of 27 years of service or attainment of age 55 and five years of service.

Amount of Allowance — The annual retirement allowance for non-university members is equal to:

- 2% of final average salary multiplied by service before July 1, 1983, plus
- 2.5% of final average salary multiplied by service after July 1, 1983.
- 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% 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.
- For members retiring on or after July 1, 2004, the retirement allowance formula is 3% 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% 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.

Service Retirement Allowance for Members on and after July 1, 2008

Condition for Allowance — Completion of 27 years of service; attainment of age 60 and five 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% 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% 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% 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.

Disability Retirement Allowance
Condition for Allowance — Totally and permanently incapable of being employed as a teacher and under age 60 but after completing five years of service.

Amount of Allowance — The disability allowance is equal to the greater of the service retirement allowance or 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 five 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 fund has been created as of June 30, 2000 to pay benefits on behalf of deceased TRS active and retired members.

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.

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.

Postretirement Adjustments
The retirement allowance of each retired member and of each beneficiary shall be increased by 1.5% each July 1.

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

Table 1
Age - Service Table
Distribution of Active Members as of June 30, 2019
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	Number	Number
Under 25	1,884	1,655	5							3,544	78,310,776
25 to 29	971	4,560	1,752	1						7,284	287,762,572
30 to 34	614	1,965	4,431	1,572						8,582	407,539,614
35 to 39	706	1,524	2,173	4,510	1,551	9				10,473	559,874,557
40 to 44	610	1,190	1,375	2,103	4,096	1,196	3			10,573	614,043,506
45 to 49	534	938	1,074	1,501	2,026	3,846	1,015	4		10,938	671,896,297
50 to 54	632	674	649	965	1,242	1,700	2,005	335	3	8,205	497,549,540
55 to 59	846	778	468	580	900	994	732	248	47	5,593	294,393,011
60 to 64	786	936	337	264	450	475	380	102	40	3,770	152,726,863
65 to 69	563	808	273	120	154	167	124	50	40	2,299	61,148,793
70 & Over	362	549	252	79	39	32	32	16	25	1,386	23,182,181
Total Count	8,508	15,577	12,789	11,695	10,458	8,419	4,291	755	155	72,647	3,648,427,710

Average Age: 43.6
Average Service: 11.0

Table 2
Schedule of Active Member Valuation Data

Valuation Date June 30	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
2010	76,387	$ 3,321,614,223	$ 43,484	1.51
2011	76,349	3,451,756,287	45,210	3.97
2012	75,951	3,479,567,004	45,813	1.33
2013	74,831	3,480,066,406	46,506	1.51
2014	73,407	3,486,326,799	47,493	2.12
2015	72,246	3,515,113,127	48,655	2.45
2016	71,848	3,537,226,348	49,232	1.19
2017	72,130	3,563,584,342	49,405	0.35
2018	72,205	3,605,115,787	49,929	1.06
2019	72,647	3,648,427,710	50,221	0.58

Table 3
Number of Retired Members, Beneficiaries and their Benefits by Age

Attained Age	Number of Members	Total Annual Payments	Average Annual Benefits
49 & Under	824	$ 10,692,233	$ 12,976
50 - 54	1,518	61,967,155	40,822
55 - 59	4,236	185,461,778	43,782
60 - 64	7,491	315,953,646	42,178
65 - 69	12,391	498,526,028	40,233
70 - 74	12,818	492,020,745	38,385
75 - 79	7,749	285,961,475	36,903
80 - 84	4,442	153,101,791	34,467
85 - 89	2,582	78,892,796	30,555
90 - 94	1,195	33,153,191	27,743
95 & Over	367	8,720,878	23,763
Total	55,613	$ 2,124,451,716	$ 38,201

Average Current Age: **70.1**

Average Age at Retirement for All Retirees and Beneficiaries: **56.2**

Table 4
Schedule of Retirees, Beneficiaries and Survivors Added to and Removed from Rolls

	Add to Rolls		Removed from Rolls		Rolls at End of Year			
Year Ended June 30	Number	Annual Allowances *(In millions)*	Number	Annual Allowances *(In millions)*	Number	Annual Allowances *(In millions)*	Increase In Annual Allowances	Average Annual Allowances
2010	2,105	$ 93.7	1,021	$ 21.8	43,134	$ 1,352.2	5.6%	$ 31,348
2011	2,133	98.9	848	17.7	44,419	1,433.4	6.0%	32,270
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	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

Schedule G

20-Year Baseline Projections

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%

Valuation Discount Rate — 7.5%

Investment Rate of Return — 7.5% each year

Actuarial Value of Assets — five 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 25.4-year period as of valuation date

Future Contributions — Based on expected actuarially determined contributions

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

20-Year Baseline Projection
(Dollars in thousands)

Fiscal Year End	Non-University Payroll	University Payroll	Total Payroll	Unfunded Accrued Liability	Funding Ratio	Actuarially Determined Contribution
2022	$ 3,629,800	$ 199,926	$ 3,829,726	$ 14,522,552	58.1%	$ 1,165,854
2023	3,719,567	205,035	3,924,602	14,603,366	58.7	1,200,978
2024	3,809,893	210,510	4,020,403	14,489,240	60.0	1,220,766
2025	3,901,606	216,801	4,118,407	14,629,891	60.5	1,262,366
2026	3,991,126	224,165	4,215,291	14,866,282	60.7	1,315,742
2027	4,081,214	232,450	4,313,664	15,031,350	61.2	1,366,547
2028	4,172,477	241,666	4,414,143	15,172,649	61.6	1,419,348
2029	4,268,103	251,466	4,519,569	15,279,228	62.1	1,476,864
2030	4,367,514	261,323	4,628,837	15,346,697	62.7	1,536,450
2031	4,470,072	271,796	4,741,868	15,369,197	63.4	1,596,994
2032	4,578,015	282,465	4,860,480	15,342,978	64.1	1,661,599
2033	4,691,000	293,137	4,984,137	15,256,546	64.9	1,728,438
2034	4,807,117	304,819	5,111,936	15,106,934	65.9	1,797,885
2035	4,930,521	316,176	5,246,697	14,887,872	66.9	1,870,030
2036	5,060,198	327,783	5,387,981	14,586,670	68.1	1,944,574
2037	5,197,690	340,357	5,538,047	14,197,048	69.4	2,023,913
2038	5,343,656	353,535	5,697,191	13,704,910	70.9	2,159,827
2039	5,498,384	367,474	5,865,858	13,102,302	72.6	2,198,723
2040	5,662,115	382,131	6,044,246	12,378,147	74.5	2,351,150
2041	5,836,091	397,499	6,233,590	11,463,252	76.7	2,473,450

Annual Valuation of the
Health and Life Insurance Trusts

TEACHERS'
Retirement System

TRS

KENTUCKY

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

November 13, 2019

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

Members of the Board:
This report covers the retiree medical plan funded by the Health Insurance Trust and OPEB liabilities related to the life insurance plan funded by the Life Insurance Trust. Cavanaugh Macdonald Consulting, LLC (CMC) has submitted the results of the annual actuarial valuation prepared as of June 30, 2019. While not verifying the data at source, the actuary performed tests for consistency and reasonability.

The valuation indicates a total actuarially determined contribution of 4.89% as of percentage of active member payroll for the health trust payable for the fiscal year ending June 30, 2020 is required to support the benefits of the Kentucky Employees' Health Plan (KEHP) and the Medicare Eligible Health Plan (MEHP). Of this amount, 2.775% of payroll is estimated to be paid by University members and 3.75% of payroll is estimated to be paid by all other members, leaving 2.115% and 1.14% respectively, as the remaining actuarially determined contribution. This actuarially determined contribution reflects the actuarial value of assets of the Health Insurance Trust and an 8% discount rate for valuing liabilities.

The initial per capita costs of health care and the rates of health care inflation used to project the per capita health care costs have been revised since the previous valuation to reflect recent experience and revised expectations.

The Life Insurance Plan valuation indicates a total actuarially determined contribution of 0.07% of active member payroll payable for the fiscal year ending June 30, 2022, is required to support the benefits of the Life Insurance Trust. This actuarially determined contribution reflects the actuarial value of assets of the Life Insurance Trust and a 7.5% discount rate for valuing liabilities.

The promised benefits of the retiree medical and life insurance plans are included in the actuarially calculated contribution rates that are developed using the entry age normal actuarial cost method. Five-year market related value of plan assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded actuarial accrued liability that is being amortized by regular annual contributions as a level percentage of payroll within a 21-year period for the retiree medical plan and a 25-year period for the life insurance plan, on the assumption that payroll will increase by 3.5% annually. The assumptions recommended by the actuary and adopted by the board are in aggregate reasonably related to the experience under the retiree medical and life insurance plans and to reasonable expectations of anticipated experience under the retiree medical and life insurance plans.

3550 Busbee Pkwy, Suite 250, Kennesaw, GA 30144
Phone (678) 388-1700 • Fax (678) 388-1730
www.CavMacConsulting.com
Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE

Board of Trustees
November 13, 2019
Page 2

CMC has prepared the trend information shown in the Schedule of Funding Progress in the Financial Section of the Annual Report and Section VII shown in the Actuarial Section of the Comprehensive Annual Financial Report.

This is to certify that the independent consulting actuaries are members of the American Academy of Actuaries and have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retiree medical and life insurance plans and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the plans.

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.

This actuarial valuation was performed to determine the recommended funding amount for the system. The asset values used to determine unfunded 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 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.

In our opinion, if the contributions to the Health Insurance Trust continue at the current statutorily required levels, the funded ratio of the retiree medical plan will continue to increase, and the ability of the Health Insurance Trust to fund the benefits called for under the retiree medical plan will improve.

Respectfully submitted,

Alisa Bennett, FSA, EA, FCA, MAAA
President

Edward J. Koebel, EA, FCA, MAAA
CEO

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.

Health Insurance Trust
(Dollars in thousands)

Valuation Date	June 30, 2019	June 30, 2018
Number of active members	72,647	72,205
Annual salaries	$ 3,648,428	$ 3,605,116
Number of deferred vested members	7,268	7,337
Number of annuitants in medical plans	40,711	40,230
Number of spouses and beneficiaries in medical plans*	7,569	7,595
Total	48,280	47,825
Assets:		
Market value	$ 1,414,020	$ 1,190,281
Actuarial value	$ 1,442,522	$ 1,213,918
Unfunded actuarial accrued liability	$ 1,690,680	$ 2,126,791
Funded ratio based on actuarial value of assets	46%	36.3%
Amortization period (years)	21	22
Discount rate	8%	8%

* *Spouses of post-65 retirees, as well as surviving spouses of deceased retirees on or after July 1, 2002, pay 100% of the full contribution. The full contribution for non-Medicare-eligible dependents is paid through a combination of payments from beneficiaries and the state. The non-Medicare dependent subsidy amount drops to two thirds in 2019 and one third in 2020.*

Health Insurance Trust Contribution Rates for University Members

Valuation Date	June 30, 2019		June 30, 2018	
Contribution For Fiscal Year Ending	June 30, 2020		June 30, 2019	
	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Normal	1.62%	1.62%	1.78%	1.78%
Accrued liability	3.27	3.27	4.04	4.04
Total	4.89%	4.89%	5.82%	5.82%
Member	2.775%	2.775%	2.775%	2.775%
Employer (ARC)	2.775	1.775	2.775	1.775
State (ARC)	(0.660)	0.340	0.270	1.270
Total	4.890%	4.890%	5.820%	5.820%

Health Insurance Trust Contribution Rates for School District Employees (Non-Federal)

Valuation Date	June 30, 2019		June 30, 2018	
Contribution For Fiscal Year Ending	June 30, 2020		June 30, 2019	
	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Normal	1.62%	1.62%	1.78%	1.78%
Accrued liability	3.27	3.27	4.04	4.04
Total	4.89%	4.89%	5.82%	5.82%
Member	3.750%	3.750%	3.750%	3.750%
Employer (ARC)	3.000	3.000	3.000	3.000
State (ARC)	(1.860)	(1.860)	(0.930)	(0.930)
Total	4.890%	4.890%	5.820%	5.820%

Health Insurance Trust Contribution Rates for Other Employees

Valuation Date	June 30, 2019		June 30, 2018	
Contribution For Fiscal Year Ending	June 30, 2020		June 30, 2019	
	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Normal	1.62%	1.62%	1.78%	1.78%
Accrued liability	3.27	3.27	4.04	4.04
Total	4.89%	4.89%	5.82%	5.82%
Member	3.750%	3.750%	3.750%	3.750%
Employer (ARC)	3.750	2.750	3.750	2.750
State (ARC)	(2.610)	(1.610)	(1.680)	(0.680)
Total	4.890%	4.890%	5.820%	5.820%

Life Insurance Trust
(Dollars in thousands)

Valuation Date	**June 30, 2019**	**June 30, 2018**
Number of active members	72,647	72,205
Annual salaries	$ 3,648,428	$ 3,605,116
Number of vested former members	8,992	8,814
Number of retirees in life insurance plan	51,438	49,422
Assets:		
Market value	$ 85,758	$ 84,462
Actuarial value	$ 92,506	$ 93,808
Unfunded actuarial accrued liability*	$ 24,979	$ 18,663
Funded ratio based on actuarial value of assets	78.7%	83.4%
Amortization period (years)	25	26
Discount rate	7.5%	7.5%

Life Insurance Contribution Rates

Contribution for fiscal year ending	**June 30, 2022**	**June 30, 2021**
Normal	0.03%	0.03%
Accrued liability	0.04	0.03
Total	0.07%	0.06%

** Includes liability for death in active service. This amount could be segregated from the OPEB liability and assets could be split for active and post-employment purposes. However, since this could be administratively burdensome and since death in active service liabilities can be considered de minimis, we will consider the entire liability an OPEB liability under GASB 74 and 75.*

2. The valuation indicates combined member, employer and state contributions of 4.89% of active member payroll would be sufficient to support the current benefits of the retiree medical plan and state contributions of 0.07% of active member payroll would be sufficient to support the current benefits of the life insurance plan. Comments on the valuation results as of June 30, 2019, are given in Section IV and further discussion of the contribution levels is set out in Sections VI and VII.
3. Schedule B shows the development of the actuarial value of assets. The assumed investment rate of return is 8% for health trust and 7.5% for Life Insurance Trust.
4. Schedule D of this report outlines the full set of actuarial assumptions and methods employed in the current valuation. Since the previous valuation, the initial per capita costs of health care and the rates of health care inflation used to project the per capita health care costs have been revised to reflect recent experience.
5. Provisions of the system, as summarized in Schedule F, were taken into account in the current valuation. As in the previous valuation, the phase out of the KEHP dependent subsidies offered to retirees has been reflected. In 2019, TRS will contribute two-thirds of the non-single premium and in 2020, TRS will contribute one-third of the non-single premium.
6. 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 retiree medical and life insurance plans for use as a basis of the valuation were furnished by the system's office. The following tables summarize the membership of the system as of June 30, 2019, upon which the valuation was based. Detailed tabulations of the data are given in Schedule F.

Active Members as of June 30, 2019

(Dollars in thousands)

Group	Number	Annual Salaries
University Full Time hired before July 1, 2008	1,414	$ 106,761
University Full Time hired after July 1, 2008	1,670	88,226
Non-University Full Time hired before July 1, 2008	32,272	2,178,155
Non-University Full Time hired after July 1, 2008	25,153	1,202,576
Non-University Part Time hired before July 1, 2008	1,671	14,382
Non-University Part Time hired after July 1, 2008	10,467	58,328
Total	72,647	$ 3,648,428

2. The following tables show the number of retired members and their beneficiaries receiving health care as of the valuation date as well as average ages.

Retirees Receiving Health Benefits as of June 30, 2019

	Under Age 65	Age 65 and Over	Total
Number	10,173	30,538	40,711
Average Age	59.9	74.3	70.7

Spouses Receiving Health Benefits as of June 30, 2019

	Under Age 65	Age 65 and Over	Total
Number	2,725	4,844	7,569
Average Age	58.9	75	69.2

3. The retiree medical plan valuation includes 7,268 deferred vested members eligible for health care at age 60 and the life insurance plan valuation includes 8,992 deferred vested members eligible for retiree life insurance at age 60.

Section III — Assets

1. As of June 30, 2019, the market value of Health Insurance Trust assets held by the retiree medical plan amounted to $1.41 billion and the market value of Life Insurance Trust assets held by the life insurance plan amounted to $85.8 million. The estimated market investment return for the plan year was 6.11% for the Health Insurance Trust and 6.49% for the Life Insurance Trust.
2. The five-year market related value of health trust assets used for valuation purposes as of June 30, 2019 was $1.44 billion and the five-year market related value of Life Insurance Trust assets used for valuation purposes as of June 30, 2019 was $92.5 million. Schedule B shows the development of the actuarial value of assets as of June 30, 2019.
3. Schedule C shows the receipts and disbursements for the year preceding the valuation date and a reconciliation of the asset balances for the health trust and the Life Insurance Trust.

Section IV — Comments on Valuation

1. Schedule A of this report outlines the results of the actuarial valuation. The valuation was prepared in accordance with the actuarial assumptions and the actuarial cost method, which are described in Schedule D.

2. The valuation shows the retiree medical plan has an actuarial accrued liability of $1.53 billion for benefits expected to be paid on account of the present active membership, based on service to the valuation date. The liability on account of deferred vested members amounts to $43.6 million. The liability on account of benefits payable to retirees and covered spouses amounts to $1.56 billion. The total actuarial accrued liability of the retiree medical plan amounts to $3.13 billion. Against these liabilities, the retiree medical plan has present assets for valuation purposes of $1.44 billion. When this amount is deducted from the actuarial accrued liability of $3.13 billion, there remains $1.69 billion as the unfunded actuarial accrued liability for the retiree medical plan.
3. The normal contribution is equal to the actuarial present value of benefits accruing during the current year. The normal contribution for the retiree medical plan is determined to be $59.2 million, or 1.62% of payroll.
4. The valuation shows that the life insurance plan has an actuarial accrued liability of $18.4 million for benefits expected to be paid on account of the present active membership, based on service to the valuation date. The liability on account of deferred vested members amounts to $3.9 million. The liability on account of benefits payable to retirees amounts to $95.2 million. The total actuarial accrued liability of the life insurance plan amounts to $117.5 million. This amount includes liability for death in active service. The liability for death in active service could be segregated from the OPEB liability and assets could be split for active and post-employment purposes. As this could be administratively burdensome and, as death in active service liabilities can be considered de minimis, we will consider the entire liability an OPEB liability under GASB 74 and 75. Against these liabilities, the life insurance plan has present assets for valuation purposes of $92.5 million. When this amount is deducted from the actuarial accrued liability of $117.5 million, there remains $25 million as the unfunded actuarial accrued liability for the life insurance plan.
5. The normal contribution is equal to the actuarial present value of benefits accruing during the current year. The normal contribution for the life insurance plan is determined to be $1.2 million, or 0.03% of payroll.

Section V — Derivation of Experience Gains and Losses

1. Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is assumed that gains and losses will be in balance over a period of years, but sizable year-to-year fluctuations are common. Detail on the derivation of the experience gain (loss) for the year ended June 30, 2019, is shown below (dollars in thousands).

		Health Insurance Trust	Life Insurance Trust
(1)	UAAL** as of June 30, 2018	$ 2,126,791	$ 18,663
(2)	Normal cost from last valuation	64,032	1,182
(3)	Expected employer contributions	209,800	2,290
(4)	Interest accrual: [(1) + (2) - (3)] x interest***	158,482	1,317
(5)	Expected UAAL before changes: (1) + (2) - (3) + (4)	$ 2,139,505	$ 18,872
(6)	Change due to claims experience	(239,583)	
(7)	Expected UAAL after changes: (5) + (6)	$ 1,899,922	$ 18,872
(8)	Actual UAAL as of June 30, 2019	1,690,680	24,979
(9)	Total gain/(loss): (7) - (8)	209,242	(6,107)
	(a) Contribution and investment gain/(loss)	83,512	(5,368)
	(b) Experience gain/(loss) (9) - (9a)	125,730	(739)
(10)	Accrued liabilities as of June 30, 2018	$ 3,340,709	$ 112,471
(11)	Experience gain/(loss) as percent of actuarial accrued liabilities at start of year (9b) / (10)	(3.8%)	0.7%

* *Rows labeled as a change, rather than a gain/(loss), are expressed as negative if the UAAL is decreased and positive if the UAAL is increased.*

Section VI — Contributions Payable Under the Plan

1. Sections 161.420 and 161.550 of the Kentucky Revised Statutes provide the amounts employers and the state are required to contribute to the Health Insurance Trust. These contribution amounts vary by date of membership and employee type.

Employer Percentage of Payroll Contributions Made to Medical Insurance Trust

University Employees		School District Employees (Non-Federal)*		Other Employees	
Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
2.775%	1.775%	3.000%	3.000%	3.750%	2.750%

**In addition to the amounts contributed by school districts on behalf of non-federal employees, the state contributes 0.75%*

2. For the fiscal year ending June 30, 2019, member contributions will be 2.775% for university employees and 3.75% for all other members. Based upon the amortization of the unfunded actuarial accrued liability over a 21-year period as a level percentage of payroll, the valuation indicates employer and state contributions of 2.115% of payroll for university employees and 1.14% of payroll for all other members.

3. The state is scheduled to contribute 0.06% of salary to the Life Insurance Trust for the fiscal year ending June 30, 2021. Based upon the amortization of the unfunded actuarial liability over a 25-year period as a level percentage of payroll, CMC's valuation indicates a contribution of 0.07% for the fiscal year ending June 30, 2022, is required to support sufficiently the benefits of the life insurance plan

Required Contribution Rates
For Fiscal Year Ending June 30, 2020
Health Insurance Trust

Normal	1.62%
Accrued liability	3.27%
Total	4.89%

	University Employees		School District Employees (Non-Federal)		Other Employees	
	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008	Members hired before July 1, 2008	Members hired on or after July 1, 2008
Members	2.775%	2.775%	3.750%	3.750%	3.750%	3.750%
Employer (ARC)	2.775	1.775	3.000	3.000	3.750	2.750
State (ARC)	(0.660)	0.340	(1.860)	(1.860)	(2.610)	(1.610)
Total	4.890%	4.890%	4.890%	4.890%	4.890%	4.890%

Required Contribution Rates
Life Insurance Trust
For Fiscal Year Ending June 30, 2022

Normal	0.03%
Accrued liability	0.04
Total	0.07%
Member	0.00%
State	0.07
Total	0.07%

4. The valuation indicates that a total normal contribution of 1.62% of payroll is required to meet the cost of benefits currently accruing under the retiree medical plan and 0.03% of payroll is required to meet the cost of benefits currently accruing under the life insurance plan. The difference between the total contribution and the normal contribution remains to be applied toward the liquidation of the unfunded actuarial accrued liability. This accrued liability payment is 3.27% of payroll for the retiree medical plan and 0.04% of payroll for the life insurance plan.
5. The unfunded actuarial accrued liability amounts to $1.69 billion for the retiree medical plan and $25 million for the life insurance plan as of the valuation date. An accrued liability contribution rate of 3.27% of payroll for the retiree medical plan and 0.04% of payroll for the life insurance plan is sufficient to amortize the unfunded actuarial accrued liabilities over a 21-year period for the retiree medical plan and a 25-year period for the life insurance plan, based on the assumption that the payroll will increase by 3.5% annually.

Section VII — Comments on the Level of Funding

1. The system's monthly contribution for retirees who opt into the retiree medical plan is based upon date of hire, date of attaining age 65, and years of service at retirement. Additionally, beneficiary contributions may vary by date of hire, date of attaining age 65, years of service at retirement, plan election, Medicare eligibility and tobacco use. Beneficiary contributions for dependents are targeted to be 100% of the cost of expected claims and/or insured premiums for spouses age 65 and older. Historically, this target has been achieved. The full cost for non-Medicare eligible dependents is paid through a combination of payments from beneficiaries and the state on a current disbursement basis. Current employer and state contributions have been determined to be sufficient to fund the cost of the benefits to be provided. Benefits for university, school district (non-federal), and other members are identical, although active employee contributions collected from university, school district (non-federal) and other members differ. A listing of active member retiree medical plan contributions by fiscal year, date of membership and employer type is provided in Schedule E.
2. This valuation provides the contributions required to fund sufficiently the retiree medical plan and to ensure the future solvency of the Health Insurance Trust. For university employees, a member contribution of 2.775% of payroll together with employer contributions of 2.115% of payroll are required to meet the cost of benefits currently accruing and provide for the amortization of the unfunded actuarial accrued liability over a period of 21 years. For the remaining membership, a member contribution of 3.75% of payroll together with employer and state contributions of 1.14% of payroll is required to meet the cost of benefits currently accruing and provide for the amortization of the unfunded actuarial accrued liability over a period of 21 years.

Section VIII — Accounting Information

1. The information required under Governmental Accounting Standards Board (GASB) Statements No. 74 and 75 will be issued in separate reports. The following information is provided for informational purposes only.

Number of Active and Retired Members in Retiree Medical Plan as of June 30, 2019

Group	Number
Retirees currently receiving health benefits	40,711
Spouses of retirees currently receiving health benefits	7,569
Terminated employees entitled to benefits but not yet receiving benefits	7,268
Active plan members	72,647
Total	128,195

Number of Active and Retired Members in Life Insurance Plan as of June 30, 2019

Group	Number
Retirees	51,438
Terminated employees	8,992
Active plan members	72,647
Total	133,077

Schedule of Funding Progress
Health Insurance Trust
(Dollars in thousands)

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liabilities (AAL)	Unfunded AAL (UAAL)	Funded Ratio	Covered Payroll	UAAL as a % of Covered Payroll
	A	B	(B-A)	(A/B)	C	[(B-A)/C]
June 30, 2010	$ 241,224	$ 3,206,806	$ 2,965,582	7.5 %	$ 3,321,614	89.3 %
June 30, 2011	294,819	3,423,149	3,128,330	8.6	3,451,756	90.6
June 30, 2012	338,746	3,594,540	3,255,794	9.4	3,479,567	93.6
June 30, 2013	412,185	3,521,073	3,108,888	11.7	3,480,066	89.3
June 30, 2014	508,913	3,194,689	2,685,776	15.9	3,486,327	77.0
June 30, 2015	637,839	3,525,584	2,887,745	18.1	3,515,113	82.2
June 30, 2016*	795,055	3,634,073	2,839,018	21.9	3,537,226	80.3
June 30, 2017	985,694	3,691,719	2,706,025	26.7	3,563,584	75.9
June 30, 2018	1,213,918	3,340,709	2,126,791	36.3	3,605,116	58.9
June 30, 2019	1,442,522	3,133,202	1,690,680	46.0	3,648,428	46.3

**Reflects change in participation assumptions and plan design.*

Schedule of Funding Progress
Life Insurance Trust
(Dollars in thousands)

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liabilities (AAL)	Unfunded AAL (UAAL)	Funded Ratio	Covered Payroll	UAAL as a % of Covered Payroll
	A	B	(B-A)	(A/B)	C	[(B-A)/C]
June 30, 2010	$ 87,905	$ 92,091	$4,186	95.5 %	$ 3,321,614	0.13 %
June 30, 2011	88,527	88,088	(439)	100.5	3,451,756	(0.01)
June 30, 2012	92,241	91,398	(843)	100.9	3,479,567	(0.02)
June 30, 2013	94,863	94,325	(538)	100.6	3,480,066	(0.02)
June 30, 2014	96,130	97,354	1,224	98.7	3,486,327	0.04
June 30, 2015	97,186	98,739	1,553	98.4	3,515,113	0.04
June 30, 2016*	97,269	106,059	8,790	91.7	3,537,226	0.25
June 30, 2017	95,730	109,069	13,339	87.8	3,563,584	0.37
June 30, 2018	93,808	112,471	18,663	83.4	3,605,116	0.52
June 30, 2019	92,506	117,485	24,979	78.7	3,648,428	0.68

**Reflects change in decrement and participation assumptions.*

2. The information presented in the required supplementary schedules was determined as part of the actuarial valuation at June 30, 2019. Additional information as of the latest actuarial valuation follows.

Valuation Date	Actuarial Cost Method	Amortization Method	Remaining Amortization Period	Asset Valuation Method	Actuarial Assumptions: Rate of Return* Investment	Actuarial Assumptions: Investment Rate of Return*
June 30, 2019	Entry age	Level percent of pay, closed	21 years retiree medical plan 25 years life insurance plan	Five-year smoothed market	8%-retiree medical plan	7.5%-life insurance plan

	Pre-Medicare**	Medicare
Medical Trend Assumption	7.25%	5.25%
Ultimate Trend Rate	5%	5%
Year of Ultimate Trend Rate	2028	2021

**Includes price inflation at 3%.*

***Alternate trend rates were used for Medicare Part B premiums and are disclosed in Schedule D.*

Schedule of Employer Contributions
Health Insurance Trust

Fiscal Year Ended	Actuarially Determined Contribution (ADC)	Actual Employer Contribution	Percentage of ADC Contributed
	(A)	(B)	(B) / (A)
June 30, 2010	$ 457,054,117	$ 158,765,496	37.9 %
June 30, 2011	477,723,070	188,453,929	39.5
June 30, 2012	470,217,067	177,450,206	37.8
June 30, 2013	186,725,823	166,611,420	89.2
June 30, 2014	159,583,400	162,568,395	101.9
June 30, 2015	106,606,132	168,084,353	157.7
June 30, 2016	97,982,580	221,966,705	226.5
June 30, 2017	102,854,017	180,375,986	175.4
June 30, 2018	118,837,620	187,102,413	157.4
June 30, 2019	76,596,876	183,146,155	239.1

Schedule of Employer Contributions
Life Insurance Trust

Fiscal Year Ended	Actuarially Determined Contribution (ADC)	Actual Employer Contribution	Percentage of ADC Contributed
	(A)	(B)	(B) / (A)
June 30, 2010	$ 1,992,969	$ 1,966,826	98.7%
June 30, 2011	1,725,878	1,668,822	96.7
June 30, 2012	1,732,831	1,684,711	97.2
June 30, 2013	1,739,908	1,680,495	96.6
June 30, 2014	1,044,959	1,006,091	96.3
June 30, 2015	1,050,216	1,019,519	97.1
June 30, 2016	1,057,851	1,037,769	98.1
June 30, 2017	1,065,122	1,049,683	98.6
June 30, 2018	1,075,305	1,058,329	98.4
June 30, 2019	1,081,535	1,421,227	131.4

Schedule A

Results of the Valuation
June 30, 2019
(Dollars in thousands)

	Medical Insurance Trust	Life Insurance Trust
Payroll	$ 3,648,428	$ 3,648,428
Actuarial Accrued Liability		
Present value of prospective benefits payable in respect of:		
(a) Present active members	$ 1,528,884	$ 18,432
(b) Present terminated vested members	43,554	3,876
(c) Present retired members and covered spouses	1,560,764	95,177
(d) Total actuarial accrued liability	$ 3,133,202	$ 117,485
Present Assets for Valuation Purposes	$ 1,442,522	$ 92,506
Unfunded Actuarial Accrued Liability	$ 1,690,680	$ 24,979

Contributions	Fiscal Year Ended June 30, 2020	Fiscal Year Ended June 30, 2022
Normal	1.62%	0.03%
Accrued liability	3.27	0.04
Total	4.89%	0.07%

Health Insurance Trust
Solvency Test
(Dollars 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)
June 30, 2010	n/a	$ 1,948.6	$ 1,258.2	$ 241.2	n/a	12%	0%
June 30, 2011	n/a	1,910.1	1,513.1	294.8	n/a	15	0
June 30, 2012	n/a	2,046.7	1,547.9	338.7	n/a	17	0
June 30, 2013	n/a	2,001.8	1,519.3	412.2	n/a	21	0
June 30, 2014	n/a	1,771.9	1,422.8	508.9	n/a	29	0
June 30, 2015	n/a	1,982.2	1,543.4	637.8	n/a	32	0
June 30, 2016	n/a	1,950.9	1,683.2	795.1	n/a	41	0
June 30, 2017	n/a	1,985.1	1,706.6	985.7	n/a	50	0
June 30, 2018	n/a	1,692.3	1,648.4	1,213.9	n/a	72	0
June 30, 2019	n/a	1,604.3	1,528.9	1,442.5	n/a	90	0

Life Insurance Trust
Solvency Test
(Dollars in millions)

Valuation Date	Aggregate Actuarial Accrued Liability for (1) Active Member Contributions	(2) Retirants and Beneficiaries	(3) Active Members (Employer Financed Portion)	Valuation Assets	Portion of Accrued Liabilities Covered by Assets (1)	(2)	(3)
June 30, 2010	n/a	$74.4	$17.7	$87.9	n/a	100%	76%
June 30, 2011	n/a	72.2	15.9	88.5	n/a	100	103
June 30, 2012	n/a	75.2	16.2	92.2	n/a	100	105
June 30, 2013	n/a	78.1	16.2	94.9	n/a	100	104
June 30, 2014	n/a	81.0	16.3	96.1	n/a	100	93
June 30, 2015	n/a	82.7	16.0	97.2	n/a	100	91
June 30, 2016	n/a	89.0	17.1	97.3	n/a	100	49
June 30, 2017	n/a	92.1	17.0	95.7	n/a	100	21
June 30, 2018	n/a	94.2	18.3	93.8	n/a	99	0
June 30, 2019	n/a	99.1	18.4	92.5	n/a	93	0

Schedule B

Development of the Actuarial Value of Assets
Health Insurance Trust
June 30, 2019

(1)	Actuarial value of assets beginning of year		$ 1,213,917,592
(2)	Market value of assets end of year		1,414,020,056
(3)	Market value of assets beginning of year		1,190,280,808
(4)	Cash flow		
	a.	Contributions	372,590,436
	b.	Benefit payments	221,433,478
	c.	Administrative expense	1,803,192
	d.	Net: (4)a - (4)b - (4)c	149,353,766
(5)	Investment Income		
	a.	Market total: (2) - (3) - (4)d	74,385,482
	b.	Assumed rate	8%
	c.	Amount for immediate recognition: [(3) x (5)b] + [(4)d x (5)b x 0.5]	101,196,615
	d.	Amount for phased-in recognition: (5)a - (5)c	(26,811,133)
(6)	Phased-in recognition of investment income		
	a.	Current year: 0.20 x (5)d	(5,362,227)
	b.	First prior year	(2,260,479)
	c.	Second prior year	6,277,740
	d.	Third prior year	(12,827,105)
	e.	Fourth prior year	(7,773,885)
	f.	Total recognized investment gain	(21,945,956)
(7)	Actuarial value of assets end of year: (1) + (4)d + (5)c + (6)f		1,442,522,017
(8)	Difference between market & actuarial values: (2) - (7)		$ (28,501,961)
(9)	Rate of return on actuarial value		6.15%

Development of the Actuarial Value of Assets
Life Insurance Trust
June 30, 2019

(1)	Actuarial value of assets beginning of year		$ 93,808,352
(2)	Market value of assets end of year		85,758,279
(3)	Market value of assets beginning of year		84,462,256
(4)	Cash flow		
	a.	Contributions	1,421,227
	b.	Benefit payments	5,153,000
	c.	Administrative expense	30,392
	d.	Net: (4)a - (4)b - (4)c	(3,762,165)
(5)	Investment Income		
	a.	Market total: (2) - (3) - (4)d	5,058,188
	b.	Assumed rate	7.5%
	c.	Amount for immediate recognition: [(3) x (5)b] + [(4)d x (5)b x 0.5]	6,193,588
	d.	Amount for phased-in recognition: (5)a - (5)c	(1,135,400)
(6)	Phased-in recognition of investment income		
	a.	Current year: 0.20 x (5)d	(227,080)
	b.	First prior year	(1,061,385)
	c.	Second prior year	(1,150,797)
	d.	Third prior year	(353,444)
	e.	Fourth prior year	(941,278)
	f.	Total recognized investment gain	(3,733,984)
(7)	Actuarial value of assets end of year: (1) + (4)d + (5)c + (6)f		92,505,791
(8)	Difference between market & actuarial values: (2) - (7)		$ (6,747,512)
(9)	Rate of return on actuarial value		2.68%

Schedule C

Medical Insurance Trust
Summary of Receipts & Disbursements
(Market Value)

	For the Year Ended June 30, 2019	For the Year Ended June 30, 2018
Receipts for the Year		
Contributions		
Members statutory	$ 131,676,820	$ 130,777,471
Payment by retired members	57,767,461	57,683,452
Total members	189,444,281	188,460,923
State statutory contributions	22,674,899	22,424,350
Employer contributions	106,764,314	106,143,410
State statutory - transition fund/KEHP	53,706,942	58,534,652
Total employer	183,146,155	187,102,412
Grand total	372,590,436	375,563,335
Net investment income	74,385,482	76,840,513
Total	446,975,918	452,403,848
Disbursements for the Year		
Administrative expense	1,803,192	1,747,561
Medical insurance expense	221,433,478	218,765,152
Total	223,236,670	220,512,713
Excess of Receipts Over Disbursements	223,739,248	231,891,135
Reconciliation of Asset Balances		
Asset balance as of the beginning of the year	1,190,280,808	958,389,673*
Excess of receipts over disbursements	223,739,248	231,891,135
Asset balance as of the end of the year	$1,414,020,056	$1,190,280,808
Investment rate of return on market value	6.11%	8.67%

**Adjustment at beginning of the year*

Life Insurance Trust
Summary of Receipts & Disbursements
(Market Value)

	For the Year Ended	
	June 30, 2019	June 30, 2018
Receipts for the Year		
Contributions		
Members	$	$
State	1,209,055	896,974
Employer	212,172	161,355
Total	1,421,227	1,058,329
Net investment income	5,058,188	1,110,421
Total	6,479,415	2,168,750
Disbursements for the Year		
Benefit payments	5,153,000	5,452,920
Miscellaneous, including expenses	30,392	30,979
Total	5,183,392	5,483,899
Excess of Receipts Over Disbursements	1,296,023	(3,315,149)
Reconciliation of Asset Balances		
Asset balance as of the beginning of the year	84,462,256	87,777,405
Excess of receipts over disbursements	1,296,023	(3,315,149)
Asset balance as of the end of the year	$ 85,758,279	$ 84,462,256
Investment rate of return on market value	6.49%	1.30%

Schedule D

Statement of Actuarial Assumptions and Methods

The rates of retirement, disability, mortality, termination, salary increases, and rates of future benefit participation used in the valuation were selected based on the actuarial experience study prepared as of June 30, 2015, submitted to and adopted by the board on Sept. 19, 2016. The health care cost trend rates, and expected plan costs were determined by the actuary based on recent experience.

Valuation Date — June 30, 2019

Discount Rate — 8% per annum, compounded annually for Health Insurance Trust.
7.5% per annum, compounded annually for Life Insurance Trust.

Health Care Cost Trend Rates — Following is a chart detailing trend assumptions.

	Annual Trend Rate		
Fiscal Year Ended	**Medicare Part B**	**Under Age 65**	**Age 65 and Over**
2020	6.49%	7.25%	5.25%
2021	3.95	7.00	5.125
2022	4.40	6.75	5.00
2023	5.68	6.50	5.00
2024	6.22	6.25	5.00
2025	5.97	6.00	5.00
2026	5.90	5.75	5.00
2027	5.90	5.50	5.00
2028	5.90	5.25	5.00
2029	5.50	5.00	5.00
2030	5.25	5.00	5.00
2031 and beyond	5.00	5.00	5.00

Age Related Morbidity — For retirees ages 65 and older, per capita health care costs are adjusted to reflect expected health care cost changes related to age. The increase to the net incurred health care claims is assumed to be as follows.

Participant Age	Annual Increase
65 – 69	3%
70 – 74	2.5
75 – 79	2
80 – 84	1
85 - 89	0.5
90 and over	0

For the retiree health care liabilities of those under age 65, the current premium charged by the Kentucky Employees' Health Plan (KEHP) is used as the base cost and is projected forward using the health care trend assumption. No implicit rate subsidy is calculated or recognized as the implicit rate subsidy is deemed the responsibility of the KEHP. Under Actuarial Standard of Practice No. 6 (ASOP No. 6), aging subsidies (or implicit rate subsidies) should be recognized, as the differences in health care utilization and cost due to age have been demonstrated and well quantified. The impact of aging on a valuation's results can be as significant as the use of mortality, trend, and discounting. It has been the long-standing position that the responsibility for compliance with GASB Statement No. 43, when it relates to KEHP implicit subsidies, rests with KEHP, not the system, as the system has no operational authority over KEHP. As such, KEHP implicit subsidies are excluded from the OPEB valuation process of the retiree medical plan. As GASB 74 and 75 prohibit such a deviation from ASOP No. 6, additional consideration to the current treatment of KEHP implicit rate subsidies may be needed in the future. Valuing the KEHP implicit subsidies will increase the actuarial accrued liability for GASB 74 and 75 purposes.

Retiree Medical Plan Costs — Assumed per capita health care costs were based on past experience and trended based on the assumptions. Following are charts detailing retiree per capita assumptions. These amounts include medical, drug, and administrative costs and represent the amount that the system pays as the full contribution amount. An additional $7.44 per month is paid to the Department of Employee Insurance (DEI) and is not included in the under-age-65 costs listed below. For retirees ages 65 and older, the average costs shown are normalized to age 65, and then age adjusted in calculating liabilities.

Monthly Under Age 65 (KEHP) Full Costs as of January 1, 2020

Tier Elected	LivingWell CDHP	LivingWell PPO	LivingWell Basic CDHP	LivingWell Limited HDP
Single	$ 711	$ 732	$ 684	$ 608
Parent Plus	982	1,044	943	867
Couple	1,343	1,605	1,458	1,334
Family	1,501	1,787	1,625	1,485
Family C-R	821	881	802	732

Average Monthly TRS Full Costs & Contributions

Calendar Year	Under Age 65 (KEHP) Contributions	Age 65 & Over (MEHP) Full Costs	Age 65 & Over (MEHP) Contributions
2008	484	278	278
2009	545	301 [1]	301
2010	594	373 [1]	373
2011	626	289 [1]	289
2012	622	270 [2]	270
2013	635	294 [2]	294
2014	679	290 [2]	290
2015	669	240 [2]	240
2016	681	260 [2]	260
2017	680	252 [2]	252
2018	688	258 [2]	258
2019	691	226 [3]	226
2020	694	224 [3]	224

1 *Under GASB 45, cost reductions for the amount of the Medicare Part D Retiree Drug Subsidy could not be taken into account in the gross cost calculations.*

2 *2,257 current, Medicare-eligible benefit recipients have been identified by the client to be ineligible for premium-free Medicare Part A benefits. For these individuals, the full cost of coverage is, on average, $575 per month. It is assumed 9% of current retirees under the age of 65 who were hired prior to April 1, 1986 will be ineligible for premium-free Medicare Part A benefits upon reaching Medicare eligibility (age 65) and 0% of these retirees will cover a spouse. All active members are assumed to have begun contributing to Medicare as of April 1, 1986 and are assumed eligible for premium- free Medicare Part A benefits.*

3 *Blended basis, includes increased costs for retirees without premium-free Medicare Part A. All active members are assumed to have begun contributing to Medicare as of April 1, 1986 and are assumed eligible for premium-free Medicare Part A benefits.*

Current Retiree Medical Plan Participation — Actual census data and current plan elections (including waivers) provided by the system were used for those retirees currently participating in the retiree medical plan. Current participants are assumed to maintain their current retiree medical plan coverage until they are no longer eligible.

Anticipated Retiree Medical Plan Participation — The assumed annual rates of health care plan participation for future retirees are as follows.

Member Participation

Years of Service	Entered TRS Before July 1, 2002	Entered TRS After June 30, 2002 & Before July 1, 2008	Entered TRS After June 30, 2008
5-9.99	20 %	20%	Not Eligible
10-14.99	49	20	Not Eligible
15-19.99	70	41	41%
20-24.99	91	61	61
25-25.99	91	76	76
26-26.99	91	84	84
27 or more	91	91	91

Anticipated Retiree Medical Plan Elections — The assumed rates of plan election for future retirees participating in the KEHP plans are provided in the following table. As the assumed plan election rates are estimates and actual results may be materially different, this assumption will need to be revised as experience evolves.

LivingWell CDHP	LivingWell PPO	LivingWell Basic CDHP	LivingWell Limited HDP
54%	42%	3%	1%

Spouse Coverage in Medical Plan — Actual census data and current plan elections were used for MEHP- and KEHP-covered spouses (including beneficiaries) of current retirees. For spouses of future retirees, 25% of future male retirees are assumed to cover their spouse and 15% of future female retirees are assumed to cover their spouse. Male retirees are assumed to be three years older than their spouse and female retirees are assumed to be one year younger than their spouse.

Disabled Dependent Children in Retiree Medical Plan — The liability associated with disabled dependent children was determined to be de minimis and was therefore excluded from this valuation.

Withdrawal Assumption — Future vested members who terminate employment prior to retirement are assumed to elect to withdraw their contributions based upon their age and service at termination of employment as follows.

Rates of Withdrawal Upon Termination of Employment

Age at Termination of Employment	Years of Service 5 - 10	10 - 15	15+
Under Age 55	20%	15%	10%
Ages 55+	10%	10%	10%

All vested members who terminate employment prior to retirement are assumed to elect to withdraw their contributions prior to receiving a pension benefit based upon their service as follows.

Rates of Withdrawal Prior to Receiving a Pension Benefit

Years of Service 5 - 10	10 - 15	15 - 27	27+
25%	15%	10%	25%

All vested members who terminate employment prior to retirement and who are assumed to elect to receive a pension benefit are assumed to begin receiving their benefit at age 60.

Payroll Growth — 3.5% per annum, compounded annually.

Price Inflation — 3% per annum, compounded annually.

Affordable Care Act (ACA) — The impact of the Affordable Care Act (ACA) was addressed in this valuation. Review of the information currently available did not identify any specific provisions of the ACA that are anticipated to significantly impact results. While the impact of certain provisions such as the potential future implementation of the excise tax on high-value health insurance plans (if applicable), mandated benefits and participation changes due to the individual mandate should be recognized in the determination of liabilities, overall future plan costs and the resulting liabilities are driven by the assumed rate of health care inflation (i.e., trend). The trend assumption forecasts the anticipated increase to initial per capita costs, taking into account health care cost inflation, increases in benefit utilization, government-mandated benefits, and technological advances. Given the uncertainty regarding the ACA's implementation (e.g., the impact of excise tax on high-value health insurance plans, changes in participation resulting from the implementation of state-based health insurance exchanges), continued monitoring of the ACA's impact on the retiree medical plan's liability will be required.

Asset Valuation Method — 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. The amount recognized each year is 20% of the difference between market value and expected actuarial value. The ultimate assumed valuation rate of return is assumed to be 8% for the Health Insurance Trust and 7.5% for the Life Insurance Trust.

Actuarial Cost Method — 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, and gender. 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. 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 deferred vested members to obtain the present value of all expected benefits payable from the system on account of the present group of members and beneficiaries.

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 accrued liability contribution.

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.

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.

Separations From Service — Representative values of the assumed annual rates of salary increases, death, disability, withdrawal, service retirement and early retirement are as follows.

Males: Annual Rate of								
				Withdrawal Years of Service			Retirement	
Age	Salary*	Death	Disability	0 - 4	5 - 9	10+	Before 27 Years of Service	After 27 Years of Service **
20	7.20%	0.019%	0.01%	11.00%				
25	6.40	0.021	0.01	11.00	3.00%			
30	5.40	0.025	0.01	11.00	3.00	3.00%		
35	4.70	0.043	0.04	12.00	3.50	1.40		
40	4.20	0.060	0.09	12.00	4.50	1.40		
45	3.80	0.084	0.20	12.00	4.50	1.30		17.0%
50	3.70	0.119	0.30	14.00	4.50	1.90		17.0
55	3.50	0.202	0.58	15.00	4.50	2.40	5.0%	45.0
60	3.50	0.340	0.75	15.00	4.00	2.40	13.0	35.0
62	3.50	0.419	0.75	15.00	3.80	2.40	15.0	25.0
65	3.50	0.565	0.75	15.00	3.50	2.40	20.0	25.0
70	3.50	0.913	0.75	20.00	0.00	0.00	20.0	20.0
75	3.50	1.556	0.75	20.00	0.00	0.00	100.0	100.0

Females: Annual Rate of								
				Withdrawal Years of Service			Retirement	
Age	Salary*	Death	Disability	0 - 4	5 - 9	10+	Before 27 Years of Service	After 27 Years of Service **
20	7.20%	0.007%	0.01%	9.00%				
25	6.40	0.008	0.01	9.00	4.00%			
30	5.40	0.010	0.03	12.00	4.00	1.65%		
35	4.70	0.018	0.06	12.00	4.00	1.50		
40	4.20	0.026	0.12	12.00	4.00	1.30		
45	3.80	0.042	0.25	13.00	4.00	1.20		15.0%
50	3.70	0.062	0.44	13.00	5.00	1.50		18.0
55	3.50	0.096	0.65	15.00	5.00	2.00	5.5%	50.0
60	3.50	0.157	0.85	15.00	5.00	2.00	14.0	40.0
62	3.50	0.197	0.85	15.00	4.60	2.00	14.0	40.0
65	3.50	0.287	0.85	15.00	4.00	2.00	22.0	35.0
70	3.50	0.495	0.85	15.00	0.00	0.00	20.0	35.0
75	3.50	0.831	0.85	15.00	0.00	0.00	100.0	100.0

**Includes wage inflation at 3.5% per annum.*

***Plus 7.5% in year when first eligible for unreduced retirement with 27 years of service.*

Deaths After Retirement: The RP-2000 Combined Mortality Table projected to 2025 using scale BB (set forward two years for males and one year for females) is used for death after service retirement and beneficiaries. The RP-2000 Disabled Mortality Table (set forward two years for males and seven years for females) is used for death after disability retirement. There is a margin for future mortality improvement in the tables used by the system. Based on the results of the most recent experience study adopted by the board on Sept. 19, 2016, the numbers of expected future deaths are 15-19% less than the occurred during the study period for healthy retirees and 13-17% less than expected under the selected table for disabled retirees. Representative values of the assumed annual rates of death after service retirement and after disability retirement are shown here.

Annual Rate of Death After

	Service Retirement		Disability Retirement	
Age	Male	Female	Male	Female
45	0.1609%	0.1135%	2.3306%	1.2482%
50	0.2474	0.1718	2.9279	1.5650
55	0.4246	0.2658	3.4400	1.7807
60	0.6985	0.4409	3.5881	2.3164
65	1.1300	0.8100	3.8275	3.1687
70	1.8697	1.3739	4.7566	4.4032
75	3.2147	2.2899	6.3153	6.0857
80	5.5160	3.7551	8.3527	8.4679
85	9.5631	6.3873	10.9122	12.7572
90	17.2787	11.2476	17.2787	19.4718
95	27.1263	18.1190	27.1263	24.2074

Schedule E

Summary of Main Plan Provisions as Interpreted for Valuation Purposes

Eligibility for Access to Retiree Medical Coverage

Service Retirement — For employees hired prior to July 1, 2008, retiree medical plan coverage eligibility is attained when an employee retires, which is possible after the completion of 27 years of service or attainment of age 55 and five years of service with reduced pension benefits. For employees hired on or after July 1, 2008, employees may retire after the completion of 27 years of service; the attainment of age 55 and 10 years of service with reduced pension benefits; or the attainment of age 60 and five years of service with unreduced pension benefits, but must complete a minimum of 15 years of service to be eligible for retiree medical plan coverage.

Disability Retirement — Disabled employees hired prior to July 1, 2008, with at least five years of service, who are totally and permanently incapable of being employed as a teacher, are eligible for retiree medical plan coverage upon approval for TRS disability retirement benefits. Disabled employees hired after July 1, 2008, must have 15 years of service to be eligible for retiree medical plan coverage upon approval for TRS disability retirement benefits.

Members and dependents under age 65 and eligible for Medicare due to a disability after Jan. 1, 2013, are only eligible to enroll in the MEHP. Under-age-65 members who retired prior to January 1, 2013, are grandfathered from this requirement and allowed a choice of KEHP or MEHP coverage. Actual census data and current plan elections were used for current disabled retirees. All future disabled members under the age of 65 with Medicare are placed on the MEHP and not the KEHP. This has been consistently applied since 2013.

Survivors — Spouses of employees who die in service while eligible to retire, as well as survivors of service and disabled retirees, are eligible for retiree medical plan coverage if elected within 30 days of the employee's/retiree's death with no future remarriage. Otherwise, survivor is not eligible for retiree medical plan coverage.

Spousal Shared Risk Waiver for MEHP — Beginning in 2013, eligible spouses who waive the MEHP coverage, will no longer have the opportunity to enroll during any annual MEHP open enrollment so most spousal waivers on the MEHP are now permanent waivers unless a TRS-specific qualifying event is met. This does not apply to the KEHP. This MEHP eligibility rule became necessary to mitigate spousal adverse selection with zero premium Medicare Advantage plans on the individual and open market.

Termination — For employees hired prior to July 1, 2008, and who terminated with at least five years of service, retiree medical plan coverage eligibility is attained at age 60 with unreduced pension benefits. For employees hired on or after July 1, 2008, and who terminated with at least 15 years of service, retiree medical plan coverage eligibility is attained at age 60 with unreduced pension benefits.

Reemployed Retirees — Effective Jan. 1, 2019, and because of the Affordable Care Act (ACA) and Medicare secondary payer (MSP) federal rules, if a TRS retiree returns to work and is offered the same health insurance coverage as any full time employee (whether the KEHP, MEHP or another plan), then the member must waive coverage through TRS. For valuation purposes, active employees identified as currently receiving retiree health care through the system are valued as retirees.

Covered Member Retiree Medical Plan Contributions

Under Age 65 Retiree Shared Responsibility Contribution — Effective July 1, 2010, retirees under the age of 65 began a three-year phase-in of the Shared Responsibility contribution. This contribution reduces the applicable amount of the full contribution provided by the system to retirees, by adjusting the Shared Responsibility Contribution amount by 100% less the appropriate percentage from the Retiree Percentage Contribution table below. Effective July 1, 2012, the full Shared Responsibility Contribution equals the Standard Medicare Part B premium paid by retirees ages 65 and older.

Monthly Under Age 65 Shared Responsibility Contribution Timeline

Effective Date	Medicare Part B Monthly Cost	Formula	Shared Responsibility Contribution
July 1, 2010	$ 110.50	(1/3 x $110.50)	$ 37.00
January 1, 2011	115.40	(1/3 x 115.40)	39.00
July 1, 2011	115.40	(2/3 x 115.40)	77.00
January 1, 2012	99.90	(2/3 x 99.90)	66.00
July 1, 2012	99.90	99.90	99.90
January 1, 2013	104.90	104.90	104.90
January 1, 2014	104.90	104.90	104.90
January 1, 2015	104.90	104.90	104.90
January 1, 2016	121.80	121.80	121.80
January 1, 2017	134.00	134.00	134.00
January 1, 2018	134.00	134.00	134.00
January 1, 2019	135.50	135.50	135.50
January 1, 2020	144.30	144.30	144.30

Retiree Years of Service Percentage Contribution — Retirees contribute the following percentages based on years of service at retirement, which are then applied to the Retiree Contribution Rate Basis.

Retiree Percentage Contribution*

Years of Service	Hired before July 1, 2002: Age 65 or Older and Covered Before Jan.1, 2005	Hired before July 1, 2002: Age 65 After or Covered After Dec.31, 2004	Entered TRS After June 30, 2002 and Before July 1, 2008	Entered TRS After June 30, 2008
5 - 9.99	30%	75%	90%	Not Eligible
10 - 14.99	20	50	75	Not Eligible
15 - 19.99	10	25	55	55%
20 - 24.99	0	0	35	35
25 - 25.99	0	0	10	10
26 - 26.99	0	0	5	5
27 or more	0	0	0	0

** 0% for disabled retirees that retired prior to 1/1/2002.*

Monthly Retiree Contribution Rate Basis
Effective Jan. 1, 2020

	Under Age 65 (KEHP)				MEHP
Tier Elected	LivingWell CDHP	LivingWell PPO	LivingWell Basic CDHP	LivingWell Limited HDP	Ages 65 and Older (MEHP)
Single	$ 660.04	$ 646.96	$ 656.60	$ 583.96	$ 224.00
Parent Plus	851.84	802.26	878.24	808.92	n/a
Couple	1,029.02	1,060.74	1,189.96	1,093.10	n/a
Family	1,131.64	1,105.34	1,303.24	1,196.18	n/a
Family Cross-Reference	738.64	719.12	771.84	704.70	n/a

Under Age 65 Retiree Plan Cost Contribution — An additional contribution according to the table below is required to be paid by retirees under the age of 65 based upon the plan elected and the date of retirement.

Monthly Under Age 65 Plan Cost Contribution*
Effective Jan. 1, 2020

Tier Elected	LivingWell CDHP	LivingWell PPO	LivingWell Basic CDHP	LivingWell Limited HDP
Single	$50.90	$84.86	$26.98	$24.28
Parent Plus	130.46	241.86	64.28	57.84
Couple	313.76	544.22	267.86	241.08
Family	368.86	682.12	321.42	289.28
Family Cross-Reference	82.72	162.28	29.98	26.98

**Does not include the additional contribution required to be paid by retirees under the age of 65 who use tobacco ($40 for Single or Family Cross-Reference, and $80 for Parent Plus, Couple or Family). Also, this does not include the additional contribution required to be paid by retirees under the age of 65 who do not complete their LivingWell Promise, which is an additional $40 per month for all levels of coverage-single, parent +, couple, and family. Approximately 2,500 retirees across all four KEHP plans did not complete their LivingWell Promise for 2019. The additional contribution for these retirees will begin in 2020. For valuation purposes, it is conservatively assumed that, over time, 100% of KEHP retirees will complete their LivingWell Promise. This assumption will be monitored in future experience studies.*

Spouse Contributions — The full cost for non-Medicare eligible dependents is paid through a combination of payments from beneficiaries and the state. Spouses of current post-65 retirees and surviving spouses of deceased retirees with a date of death on or after July 1, 2002, pay 100% of the full contribution. Spouses of active members who died while eligible to retire prior to July

1, 2002, are provided the same subsidy by the system that would have been provided to the retiree for the lifetime of the spouse, or until remarriage. Spouses of active members who die while eligible to retire on or after July 1, 2002, or later pay 100% of the full contribution.

Survivors — Spouses of employees who die in service while eligible to retire, as well as survivors of service and disabled retirees, are eligible for retiree medical plan coverage if elected within 30 days of the employee's/retiree's death with no future remarriage. Otherwise, survivor is not eligible for retiree medical plan coverage.

Spousal Shared Risk Waiver for MEHP — Beginning in 2013, eligible spouses who waive the MEHP coverage, will no longer have the opportunity to enroll during any annual MEHP open enrollment so most spousal waivers on the MEHP are now permanent waivers unless a TRS-specific qualifying event is met. This does not apply to the KEHP. This MEHP eligibility rule became necessary to mitigate spousal adverse selection with zero premium Medicare Advantage plans on the individual and open market.

Monthly Surviving Spouse Contribution
Effective Jan. 1, 2020

	Under Age 65 (KEHP)				MEHP
Tier Elected by Surviving Spouse	LivingWell CDHP	LivingWell PPO	LivingWell Basic CDHP	LivingWell Limited HDP	Age 65 and Older (MEHP)
Single	$ 718.38	$ 739.26	$ 691.02	$ 615.68	$ 224.00
Parent Plus	989.74	1,051.56	949.96	874.20	n/a

System Retiree Medical Plan Contributions — The system Contribution Rate Basis is determined annually by the system; and the full cost is projected based on historical claims data. For retirees, the following percentages are based on years of service at retirement and are then applied to the system Contribution Rate Basis.

Percentage of System Contribution Rate Provided to Retirees*

Years of Service	Entered TRS Before July 1, 2002: Age 65 or Older & Covered Before Jan. 1, 2005	Entered TRS Before July 1, 2002: Age 65 After or Covered After Dec. 31, 2004	Entered TRS After June 30, 2002 and Before July 1, 2008	Entered TRS After June 30, 2008
5 - 9.99	70%	25%	10%	Not Eligible
10 - 14.99	80	50	25	Not Eligible
15 - 19.99	90	75	45	45%
20 - 24.99	100	100	65	65
25 - 25.99	100	100	90	90
26 - 26.99	100	100	95	95
27 or more	100	100	100	100

**100% for disabled retirees that retired prior to January 1, 2002.*

Monthly System Contribution Rate Basis
Effective Jan. 1, 2020

Tier Elected	Under Age 65 (KEHP)*: LivingWell CDHP	LivingWell PPO	LivingWell Basic CDHP	LivingWell Limited HDP	MEHP: Ages 65 and Older (MEHP)
Single	$ 660.04	$ 646.96	$ 656.60	$ 583.96	$ 224.00
Parent Plus	851.84	802.26	878.24	808.92	n/a
Couple	1,029.02	1,060.74	1,189.96	1,093.10	n/a
Family	1,131.64	1,105.34	1,303.24	1,196.18	n/a
Family Cross-Reference	738.64	719.12	771.84	704.70	n/a

**Irrespective of a participating retiree's service, an additional $7.44 per month is paid by the system to the Department of Employee Insurance (DEI) for KEHP coverage.*

Active Member Retiree Medical Plan Contributions — Actively employed members make payroll contributions to the Health Insurance Trust based upon the following schedule.

Active Member Percentage of Payroll Contribution Made to Health Insurance Trust

University Employees: Hired Before July 1, 2008	University Employees: Hired on or After July 1, 2008	School District Employees (Non-Federal): Hired Before July 1, 2008	School District Employees (Non-Federal): Hired on or After July 1, 2008	Other Employees: Hired Before July 1, 2008	Other Employees: Hired on or After July 1, 2008
2.775 %	2.775 %	3.750 %	3.750%	3.750 %	3.750 %

Life Insurance Plan Benefits — Effective July 1, 2000, the Teachers' Retirement System shall:

(a) Provide a life insurance benefit in a minimum amount of $5,000 for its members who are retired for service or disability. This life insurance benefit shall be payable upon the death of a member retired for service or disability to the member's estate or to a party designated by the member on a form prescribed by the retirement system; and

(b) Provide a life insurance benefit in a minimum amount of $2,000 for its active contributing members. This life insurance benefit shall be payable upon the death of an active contributing member to the member's estate or to a party designated by the member on a form prescribed by the retirement system.

Note — Members employed on a substitute or part-time basis and working at least 69% of a full contract year in a single fiscal year will be eligible for a life insurance benefit for the balance of the fiscal year or the immediately succeeding fiscal year under certain conditions. For non-vested members employed on a substitute or part-time basis, the life insurance benefit is provided if death occurs as the result of a physical injury on the job. For vested members employed on a substitute or part-time basis, death does not have to be the result of a physical injury on the job for life insurance benefits to be provided.

Schedule F

Table 1
Age - Service Table
Distribution of Active Members as of June 30, 2019
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	Number	Payroll
Under 25	1,884	1,655	5							3,544	$ 78,310,776
25 to 29	971	4,560	1,752	1						7,284	287,762,572
30 to 34	614	1,965	4,431	1,572						8,582	407,539,614
35 to 39	706	1,524	2,173	4,510	1,551	9				10,473	559,874,557
40 to 44	610	1,190	1,375	2,103	4,096	1,196	3			10,573	614,043,506
45 to 49	534	938	1,074	1,501	2,026	3,846	1,015	4		10,938	671,896,297
50 to 54	632	674	649	965	1,242	1,700	2,005	335	3	8,205	497,549,540
55 to 59	846	778	468	580	900	994	732	248	47	5,593	294,393,011
60 to 64	786	936	337	264	450	475	380	102	40	3,770	152,726,863
65 to 69	563	808	273	120	154	167	124	50	40	2,299	61,148,793
70 & Over	362	549	252	79	39	32	32	16	25	1,386	23,182,181
Total Count	8,508	15,577	12,789	11,695	10,458	8,419	4,291	755	155	72,647	$ 3,648,427,710

Average Age: 43.6 Average Service: 11.0

Table 2
Schedule of Total Active Member Valuation Data

Valuation Date June 30	Number	Annual Payroll	Annual Average Pay	Percentage Increase in Average Pay
2010	76,387	$3,321,614,223	$43,484	1.51%
2011	76,349	3,451,756,288	45,210	3.97
2012	75,951	3,479,567,004	45,813	1.33
2013	74,831	3,480,066,406	46,506	1.51
2014	73,407	3,486,326,799	47,493	2.12
2015	72,246	3,515,113,126	48,655	2.45
2016	71,848	3,537,226,348	49,232	1.19
2017	72,130	3,563,584,342	49,405	0.35
2018	72,205	3,605,115,787	49,929	1.06
2019	72,647	3,648,427,710	50,221	0.58

Table 3

Eligible Deferred Vested Members
as of June 30, 2019
Health Insurance Trust
Male and Female Demographic Breakdown

Attained Age	Number of Males	Number of Females	Total Number
Under 30	0	0	0
30-34	23	104	127
35-39	246	826	1,072
40-44	306	910	1,216
45-49	346	1,120	1,466
50-54	259	1013	1,272
55-59	239	856	1,095
60 & Over	252	768	1,020
Total	1,671	5,597	7,268

Eligible Deferred Vested Members
as of June 30, 2019
Life Insurance Trust
Male and Female Demographic Breakdown

Attained Age	Number of Males	Number of Females	Total Number
Under 30	9	26	35
30-34	140	525	665
35-39	347	1,049	1,396
40-44	367	1,093	1,460
45-49	387	1,297	1,684
50-54	284	1,127	1,411
55-59	268	933	1,201
60 & Over	298	842	1,140
Total	2,100	6,892	8,992

Table 4

All Retirees and Spouses Receiving Health Care Benefits as of June 30, 2019 Male and Female Demographic Breakdown

Attained Age	Number of Males	Number of Females	Total Number
Under 40	1	10	11
40-44	11	37	48
45-49	72	179	251
50-54	450	1,069	1,519
55-59	1216	2,802	4,018
60-64	2,202	4,849	7,051
65-69	3,362	7,762	11,124
70-74	3,652	7,062	10,714
75-79	2,343	4,121	6,464
80-84	1,380	2,362	3,742
85-89	710	1,406	2,116
90-94	212	722	934
95-99	50	206	256
100 and over	3	29	32
Total	15,664	32,616	48,280

Table 5

Schedule of Retirees, Beneficiaries and Survivors Added To and Removed From Rolls *

Health Insurance Trust

Year Ended June 30	Members Added	Spouses** Added	Total Added	Members Removed	Spouses** Removed	Total Removed	Members at Year End	Spouses** at Year End	Total at Year End
2010	1,710	555	2,265	876	529	1,405	34,315	6,834	41,149
2011	1,770	629	2,399	1,052	541	1,593	35,033	6,922	41,955
2012	1,996	702	2,698	1,029	616	1,645	36,000	7,008	43,008
2013	1,853	664	2,517	1,076	619	1,695	36,777	7,053	43,830
2014	1,663	638	2,301	1,165	660	1,825	37,275	7,031	44,306
2015	1,990	731	2,721	1,190	633	1,823	38,075	7,129	45,204
2016	2,045	726	2,771	1,305	674	1,979	38,815	7,181	45,996
2017	1,835	699	2,534	1,153	691	1,844	39,497	7,189	46,686
2018	1,903	828	2,731	1,170	422	1,592	40,230	7,595	47,825
2019	1,701	666	2,367	1,220	692	1,912	40,711	7,569	48,280

*Reflects members, spouses, and beneficiaries participating in a health care plan.
**Includes spouses, beneficiaries, and surviving spouses.

Table 6
Schedule of Retirees, Beneficiaries and Survivors Added To and Removed From Rolls *
Life Insurance Trust

(Dollars in thousands except Average Life Insurance Benefit)

Year Ended June 30	Number Added	Life Insurance Benefit	Number Removed	Life Insurance Benefit	Number at Year End	Life Insurance Benefit	Increase in Life Insurance Benefit	Average Life Insurance Benefit
2010	1,799	$8,995	806	$4,030	39,951	$199,755	2.55%	$5,000
2011	2,025	10,125	858	4,290	41,118	205,590	2.92	5,000
2012	2,364	11,820	880	4,400	42,602	213,010	3.61	5,000
2013	2,195	10,975	952	4,760	43,845	219,225	2.92	5,000
2014	1,964	9,820	954	4,770	44,855	224,275	2.30	5,000
2015	2,270	11,350	1,641	8,205	45,484	227,420	1.40	5,000
2016	2,394	11,970	807	4,035	47,071	235,355	3.49	5,000
2017	2,175	10,875	1,021	5,105	48,225	241,125	2.45	5,000
2018	2,605	13,025	1,408	7,040	49,422	247,110	2.48	5,000
2019	2,226	11,130	210	1,050	51,438	257,190	4.08	5,000

** The life insurance benefit is payable upon the death of only members retired for service or disability. Numbers do not include life insurance benefits payable upon the death of an active contributing member.*

Sensitivity Analysis
Health Insurance Trust
as of June 30, 2019

The June 30, 2019, valuation results of the Health Insurance Trust are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing cost. The charts on the following pages provide a simple analysis on how the costs are sensitive to changes to the assumed discount rate, the assumed inflation rate, the assumed rate of payroll growth, and the assumed rates of health care inflation (trend). The charts show the actuarial accrued liability, the unfunded liability, the funded ratio and the employer contribution rate under the following scenarios:

- The discount rate assumption sensitivity analysis shows the valuation results with the baseline discount rate assumption, 8%, together with a decrease in the discount rate to 7% and an increase in the discount rate to 9%. Under this scenario, the underlying inflation rate assumption is held constant at 3% and the payroll growth assumption is held constant at 3.5%.
- The inflation assumption sensitivity analysis shows the valuation results with the baseline underlying inflation rate assumption, 3%, together with decreases in the inflation rate to 2.75% and 2.5%. Under this scenario, the decrease in the underlying inflation rate assumption leads to corresponding decreases in the discount rate, the payroll growth assumption, and the assumed rates of salary increase for active members. The assumed decreases in inflation are not assumed to impact the assumed rates of health care inflation (trend).
- The wage inflation assumption sensitivity analysis shows the valuation results with the baseline underlying payroll growth assumption, 3.5%, together with decreases in the wage inflation assumption to 2% and 0%. 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 liability, leading to higher employer contribution rates.
- The health care inflation (trend) assumption sensitivity analysis shows the valuation results with the baseline trend assumption along with a 1% increase in all assumed trend rates and a 1% decrease in all assumed trend rates.

Assumed Discount Rate Sensitivity Analysis
(Dollars in thousands)

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
Actuarial accrued liability	$ 3,563,566	$ 3,133,202	$ 2,778,342
Actuarial value of assets	1,442,522	1,442,522	1,442,522
Unfunded liability	$ 2,121,044	$ 1,690,680	$ 1,335,820
Funded ratio	40.48 %	46.04 %	51.92 %
Contributions			
Normal cost	2.14 %	1.62 %	1.24 %
Accrued liability	3.78 %	3.27 %	2.79 %
Total	5.92 %	4.89 %	4.03 %
Member	(3.7)%	(3.7)%	(3.7)%
Employer/state	2.22 %	1.19 %	0.33 %
Discount rate	7 %	8 %	9 %
Payroll growth	3.5 %	3.5 %	3.5 %
Inflation rate	3 %	3 %	3 %

Inflation Assumption Sensitivity Analysis
(Dollars in thousands)

	Valuation Results	Decrease Inflation Rate 0.25%	Decrease Inflation Rate 0.50%
Actuarial accrued liability	$ 3,133,202	$ 3,246,150	$ 3,365,907
Actuarial value of assets	1,442,522	1,442,522	1,442,522
Unfunded liability	$ 1,690,680	$ 1,803,628	$ 1,923,385
Funded ratio	46.04 %	44.44 %	42.86 %
Contributions			
Normal cost	1.62 %	1.72 %	1.83 %
Accrued liability	3.27 %	3.49 %	3.72 %
Total	4.89 %	5.21 %	5.55 %
Member	(3.7)%	(3.7)%	(3.7)%
Employer/state	1.19 %	1.51 %	1.85 %
Discount rate	8 %	7.75 %	7.5 %
Payroll growth	3.5 %	3.25 %	3 %
Inflation rate	3 %	2.75 %	2.5 %

Payroll Growth Assumption Sensitivity Analysis

(Dollars in thousands)

	Valuation Results	Decrease Payroll Growth 1.5%	No Payroll Growth
Actuarial accrued liability	$ 3,133,202	$ 3,133,202	$ 3,133,202
Actuarial value of assets	1,442,522	1,442,522	1,442,522
Unfunded liability	$ 1,690,680	$ 1,690,680	$ 1,690,680
Funded ratio	46.04 %	46.04 %	46.04 %
Contributions			
Normal cost	1.62 %	1.62 %	1.62 %
Accrued liability	3.27 %	3.68 %	4.28 %
Total	4.89 %	5.3 %	5.9 %
Member	(3.7)%	(3.7)%	(3.7)%
Employer/state	1.19 %	1.6 %	2.2 %
Discount rate	8 %	8 %	8 %
Payroll growth	3.5 %	2 %	0 %
Inflation rate	3 %	3 %	3 %

Health Care Trend Assumption Sensitivity Analysis

(Dollars in thousands)

	Decrease Trend Rates 1%	Valuation Results	Increase Trend Rates 1%
Actuarial accrued liability	$ 2,742,612	$ 3,133,202	$ 3,617,384
Actuarial value of assets	1,442,522	1,442,522	1,442,522
Unfunded liability	$ 1,300,090	$ 1,690,680	$ 2,174,862
Funded ratio	52.6 %	46.04 %	39.88 %
Contributions			
Normal cost	1.28 %	1.62 %	2.08 %
Accrued liability	2.51 %	3.27 %	4.2 %
Total	3.79 %	4.89 %	6.28 %
Member	(3.7)%	(3.7)%	(3.7)%
Employer/state	0.09 %	1.19 %	2.58 %
Discount rate	8 %	8 %	8 %
Payroll growth	3.5 %	3.5 %	3.5 %
Inflation rate	3 %	3 %	3 %

Sensitivity Analysis
Life Insurance Trust
as of June 30, 2019

The June 30, 2019, valuation results of the Life Insurance Trust are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing cost. The charts on the following pages provide a simple analysis on how the costs are sensitive to changes to the assumed discount rate, the assumed inflation rate, and the assumed rate of payroll growth. The charts show the actuarial accrued liability, the unfunded liability, the funded ratio and the employer contribution rate under the following scenarios:

- The discount rate assumption sensitivity analysis shows the valuation results with the baseline discount rate assumption, and 7.5% together with a decrease in the discount rate to 6.5% and an increase in the discount rate to 8.5%. Under this scenario, the underlying inflation rate assumption is held constant at 3% and the payroll growth assumption is held constant at 3.5%.
- The inflation assumption sensitivity analysis shows the valuation results with the baseline underlying inflation rate assumption, 3%, together with decreases in the inflation rate to 2.75% and 2.5%. Under this scenario, the decrease in the underlying inflation rate assumption leads to corresponding decreases in the discount rate, the payroll growth assumption, and the assumed rates of salary increase for active members.
- The wage inflation assumption sensitivity analysis shows the valuation results with the baseline underlying wage inflation assumption, 3.5%, together with decreases in the wage inflation assumption to 2% and 0%. 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 liability, leading to higher employer contribution rates.

Assumed Discount Rate Sensitivity Analysis
(Dollars in thousands)

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
Actuarial accrued liability	$ 132,794	$ 117,485	$ 104,905
Actuarial value of assets	92,506	92,506	92,506
Unfunded liability	$ 40,288	$ 24,979	$ 12,399
Funded ratio	69.66%	78.74%	88.18%
Contributions			
Normal cost	0.04%	0.03%	0.03%
Accrued liability	0.06%	0.04%	0.02%
Total	0.1%	0.07%	0.05%
Member	0%	0%	0%
Employer/state	0.1%	0.07%	0.05%
Discount rate	6.5%	7.5%	8.5%
Payroll growth	3.5%	3.5%	3.5%
Inflation rate	3%	3%	3%

Inflation Assumption Sensitivity Analysis

(Dollars in thousands)

	Valuation Results	Decrease Inflation Rate 0.25%	Decrease Inflation Rate 0.50%
Actuarial accrued liability	$ 117,485	$ 121,207	$ 125,135
Actuarial value of assets	92,506	92,506	92,506
Unfunded liability	$ 24,979	28,701	32,629
Funded ratio	78.74%	76.32%	73.92%
Contributions			
Normal cost	0.03%	0.03%	0.04%
Accrued liability	0.04%	0.05%	0.05%
Total	0.07%	0.08%	0.09%
Member	0%	0%	0%
Employer/state	0.07%	0.08%	0.09%
Discount rate	7.5%	7.25%	7%
Payroll growth	3.5%	3.25%	3%
Inflation rate	3%	2.75%	2.5%

Payroll Growth Assumption Sensitivity Analysis

(Dollars in thousands)

	Valuation Results	Decrease Payroll Growth 1.5%	No Payroll Growth
Actuarial accrued liability	$ 117,485	$ 117,485	$ 117,485
Actuarial value of assets	92,506	92,506	92,506
Unfunded liability	$ 24,979	$ 24,979	$ 24,979
Funded ratio	78.74%	78.74%	78.74%
Contributions			
Normal cost	0.03%	0.03%	0.03%
Accrued liability	0.04%	0.05%	0.06%
Total	0.07%	0.08%	0.09%
Member	0%	0%	0%
Employer/state	0.07%	0.08%	0.09%
Discount rate	7.5%	7.5%	7.5%
Payroll growth	3.5%	2%	0%
Inflation rate	3%	3%	3%

20-Year Baseline Projection
Health Insurance Trust

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 (30 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%
- Valuation Discount Rate — 8%
- Investment Rate of Return — 8% each year
- Actuarial Value of Assets — Five year smoothing, no corridor
- Amortization Method — Level percent of payroll, closed
- Amortization Period — 21-year period as of valuation date
- Future Contributions — Based on expected actuarially determined contributions

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

20 Year Baseline Projection
(Dollars in thousands)

Fiscal Year	Non-University Payroll	University Payroll	Total Payroll	Unfunded Accrued Liability	Funding Ratio	Actuarially Determined Contribution
2020	$ 3,453,441	$ 194,987	$ 3,648,428	$ 1,690,680	46%	$ 178,446
2021	3,540,907	195,809	4,736,716	1,572,229	52.4	177,268
2022	3,629,800	199,926	3,829,726	1,424,340	59.1	173,693
2023	3,719,567	205,035	3,924,602	1,261,546	65.6	168,692
2024	3,809,893	210,510	4,020,403	1,072,731	72.2	161,137
2025	3,901,606	216,801	4,118,407	853,226	79.0	150,264
2026	3,991,126	224,165	4,215,291	605,222	85.8	135,598
2027	4,081,214	232,450	4,313,664	326,053	92.7	116,402
2028	4,172,477	241,666	4,414,143	11,883	100	91,459
2029	4,268,103	251,466	4,519,569		100	94,687
2030	4,367,514	261,323	4,628,837		100	99,330
2031	4,470,072	271,796	4,741,868		100	104,211
2032	4,578,015	282,465	4,860,480		100	109,389
2033	4,691,000	293,137	4,984,137		100	114,848
2034	4,807,117	304,819	5,111,936		100	120,614
2035	4,930,521	316,176	5,246,697		100	126,721
2036	5,060,198	327,783	5,387,981		100	133,159
2037	5,197,690	340,357	5,538,047		100	139,955
2038	5,343,656	353,535	5,697,191		100	147,158
2039	5,498,384	367,474	5,865,858		100	154,790

20-Year Baseline Projection
Life Insurance Trust

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 (30 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%
- Valuation Discount Rate — 7.5%
- Investment Rate of Return — 7.5% each year
- Actuarial Value of Assets — Five-year smoothing, no corridor
- Amortization Method — Level percent of payroll, closed
- Amortization Period — 25-year period as of valuation date
- Future Contributions — Based on expected actuarially determined contributions

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

20-Year Baseline Projection
(Dollars in thousands)

Fiscal Year	Non-University Payroll	University Payroll	Total Payroll	Unfunded Accrued Liability	Funding Ratio	Actuarially Determined Contribution
2020	$ 3,453,441	$ 194,987	$ 3,648,428	$ 24,979	78.7%	$ 2,726
2021	3,540,907	195,809	4,736,716	28,732	76.2	3,006
2022	3,629,800	199,926	3,829,726	31,926	74.1	3,263
2023	3,719,567	205,035	3,924,602	33,771	73.2	3,450
2024	3,809,893	210,510	4,020,403	34,415	73.3	3,567
2025	3,901,606	216,801	4,118,407	34,753	73.6	3,673
2026	3,991,126	224,165	4,215,291	35,018	73.9	3,785
2027	4,081,214	232,450	4,313,664	35,200	74.2	3,904
2028	4,172,477	241,666	4,414,143	35,288	74.6	4,029
2029	4,268,103	251,466	4,519,569	35,268	75.0	4,158
2030	4,367,514	261,323	4,628,837	35,126	75.4	4,293
2031	4,470,072	271,796	4,741,868	34,847	75.9	4,435
2032	4,578,015	282,465	4,860,480	34,413	76.5	4,585
2033	4,691,000	293,137	4,984,137	33,805	77.2	4,743
2034	4,807,117	304,819	5,111,936	33,002	77.9	4,910
2035	4,930,521	316,176	5,246,697	31,978	78.8	5,086
2036	5,060,198	327,783	5,387,981	30,707	79.8	5,273
2037	5,197,690	340,357	5,538,047	29,158	80.9	5,472
2038	5,343,656	353,535	5,697,191	27,296	82.2	5,685
2039	5,498,384	367,474	5,865,858	25,081	83.7	5,917

Statistical Section

This section of the Teachers' Retirement System of the State of Kentucky's Comprehensive Annual Financial Report presents detailed information as a context for understanding the information in the financial statements, note disclosures and required supplementary information regarding TRS's overall financial health. Schedules and information are derived from TRS's internal sources.

Contents

Retirement Annuity Trust
Past 10 Fiscal Years

Additions by Source

Year	Employer Contributions	Member Contributions	Net Investment Income (Loss)	Total Additions to Plan Net Position
2019	$ 1,123,034,823	$ 321,172,166	$ 1,085,189,349	$ 2,529,396,338
2018	1,048,671,201	319,127,087	1,953,214,031	3,321,012,319
2017	1,060,719,993	313,625,434	2,475,752,798	3,850,098,225
2016	565,454,590	313,044,226	(245,214,860)	633,283,956
2015	559,579,290	308,159,763	862,178,759	1,729,917,812
2014	563,326,249	304,981,620	2,803,247,956	3,671,555,825
2013	568,233,446	304,738,728	2,039,874,263	2,912,846,437
2012	557,339,552	309,729,924	309,696,252	1,176,765,728
2011	1,037,935,993	302,262,819	2,760,972,224	4,101,171,036
2010	479,805,088	297,613,965	1,509,785,381	2,287,204,434

Deductions by Type

Year	Service Retirants	Disability Retirants	Survivors	Total Benefits	Refunds	Administrative Expense	Total Deductions to Plan Net Position
2019	$ 1,989,082,744	$ 86,215,602	$ 19,065,726	$ 2,094,364,072	$ 32,403,149	$ 12,352,308	$ 2,139,119,529
2018	1,901,237,575	84,500,330	18,879,429	2,004,617,334	31,072,421	11,388,493	2,047,078,248
2017	1,817,594,617	82,466,114	18,551,397	1,918,612,128	26,305,240	10,313,715	1,955,231,083
2016	1,735,374,416	79,808,432	18,015,782	1,833,198,630	27,747,742	8,636,438	1,869,582,810
2015	1,647,205,474	76,912,574	17,338,047	1,741,456,095	23,032,624	8,868,971	1,773,357,690
2014	1,563,634,993	73,501,441	17,239,266	1,654,375,700	25,461,843	7,955,972	1,687,793,515
2013	1,484,132,938	69,808,291	16,781,695	1,570,722,924	22,059,094	8,377,003	1,601,159,021
2012	1,401,380,816	65,297,491	16,260,858	1,482,939,165	19,549,073	7,762,880	1,510,251,118
2011	1,326,033,698	60,950,214	15,551,801	1,402,535,713	17,325,387	7,322,739	1,427,183,839
2010	1,249,272,057	57,782,651	14,754,062	1,321,808,770	15,310,680	8,830,054	1,345,949,504

Changes in Plan Net Position

Year	Total Additions to Plan Net Position	Total Deductions to Plan Net Position	Changes in Plan Net Position
2019	$ 2,529,396,338	$ 2,139,119,529	$ 390,276,809
2018	3,321,012,319	2,047,078,248	1,273,934,071
2017	3,850,098,225	1,955,231,083	1,894,867,142
2016	633,283,956	1,869,582,810	(1,236,298,854)
2015	1,729,917,812	1,773,357,690	(43,439,878)
2014	3,671,555,825	1,687,793,515	1,983,762,310
2013	2,912,846,437	1,601,159,021	1,311,687,416
2012	1,176,765,728	1,510,251,118	(333,485,390)
2011	4,101,171,036	1,427,183,839	2,673,987,197
2010	2,287,204,434	1,345,949,504	941,254,930

Health Insurance Trust

Past 10 Fiscal Years

Additions by Source

Year	Employer Contributions	Member Contributions*	Recovery Income*	Net Investment Income (Loss)	Total Additions to Plan Net Position
2019	$ 183,146,155	$ 131,676,820		$ 74,385,482	$ 389,208,457
2018	187,102,413	130,777,471		76,840,512	394,720,396
2017	180,375,986	128,819,243		95,452,597	404,647,826
2016	178,638,370	128,068,781		(9,332,490)	297,374,661
2015	145,263,926	157,467,680	$ 22,820,427	7,354,704	332,906,737
2014	157,688,414	135,190,891	4,879,981	67,741,063	365,500,349
2013	166,576,444	119,795,780	34,976	30,718,836	317,126,036
2012	173,966,623	100,346,070	3,781,222	(3,989,202)	274,104,713
2011	188,241,202	84,147,337	493,312	8,334,296	281,216,147
2010	158,761,433	63,805,573	14,618,348	12,312,999	249,498,353

Amounts paid by retirees and recovery income is netted against insurance expenses beginning fiscal year 2016.

Deductions by Type

Year	Insurance Benefit Expense: Under Age 65	Insurance Benefit Expense: Age 65 & Over	Administrative Expense	Total Insurance Benefits Expense	Total Deductions to Plan Net Position
2019	$ 114,509,069	$ 49,156,948	$ 1,803,192	$ 165,469,209	$ 165,469,209
2018	120,519,991	40,561,709	1,747,561	162,829,261	162,829,261
2017	124,079,802	54,420,744	1,538,574	180,039,120	180,039,120
2016	127,673,325	61,196,669	1,686,070	190,556,064	190,556,064
2015	131,396,480	108,998,102	1,545,235	241,939,817	241,939,817
2014	136,963,208	105,107,323	1,100,133	243,170,664	243,170,664
2013	142,170,438	98,761,180	1,275,206	242,206,824	242,206,824
2012	156,228,181	72,746,945	1,201,629	230,176,755	230,176,755
2011	145,544,405	80,890,958	1,186,029	227,621,392	227,621,392
2010	136,702,152	100,675,376		237,377,528	237,377,528

Changes in Plan Net Position

Year	Total Additions to Plan Net Position	Total Deductions to Plan Net Position	Changes in Plan Net Position
2019	$ 389,208,457	$ 165,469,209	$ 223,739,248
2018	394,720,396	162,829,261	231,891,135
2017	404,647,826	180,039,120	224,608,706
2016	297,374,661	190,556,064	106,818,597
2015	332,906,737	241,939,817	90,966,920
2014	365,500,349	243,170,664	122,329,685
2013	317,126,036	242,206,824	74,919,212
2012	274,104,713	230,176,755	43,927,958
2011	281,216,147	227,621,392	53,594,755
2010	249,498,353	237,377,528	12,120,825

Life Insurance Trust

Past 10 Fiscal Years

While TRS began separate reporting of its Life Insurance Trust effective Feb. 1, 2018, for investment purposes, life insurance funds always have been accounted for separately, which is the basis of the following schedules.

Additions by Source

Year	Employer Contributions	Net Investment Income (Loss)	Total Additions to Plan Net Position
2019	$ 1,421,227	$ 5,058,188	$ 6,479,415
2018	1,058,329	1,110,421	2,168,750
2017	1,049,683	915,497	1,965,180
2016	1,037,769	4,829,336	5,867,105
2015	1,019,519	1,990,324	3,009,843
2014	1,006,091	4,572,845	5,578,936
2013	1,680,495	674,760	2,355,255
2012	1,684,711	6,450,022	8,134,733
2011	1,668,822	3,094,776	4,763,598
2010	1,966,826	5,383,644	7,350,470

Deductions by Type

Year	Life Insurance	Administrative Expense	Total Deductions to Plan Net Position
2019	$ 5,153,000	$ 30,392	$ 5,183,392
2018	5,452,920	30,979	5,483,899
2017	5,151,013	27,690	5,178,703
2016	4,595,489	27,195	4,622,684
2015	4,061,000	25,306	4,086,306
2014	4,692,000	21,324	4,713,324
2013	4,614,718	24,425	4,639,143
2012	4,397,281	22,886	4,420,167
2011	4,120,000	21,511	4,141,511
2010	4,148,511		4,148,511

Changes in Plan Net Position

Year	Total Additions to Plan Net Position	Total Deductions to Plan Net Position	Changes in Plan Net Position
2019	$ 6,479,415	$ 5,183,392	$ 1,296,023
2018	2,168,750	5,483,899	(3,315,149)
2017	1,965,180	5,178,703	(3,213,523)
2016	5,867,105	4,622,684	1,244,421
2015	3,009,843	4,086,306	(1,076,463)
2014	5,578,936	4,713,324	865,612
2013	2,355,255	4,639,143	(2,283,888)
2012	8,134,733	4,420,167	3,714,566
2011	4,763,598	4,141,511	622,087
2010	7,350,470	4,148,511	3,201,959

Distribution of Active Contributing Members as of June 30, 2019

By Age

Age	Male	Female
20-24	706	2,892
25-29	1,683	5,686
30-34	2,075	6,585
35-39	2,565	7,987
40-44	2,614	8,013
45-49	2,740	8,306
50-54	1,999	6,476
55-59	1,473	4,576
60-64	1,068	3,050
65 & over	1,198	2,871
Total	18,121	56,442

By Service

Years of	Male	Female
Less than 1	2,517	8,059
1-4	4,047	12,647
5-9	3,150	9,554
10-14	2,733	8,660
15-19	2,337	7,743
20-24	2,016	6,025
25-29	1,052	3,072
30-34	229	610
35 or more	40	72
Total	18,121	56,442

Principal Participating Employers
Current Year and Nine Years Ago

Employer	2019 Covered Employees	2019 Rank	2019 Percentage of System	2010 Covered Employees	2010 Rank	2010 Percentage of System
Jefferson County	10,736	1	14.40%	10,058	1	13.02%
Fayette County	4,816	2	6.46	4,384	2	5.67
Boone County	2,060	3	2.76	1,826	3	2.36
Warren County	1,487	4	1.99	1,260	6	1.63
Hardin County	1,390	5	1.86	1,370	4	1.77
Kenton County	1,297	6	1.74	1,299	5	1.68
Bullitt County	1,258	7	1.69	1,239	7	1.60
Oldham County	1,228	8	1.65	1,190	8	1.54
Madison County	1,127	9	1.51	1,177	9	1.52
Daviess County	1,106	10	1.48	1,157	10	1.50
All Other*	48,058		64.46	52,316		67.71
Total (207 employers)	74,563		100%	77,276		100%

*In fiscal 2019, All Other consisted of:

Type	Number of Employers	Employees
Local School Districts	163	43,020
Higher Education	6	3,194
State Agencies	14	1,394
Educational Cooperatives	8	331
Other	6	119
Total	197	48,058

TRS Schedule of Participating Local School District Employers

Adair County
Allen County
Anchorage
Anderson County
Ashland
Augusta
Ballard County
Barbourville
Bardstown
Barren County
Bath County
Beechwood
Bell County
Bellevue
Berea
Boone County
Bourbon County
Bowling Green
Boyd County
Boyle County
Bracken County
Breathitt County
Breckinridge County
Bullitt County
Burgin
Butler County
Caldwell County
Calloway County
Campbell County
Campbellsville
Carlisle County
Carroll County
Carter County
Casey County
Caverna
Christian County
Clark County
Clay County
Clinton County
Cloverport
Corbin
Covington
Crittenden County
Cumberland County
Danville
Daviess County
Dawson Springs
Dayton
East Bernstadt
Edmonson County
Elliott County
Elizabethtown
Eminence
Erlanger-Elsmere
Estill County
Fairview
Fayette County
Fleming County
Floyd County
Fort Thomas
Frankfort
Franklin County
Fulton
Fulton County
Gallatin County
Garrard County
Glasgow
Grant County
Graves County
Grayson County
Green County
Greenup County
Hancock County
Hardin County
Harlan
Harlan County
Harrison County
Hart County
Hazard
Henderson County
Henry County
Hickman County
Hopkins County
Jackson
Jackson County
Jefferson County
Jenkins
Jessamine County
Johnson County
Kenton County
Knott County
Knox County
Larue County
Laurel County
Lawrence County
Lee County
Leslie County
Letcher County
Lewis County
Lincoln County
Livingston County
Logan County
Ludlow
Lyon County
Madison County
Magoffin County
Marion County
Marshall County
Martin County
Mason County
Mayfield
McCracken County
McCreary County
McLean County
Meade County
Menifee County
Mercer County
Metcalfe County
Middlesboro
Monroe County
Montgomery County
Morgan County
Muhlenberg County
Murray
Nelson County
Newport
Nicholas County
Ohio County
Oldham County
Owen County
Owensboro
Owsley County
Paducah
Paintsville
Paris
Pendleton County
Perry County
Pike County
Pikeville
Pineville
Powell County
Pulaski County
Raceland
Robertson County
Rockcastle County
Rowan County
Russell
Russell County
Russellville
Science Hill
Scott County
Shelby County
Silver Grove
Simpson County
Somerset
Southgate
Spencer County
Taylor County
Todd County
Trigg County
Trimble County
Union County
Walton-Verona
Warren County
Washington County
Wayne County
Webster County
West Point
Whitley County
Williamsburg
Williamstown
Wolfe County
Woodford County

TRS Schedule of Participating Higher Education and Agency Employers

Central Kentucky Special Education Cooperative
Department of Corrections
Eastern Kentucky University
Education and Workforce Development Cabinet
Education Professional Standards Board
Green River Regional Education Cooperative
Kentucky Academic Association
Kentucky Community & Technical College System
Kentucky Education Association
Kentucky Educational Development Cooperative
Kentucky High School Athletic Association
Kentucky School Boards Association
Kentucky State University
Kentucky Valley Educational Cooperative
Morehead State University
Murray State University
Northern Kentucky Cooperative for Educational Services
Ohio Valley Educational Cooperative
Southeast South-Central Educational Cooperative
West Kentucky Education Cooperative
Western Kentucky University

Distribution of Retirement and Medical Payments Statewide
Fiscal Year Ended June 30, 2019

County	Payments	Recipients	County	Payments	Recipients
Adair	$ 8,761,482	233	Laurel	$ 28,881,323	733
Allen	7,550,529	188	Lawrence	5,806,989	148
Anderson	9,037,177	253	Lee	3,422,770	90
Ballard	4,838,683	131	Leslie	6,655,101	159
Barren	19,092,283	475	Letcher	13,800,070	365
Bath	5,376,730	150	Lewis	7,480,540	200
Bell	15,255,250	394	Lincoln	12,494,171	316
Boone	46,529,423	1,090	Livingston	3,473,204	88
Bourbon	8,385,117	216	Logan	12,107,854	305
Boyd	23,706,889	578	Lyon	4,565,356	113
Boyle	20,283,633	500	Madison	62,610,918	1,524
Bracken	4,496,204	113	Magoffin	7,973,439	207
Breathitt	9,968,018	267	Marion	8,192,169	217
Breckinridge	8,106,551	202	Marshall	16,547,840	411
Bullitt	20,974,576	488	Martin	5,750,239	152
Butler	4,563,422	114	Mason	8,854,719	235
Caldwell	7,829,652	204	McCracken	29,752,386	762
Calloway	28,977,687	720	McCreary	8,716,837	232
Campbell	32,714,001	777	McLean	5,056,411	126
Carlisle	1,921,405	56	Meade	8,552,117	199
Carroll	4,641,760	106	Menifee	2,621,256	76
Carter	15,672,778	419	Mercer	10,772,640	299
Casey	6,935,288	174	Metcalfe	4,194,650	104
Christian	23,116,817	596	Monroe	6,767,932	164
Clark	15,596,814	389	Montgomery	14,361,207	357
Clay	12,965,198	321	Morgan	7,843,499	205
Clinton	6,070,014	166	Muhlenberg	15,579,449	372
Crittenden	2,562,406	73	Nelson	18,705,715	472
Cumberland	3,903,293	93	Nicholas	2,513,058	68
Daviess	49,164,749	1,231	Ohio	8,680,052	237
Edmonson	4,446,744	121	Oldham	23,402,307	546
Elliott	2,430,887	69	Owen	4,434,950	111
Estill	6,864,382	180	Owsley	4,631,234	119
Fayette	135,793,889	3,396	Pendleton	6,069,744	143
Fleming	7,258,668	199	Perry	17,089,797	430
Floyd	22,759,926	592	Pike	32,493,417	831
Franklin	31,577,949	974	Powell	5,943,325	146
Fulton	2,974,384	81	Pulaski	30,838,090	789
Gallatin	1,568,835	40	Robertson	1,029,024	25
Garrard	9,094,670	226	Rockcastle	8,286,449	200
Grant	8,392,735	195	Rowan	21,979,722	563
Graves	17,130,589	435	Russell	10,358,259	262
Grayson	11,667,294	300	Scott	21,285,266	533
Green	5,555,688	140	Shelby	22,431,730	533
Greenup	17,304,210	425	Simpson	6,705,877	174
Hancock	2,719,834	69	Spencer	7,078,978	162
Hardin	42,035,890	1015	Taylor	13,849,089	351
Harlan	16,556,644	436	Todd	3,814,359	102
Harrison	8,086,567	210	Trigg	7,364,666	195
Hart	6,469,448	154	Trimble	2,856,024	65
Henderson	19,088,962	485	Union	4,734,858	130
Henry	7,675,117	203	Warren	76,928,667	1,902
Hickman	1,516,800	38	Washington	5,196,328	136
Hopkins	20,694,315	505	Wayne	9,725,447	253
Jackson	6,021,067	159	Webster	5,455,368	148
Jefferson	350,219,573	7,487	Whitley	28,718,346	751
Jessamine	19,318,498	488	Wolfe	4,856,057	134
Johnson	14,956,828	369	Woodford	14,436,647	370
Kenton	43,223,026	1,043			
Knott	10,980,160	277	**Total in Kentucky**	**$ 2,056,992,510**	**50,544**
Knox	11,433,276	308			
Larue	7,449,893	168			

Distribution of Retirement and Medical Payments Worldwide as of June 30, 2019

Number of Recipients in United States Outside Kentucky

159	Alabama
4	Alaska
93	Arizona
38	Arkansas
99	California
70	Colorado
10	Connecticut
13	Delaware
6	District of Columbia
1,380	Florida
273	Georgia
9	Hawaii
11	Idaho
124	Illinois
811	Indiana
19	Iowa
35	Kansas
44	Louisiana
19	Maine
43	Maryland
31	Massachusetts
58	Michigan
28	Minnesota
59	Mississippi
101	Missouri
8	Montana
9	Nebraska
25	Nevada
6	New Hampshire
11	New Jersey
16	New Mexico
39	New York
299	North Carolina
1	North Dakota
684	Ohio
38	Oklahoma
34	Oregon
70	Pennsylvania
3	Rhode Island
243	South Carolina
7	South Dakota
1,045	Tennessee
230	Texas
29	Utah
3	Vermont
184	Virginia
48	Washington
106	West Virginia
34	Wisconsin
7	Wyoming

Number of Recipients Outside United States

5	Military APO
2	Australia
1	Barbados
6	Canada
1	New Zealand
1	Poland
1	Spain
1	Sweden
1	Switzerland

	Number of Recipients	Amount of Payments
Inside Kentucky	50,544	$ 2,056,992,510
Outside Kentucky	6,735	201,037,579
Total	57,279	$ 2,258,030,089

Growth in Annuitants as of June 30, 2019

Fiscal Year	Service Retirees	Disability Retirees	Beneficiaries of Retired Members	Beneficiaries of Deceased Members Eligible to Retire	Survivors	Disabled Adult Child
2019	48,727	2,842	2,886	644	344	343
2018	47,606	2,831	2,757	648	353	339
2017	46,356	2,806	2,675	655	349	333
2016	45,096	2,762	2,544	652	370	327
2015	43,634	2,691	2,442	653	349	328
2014	42,265	2,641	2,304	596	429	316
2013	41,255	2,582	2,207	601	432	303
2012	40,107	2,478	2,126	596	444	304
2011	38,705	2,379	2,003	584	430	296
2010	37,607	2,284	1,915	567	435	291

Schedule of Annuitants by Type of Benefit as of June 30, 2019

Monthly Benefit ($)	Number of Annuitants	Type of Benefit*					
		1	2	3	4	5	6
1 - 500	4,097	3,186	12	186	27	343	343
501 - 1,000	2,957	2,454	140	285	78	0	0
1,001 - 1,500	2,952	2,092	280	477	102	1	0
1,501 - 2,000	3,451	2,525	400	448	78	0	0
2,001 - 2,500	4,415	3,476	505	341	93	0	0
2,501 - 3,000	7,315	6,154	703	363	95	0	0
3,001 - 3,500	8,997	8,194	463	270	70	0	0
3,501 - 4,000	7,175	6,761	185	194	35	0	0
4,001 - 4,500	4,823	4,572	92	133	26	0	0
4,501 - 5,000	3,394	3,275	32	72	15	0	0
5,001 & over	6,210	6,038	30	117	25	0	0
Total	55,786	48,727	2,842	2,886	644	344	343

Type of Benefit
1-Normal Retirement for Age & Service
2-Disability Retirement
3-Beneficiaries of Retired Members
4-Beneficiaries of Deceased Member Eligible to Retire
5-Survivor Payments
6-Disabled Adult Child

Schedule of Annuitants by Option Selected as of June 30, 2019

Monthly Benefit ($)	Option Selected*							
	1	2	3	4	5	6	7	8
1 - 500	2,066	471	308	51	2	421	91	687
501 - 1,000	1,674	418	236	89	8	375	150	7
1,001 - 1,500	1,445	334	287	146	17	386	327	10
1,501 - 2,000	1,744	390	302	147	6	496	340	26
2,001 - 2,500	2,198	473	414	150	4	689	399	88
2,501 - 3,000	3,467	744	602	211	11	1,357	696	227
3,001 - 3,500	4,665	1,056	648	223	7	1,425	885	88
3,501 - 4,000	3,759	841	504	188	7	1,094	731	51
4,001 - 4,500	2,477	523	385	134	8	740	539	17
4,501 - 5,000	1,760	371	276	106	7	489	382	3
5,001 & OVER	3,175	627	581	250	18	857	698	4
Total	28,430	6,248	4,543	1,695	95	8,329	5,238	1,208

Option selected:
1 - Straight-life annuity with refundable balance
2 - Period certain benefit and life thereafter
3 - Joint-survivor annuity
4 - Joint-survivor annuity, one-half benefit to beneficiary
5 - Other payment - special option
6 - Joint-survivor annuity with pop-up option
7 - Joint-survivor annuity, one-half benefit to beneficiary with pop-up option
8 - Disability, survivors and disabled adult children - set by statute

Retirement Annuity Trust
Average Initial Benefit Payments for the Past 10 Years
By Years of Service Credit

Retirement Effective Dates	0-4.99	5-9.99	10-14.99	15-19.99	20-24.99	25-29.99	≥ 30	Total
Year ending June 30, 2010								
Average monthly benefit	$ 185	$ 525	$ 1,104	$ 1,700	$ 2,513	$ 3,468	$ 4,670	**$ 3,222**
Final average salary	$ 3,654	$ 3,637	$ 4,124	$ 4,508	$ 5,184	$ 5,383	$ 6,102	**$ 5,316**
Number of retired members	28	133	98	103	242	442	601	**1,647**
Year ending June 30, 2011								
Average monthly benefit	$ 149	$ 519	$ 1,225	$ 1,781	$ 2,529	$ 3,621	$ 4,827	**$ 3,240**
Final average salary	$ 3,570	$ 3,640	$ 4,423	$ 4,825	$ 5,143	$ 5,574	$ 6,235	**$ 5,392**
Number of retired members	45	157	144	112	235	544	617	**1,854**
Year ending June 30, 2012								
Average monthly benefit	$ 175	$ 507	$ 1,170	$ 1,897	$ 2,613	$ 3,674	$ 4,726	**$ 3,148**
Final average salary	$ 3,292	$ 3,759	$ 4,307	$ 4,898	$ 5,219	$ 5,605	$ 6,109	**$ 5,331**
Number of retired members	45	197	146	162	303	778	569	**2,200**
Year ending June 30, 2013								
Average monthly benefit	$ 161	$ 475	$ 1,186	$ 1,963	$ 2,781	$ 3,811	$ 5,162	**$ 3,149**
Final average salary	$ 3,362	$ 3,660	$ 4,498	$ 4,956	$ 5,518	$ 5,799	$ 6,632	**$ 5,476**
Number of retired members	44	234	156	154	294	685	447	**2,014**
Year ending June 30, 2014								
Average monthly benefit	$ 192	$ 484	$ 1,270	$ 2,068	$ 2,797	$ 3,847	$ 5,362	**$ 3,126**
Final average salary	$ 4,148	$ 3,677	$ 4,751	$ 5,364	$ 5,600	$ 5,902	$ 6,860	**$ 5,589**
Number of retired members	56	211	161	145	258	678	344	**1,853**
Year ending June 30, 2015								
Average monthly benefit	$ 157	$ 472	$ 1,282	$ 2,038	$ 2,890	$ 3,898	$ 5,124	**$ 3,173**
Average final average salary	$ 3,331	$ 3,577	$ 4,892	$ 5,266	$ 5,709	$ 5,948	$ 6,552	**$ 5,577**
Number of retired members	60	231	183	206	314	806	456	**2,256**
Year ending June 30, 2016								
Average monthly benefit	$ 177	$ 519	$ 1,316	$ 1,998	$ 2,934	$ 3,935	$ 5,389	**$ 3,195**
Final average salary	$ 3,642	$ 3,791	$ 4,847	$ 5,188	$ 5,777	$ 6,019	$ 6,858	**$ 5,664**
Number of retired members	61	254	194	217	356	807	448	**2,337**
Year ending June 30, 2017								
Average monthly benefit	$ 176	$ 473	$ 1,235	$ 2,039	$ 2,902	$ 3,935	$ 5,179	**$ 3,040**
Final average salary	$ 3,691	$ 3,506	$ 4,588	$ 5,208	$ 5,722	$ 6,024	$ 6,666	**$ 5,514**
Number of retired members	53	259	162	212	346	766	320	**2,118**
Year ending June 30, 2018								
Average monthly benefit	$ 152	$ 486	$ 1,254	$ 2,098	$ 2,990	$ 4,002	$ 5,412	**$ 3,175**
Final average salary	$ 3,760	$ 3,668	$ 4,702	$ 5,397	$ 5,883	$ 6,068	$ 6,980	**$ 5,677**
Number of retired members	64	255	147	193	356	844	330	**2,189**
Year ending June 30, 2019								
Average monthly benefit	$ 130	$ 460	$ 1,190	$ 2,073	$ 2,847	$ 4,027	$ 5,393	**$ 3,078**
Final average salary	$ 3,041	$ 3,595	$ 4,523	$ 5,260	$ 5,738	$ 6,185	$ 7,049	**$ 5,607**
Number of retired members	79	239	153	197	330	779	295	**2,072**
Ten Years Ended June 30, 2019								
Average monthly benefit	**$ 163**	**$ 489**	**$ 1,231**	**$ 1,989**	**$ 2,800**	**$ 3,847**	**$ 5,062**	**$ 3,153**
Final average salary	**$ 3,532**	**$ 3,650**	**$ 4,597**	**$ 5,133**	**$ 5,580**	**$ 5,885**	**$ 6,526**	**$ 5,521**
Number of retired members	**535**	**2,170**	**1,544**	**1,701**	**3,034**	**7,129**	**4,427**	**20,540**

The annuity for most TRS retirees is in lieu of Social Security. Final average salary is a monthly equivalent of the average final average salary for the respective group.

Health Insurance Trust
Average Insurance Premium Supplements for the Last Five Years
By Years of Service Credit

Retirement Effective Dates	0-9.99	10-14.99	15-19.99	≥ 20	Total
Year ending June 30, 2014					
Average monthly supplement	$ 52	$ 190	$ 335	$ 484	
Number of retired members	15	82	100	1,227	1,424
Year ending June 30, 2015					
Average monthly supplement	$ 78	$ 204	$ 369	$ 492	
Number of retired members	24	101	176	1,411	1,712
Year ending June 30, 2016					
Average monthly supplement	$ 87	$ 182	$ 323	$ 484	
Number of retired members	68	98	178	1,407	1,751
Year ending June 30, 2017					
Average monthly supplement	$ 75	$ 192	$ 333	$ 477	
Number of retired members	62	71	194	1,291	1,618
Year ending June 30, 2018					
Average monthly supplement	$ 85	$ 122	$ 299	$ 464	
Number of retired members	59	71	169	1,375	1,674
Year ending June 30, 2019					
Average monthly supplement	$ 75	$ 181	$ 305	$ 483	
Number of retired members	48	72	158	1,239	1,517

Retiree Sick Leave Payments
Summary of Fiscal Year Ended June 30, 2019

Total members retiring	2,253
Total members receiving sick leave payments	1,329
Total amount of sick leave payments at 12.855% contribution rate	$ 17,699,579
Average sick leave payment per retiree	$ 13,318
Total increase in final three or five year average salary base	$ 4,688,585
Average increase in final average salary	$ 3,528
Total service credit of 1,329 retirees	33,522
Average service credit of 1,329 retirees	25.22

Anticipated Payout of Additional Annuity

Actuarial cost of sick leave as salary credit	$ 38,703,773

Funding of Additional Payments

Member contributions ($17,699,579 x 9.105%)	$ 1,611,547
Employer contributions ($17,699,579 x 12.325%)	2,181,473
Total Contributions	$ 3,793,020
Deficit:	
Anticipated additional payout	$ 38,703,773
Less: total member and state contributions	3,793,020
Subtotal unfunded debt	$ 34,910,753
Less: current year appropriation	4,726,200
Total Unfunded Cost of Sick Leave Payments*	$ 30,184,553

* *This amount will be amortized over a 20-year period per KRS 161.553.*