



Tennessee Consolidated Retirement System

Teacher Retirement Plan, a Cost-Sharing Defined Benefit Plan

GASB Statement No. 67

Actuarial Report

Reporting Date: June 30, 2018

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Accounting Governance Background

Statement No. 25 of the Governmental Accounting Standards Board was amended by Statement No. 67 of the Governmental Accounting Standards Board. Statement No. 67 became effective for the plan's financial statements for the fiscal year beginning after June 15, 2013. Statement No. 67 establishes financial reporting standards for state and local government pension plans that are administered through trusts or equivalent arrangements. The objective of this statement is to improve the usefulness of the information included in pension plan reports.

Purpose and Use

This report has been prepared exclusively for the Tennessee Consolidated Retirement System. Actuarial computations under Statement No. 67 are for purposes of fulfilling employer governmental accounting requirements, and may not be appropriate for other purposes. The calculations reported herein have been made on a basis consistent with our understanding of the statement. Findley is not responsible for consequences resulting from the use of any part of this report without prior authorization or approval. This report provides actuarial advice and does not constitute legal, accounting, tax or investment advice. Determinations for other purposes, such as funding, bond ratings, or judging benefit security, may be significantly different from the results shown in this report.

Actuarial findings in this report are based on actuarial assumptions which reflect expected plan experience. Although the deviation of the actual future plan experience and the expected experience inherently creates some uncertainty with the results, in our opinion the actuarial assumptions reasonably reflect the expected future experience of the plan. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. All of these factors can cause volatility in the Net Pension Liability (Asset) over time.

Data

The calculations shown in this report have been prepared using employee data and plan documentation furnished by the Tennessee Consolidated Retirement System as of June 30, 2017. Plan asset information and covered-employee payroll were furnished by the Tennessee Consolidated Retirement System for the twelve month period ending June 30, 2018. While we have not audited the data, we have reviewed it for reasonableness and internal consistency. We have made reasonable assumptions with regard to any incomplete records, and to the best of our knowledge, there are no material limitations to the data provided. A complete summary of the census data utilized in this report is available upon request.

Assumptions, Methods, and Procedures

The results presented in this report comply with the assumptions, methods, and procedures under Statement No. 67. The results are based on a June 30, 2017 actuarial valuation date rolled-forward to a measurement date and reporting date of June 30, 2018. All assumptions are selected by the TCRS Board of Trustees. Statement No. 67 mandates the use of the Entry Age Normal actuarial funding method.

Subsequent Events

We are unaware of any subsequent events after June 30, 2018 which would have a material effect on the results presented in this report.

Changes in Plan Provisions, Actuarial Assumptions, and Actuarial Methods

Based on the 2016 experience study, the following changes were made to the actuarial assumptions effective with the June 30, 2017 actuarial valuation:

1. The assumed discount rate was lowered from 7.50% to 7.25%.
2. The assumed nominal rates for salary increases were lowered by 25 basis points, which is the combined effect of lowering the inflation assumption by 50 basis points and increasing the post-inflation rates for salary increases by 25 basis points.
3. The assumed increase in the Social Security Wage Base was lowered from 3.50% to 3.00%.
4. The assumed cost-of-living adjustment for monthly retirement benefits was lowered from 2.50% to 2.25%.
5. The inflation assumption was lowered from 3.00% to 2.50%.
6. The post-retirement mortality assumption for Service Retirement was updated from the rates developed in the 2012 experience study (including generational projection of mortality improvements after year 2012 using Scale AA) to the rates developed in the 2016 experience study (including generational projection of mortality improvements after year 2014 using Scale MP-2016).

7. The pre-retirement mortality assumption was updated from the IRS 2012 Generational Mortality Table (including generational projection of mortality improvements after year 2012 using Scale AA) to the RP-2014 Mortality Table for Employees (including generational projection of mortality improvements after year 2014 using Scale MP-2016).

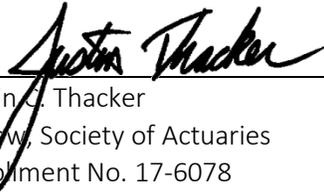
The aggregate effect of the changes described above on the Total Pension Liability can be found in the GASB Statement No. 67 section of this report.

No other changes were made to the plan provisions, actuarial assumptions or methods in the June 30, 2017 actuarial valuation.

Summaries of the plan provisions, actuarial assumptions and methods can be found in the Basis for Valuation section of this report.

Professional Qualifications

This report has been prepared under the supervision of Justin C. Thacker, a member of the American Academy of Actuaries, a Fellow of the Society of Actuaries, and a consulting actuary with Findley, who has met the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions herein. To the best of our knowledge this report has been prepared in accordance with generally accepted actuarial standards and our understanding of Government Accounting Standards Board Statement No. 67, including the overall appropriateness of the analysis, assumptions, and results and conforms to appropriate Standards of Practice as promulgated from time to time by the Actuarial Standards Board, which standards form the basis for the actuarial report. We are not aware of any direct or material indirect financial interest or relationship that could create, or appear to create, a conflict of interest that would impair the objectivity of our work. The undersigned are available to provide supplemental information or explanation.



Justin C. Thacker
Fellow, Society of Actuaries
Enrollment No. 17-6078
Phone 615.665.5387

December 7, 2018

Date



Tim C. Lavender
Fellow, Society of Actuaries
Enrollment No. 17-6745
Phone 615.665.5305

December 7, 2018

Date

Summary of Plan Provisions

The actuarial valuation includes all benefits provided by the Tennessee Consolidated Retirement System to the current active and inactive plan members. Benefit provisions include retirement, death and disability benefits. If applicable, post-retirement cost of living adjustments are included. Tennessee state law provides full documentation of the plan provisions. The Tennessee Consolidated Retirement System actuarial valuation funding report as of June 30, 2017 includes a summary of plan provisions.

Summary of Actuarial Assumptions and Methods

Investment Rate of Return

7.25 percent per annum, compounded annually

The long-term expected rate of return on pension plan investments was established by the TCRS Board of Trustees in conjunction with the June 30, 2016 actuarial experience study. A blend of future capital market projections and historical market returns was used in a building-block method in which a best-estimate of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) is developed for each major asset class. These best-estimates 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 of 2.5 percent. The best-estimates of geometric real rates of return and the TCRS investment policy target asset allocation for each major asset class are summarized in the following table:

Asset Class	Long-Term Expected Real Rate of Return	Target Allocation
U.S. equity	5.69%	31%
Developed market international equity	5.29%	14%
Emerging market international equity	6.36%	4%
Private equity and strategic lending	5.79%	20%
U.S. fixed income	2.01%	20%
Real estate	4.32%	10%
Short-term securities	0.00%	1%
		100%

Discount Rate

7.25 percent per annum, compounded annually

Paragraph 43 of Statement No. 67 provides for an alternative method to be used other than the projection of the pension plan's fiduciary net position based on projected contributions, benefit payments and investment earnings. The current contribution policy requires contributions of the normal cost plus a closed amortization of the unfunded liabilities (not to exceed 30 years from when the unfunded liability was created). In addition, the employer has a documented history of contributing 100 percent of the actuarially determined contribution requirement. The discount rate utilized assumes that employee contributions will be made at the current applicable rate and that contributions from the employer will be made at the actuarially determined contribution rate pursuant to an actuarial valuation in accordance with the pension funding policy of the TCRS Board of Trustees and as required to be paid by state statute. Based on these assumptions and the actuarial methodology adopted, the employer's fiduciary net position is expected to remain positive and to be available to make projected future benefit payments of current active and inactive members and to cover administrative expenses. 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.

Actuarial Valuation Method

All liabilities and normal costs shown in this report are calculated based on the Entry Age Normal method.

Asset Valuation Method

Fair Market Value

Additional Assumptions

The Tennessee Consolidated Retirement System actuarial valuation funding report as of June 30, 2017 includes a summary of actuarial assumptions.

Selection of Assumptions

The TCRS Board of Trustees selected the assumptions described above based on the review of plan experience in conjunction with an experience study conducted as of June 30, 2016 for the Teacher Legacy Pension Plan. A complete plan experience study is conducted every four years.

Summary of Participant Data

A complete summary of the census data utilized in this report is available upon request.

This section presents specific information required under Statement No. 67. The information in this report is to satisfy the reporting for the pension plan. This section contains the following:

- Statement of Change in Fiduciary Net Position
- Net Pension Liability (Asset) including discount rate sensitivity and reconciliation between years

Fiduciary Net Position is the amount of assets available for benefits in the Pension Plan.

Total Pension Liability is the plan liability determined using assumptions listed in the Summary of Actuarial Assumptions.

Net Pension Liability (Asset) is the difference in the Total Pension Liability and the Fiduciary Net Position.

Statement of Changes in Fiduciary Net Position

	<u>June 30, 2018</u>
Additions	
Contributions:	
Employer	\$ 34,955,185
Employee	<u>43,733,252</u>
Total Contributions	<u>78,688,437</u>
Investment Income:	
Net Investment Income	13,482,650
Other	<u>87,409</u>
Total Additions	<u>92,258,496</u>
Deductions	
Benefit Payments / Refunds	1,581,892
Administrative Expenses	1,846,334
Other	<u>0</u>
Total Deductions	<u>3,428,226</u>
Net Increase/(Decrease) in Net Position	<u>88,830,270</u>
Net Position Restricted for Pensions	
Beginning of Year	<u>124,712,519</u>
End of Year	<u><u>\$213,542,789</u></u>

Net Pension Liability (Asset) (NPL)

Determination of Net Pension Liability (Asset)

The components of the net pension liability (asset) at June 30, 2018 were as follows:

Total Pension Liability	166,743,619
Plan Fiduciary Net Position	<u>(213,542,789)</u>
Net Pension Liability (Asset)	<u><u>\$(46,799,170)</u></u>
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	128.07%

Sensitivity of Net Pension Liability (Asset) to Changes in the Discount Rate

The following represents the net pension liability (asset) calculated using the stated discount rate, as well as what the net pension liability (asset) would be if it were calculated using a discount rate that is 1-percentage-point lower or 1-percentage-point higher than the current rate:

	1% Decrease	Current Rate	1% Increase
	(6.25%)	(7.25%)	(8.25%)
Net Pension Liability (Asset)	\$6,110,918	\$(46,799,170)	\$(85,683,776)

Schedule of Changes in the Net Pension Liability (Asset) and Related Ratios

	fiscal year ending June 30				
	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>
Total Pension Liability					
Service cost	\$60,633,198	\$43,440,149	\$28,980,449	\$15,581,497	\$--
Interest	9,275,807	5,159,135	2,175,079	583,011	--
Changes of benefit terms	--	--	--	--	--
Differences between expected and actual experience	763,491	2,054,643	(1,477,409)	--	--
Changes of assumptions	2,496,211	--	--	--	--
Benefit Payments / Refunds	(1,581,892)	(1,021,752)	(283,467)	(34,531)	--
Net Change in Total Pension Liability	71,586,815	49,632,175	29,394,652	16,129,977	--
Total Pension Liability - beginning	95,156,804	45,524,629	16,129,977	--	--
Total Pension Liability - ending (a)	\$166,743,619	\$95,156,804	\$45,524,629	\$16,129,977	\$--
Plan Fiduciary Net Position					
Contributions - employer	\$34,955,185	\$26,262,053	\$17,538,589	\$8,310,132	\$--
Contributions - employee	43,733,252	32,848,220	21,855,921	10,390,077	--
Net investment income	13,482,650	10,058,396	1,011,283	294,742	--
Benefit Payments / Refunds	(1,581,892)	(1,021,752)	(283,467)	(34,531)	--
Administrative expenses	(1,846,334)	(1,417,125)	(819,972)	(280,047)	--
Other	87,409	--	--	--	--
Net Change in Plan Fiduciary Net Position	\$88,830,270	\$66,729,792	\$39,302,354	\$18,680,373	\$--
Plan Fiduciary Net Position - beginning	124,712,519	57,982,727	18,680,373	--	--
Plan Fiduciary Net Position - ending (b)	\$213,542,789	\$124,712,519	\$57,982,727	\$18,680,373	\$--
Net Pension Liability (Asset) - ending (a) - (b)	\$(46,799,170)	\$(29,555,715)	\$(12,458,098)	\$(2,550,396)	\$--
Plan Fiduciary Net Position as a % of the Total Pension Liability	128.07%	131.06%	127.37%	115.81%	--
Covered-employee payroll	\$873,677,206	\$655,205,868	\$441,775,131	\$207,753,299	\$--
Net Pension Liability (Asset) as a % of covered-employee payroll	-5.36%	-4.51%	-2.82%	-1.23%	--%

Notes to Schedule

See Summary of Plan Provisions for notes regarding benefit changes. See Summary of Actuarial Assumptions and Methods for notes regarding changes in assumptions.