Milliman

TEACHERS' PENSION AND ANNUITY FUND OF NEW JERSEY

GASB 67 DISCLOSURE
Fiscal Year: July 1, 2015 to June 30, 2016

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March 16, 2017

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Certification

Actuarial computations presented in this report under Statement No. 67 of the Governmental Accounting Standards Board are for purposes of assisting the State of NJ in fulfilling its financial accounting requirements. No attempt is being made to offer any accounting opinion or advice. This report is for fiscal year July 1, 2015 to June 30, 2016. The reporting date for determining plan assets and obligations is June 30, 2016. The calculations enclosed in this report have been made on a basis consistent with our understanding of the plan provisions. Determinations for purposes other than meeting financial reporting requirements may be significantly different than the results contained in this report. Accordingly, additional determinations may be needed for other purposes, such as judging benefit security or meeting employer funding requirements.

In preparing this report, we relied, without audit, on information as of July 1, 2015 as well as asset information as of June 30, 2016 furnished by the State of NJ. This information includes, but is not limited to, statutory provisions, member census data, and financial information. The breakdown as of July 1, 2015 includes 140,227 active participants, 13,435 terminated vested and other inactive participants (13,225 non-contributory members are treated as inactive for this purpose), and 98,230 retirees and beneficiaries. Please see Milliman's funding valuation report dated February 18, 2016 for more information on the plan's participants as of July 1, 2015 as well as a summary of the plan provisions and actuarial methods. Furthermore, this report reflects the adoption of the June 30, 2015 Experience Study and a reduction in the investment return assumption to 7.65%. Please refer to the Experience Study report dated January 16, 2017 for more information on the actuarial assumptions.

We performed a limited review of the census and financial information used directly in our analysis and have found them to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

We hereby certify that, to the best of our knowledge, this report, including all costs and liabilities based on actuarial assumptions and methods adopted by the Board or mandated by statute, is complete and accurate and determined in conformance with generally recognized and accepted actuarial principles and practices, which are consistent with the Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying Opinions and supporting Recommendations of the American Academy of Actuaries.

This valuation report is only an estimate of the Plan's financial condition as of a single date. It can neither predict the Plan's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of Plan benefits, only the timing of Plan contributions. While the valuation is based on an array of individually reasonable assumptions, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions is outside the scope of our engagement.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as, but not limited to, 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. Due to the limited scope of the actuarial assignment, we did not perform an analysis of the potential range of such future measurements.

Certification

Milliman's work is prepared solely for the use use and benefit of the State of New Jersey Division of Pensions and Benefits. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions: (a) the Plan Sponsor may provide a copy of Milliman's work, in its entirety, to the Plan Sponsor's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the Fund; and (b) the Plan Sponsor may provide a copy of Milliman's work, in its entirety,to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and has been prepared in accordance with generally recognized accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

Scott F. Porter, FSA
Consulting Actuary

Richard L. Gordon, FSA
Consulting Actuary

Executive Summary

This report presents the results of the actuarial valuation in accordance with GASB 67 as of June 30, 2016 for the Teachers' Pension and Annuity Fund. There are several differences in actuarial assumptions and methods specified by GASB 67 versus those used to determine the statutory contribution in accordance with New Jersey statute. These differences include treatment of receivable contributions, amortization methods, actuarial cost methods, inclusion of insurance benefits and potentially the discount rate.

The discount rate is based on the single equivalent rate that results in the same actuarial present value as the long-term expected rate of return applied to benefit payments, to the extent that the plan's fiduciary net position is projected to be sufficient to make projected benefit payments, and the municipal bond rate applied to benefit payments, to the extent that the plan's fiduciary net position is not projected to be sufficient. As of June 30, 2016, the plan's fiduciary net position is not projected to be sufficent in year 13 of the projection or by June 30, 2029. The depletion date has increased two years from the prior year GASB 67 valuation.

The primary assumption in determining the sufficiency of a plan's fiduciary net position relates to expected State contributions. Beginning with the 2017 fiscal year, 30% of the projected statutory pension contributions was assumed to be made by the State each year. This assumption represents the percentage of actual State contributions made towards the statutory contribution for the Fiscal Year Ending June 30, 2016 in accordance with GASB Statement No. 67. To the extent actual contributions are higher (lower) than shown, any date of depletion would be later (sooner) than shown in this report.

Since a date of depletion is determined, the discount rate is much lower than the current 7.65% investment return assumption. After assets are expected to be depleted, projected benefit payments are discounted using the municipal bond index. The State of New Jersey chose the Bond Buyer GO 20-Bond Municipal Bond Index. The bond index decreased from 3.80% as of June 30, 2015 to 2.85% as of June 30, 2016 resulting in a decrease in the single equivalent rate from 4.13% as of July 1, 2015 to 3.22% as of June 30, 2016. The combined impact of the decrease in the discount rate and reflection of the 2015 Experience Study increased the unfunded liability by approximately $10.8 billion. The unfunded liability, referred to as the Net Pension Liability, is $79.0 billion for a funded ratio of 22.3% as of June 30, 2016.

The benefits covered under this valuation include pension benefits and noncontributory group insurance benefits (NCGI). The depletion date has been determined based on the funding of pension benefits only whereas the weighted average discount rate reflects pension and NCGI benefits.

Overview of GASB 67 and GASB 68

The Governmental Accounting Standards Board (GASB) released new accounting standards for public pension plans and participating employers in 2012. These standards, GASB Statements No. 67 and 68, have substantially revised the accounting requirements previously mandated under GASB Statements No. 25 and 27. The most notable change is the distinct separation of funding from financial reporting. The Annual Required Contribution (ARC) has been eliminated under GASB 67 and 68 and is no longer relevant for financial reporting purposes. As a result, plan sponsors have been encouraged to establish a formal funding policy that is separate from financial reporting calculations.

GASB 67 applies to financial reporting for public pension plans and is required to be implemented for plan fiscal years beginning after June 15, 2013. Note that a plan's fiscal year might not be the same as the employer's fiscal year. Even if the plan does not issue standalone financial statements, but rather is considered a pension trust fund of a government, it is subject to GASB 67. Under GASB 67, enhancements to the financial statement disclosures are required, along with certain required supplementary information.

GASB 68 governs the specifics of accounting for public pension plan obligations for participating employers and is required to be implemented for employer fiscal years beginning after June 15, 2014. GASB 68 requires a liability for pension obligations, known as the Net Pension Liability, to be recognized on the balance sheets of participating employers. Changes in the Net Pension Liability will be immediately recognized as Pension Expense on the income statement or reported as deferred inflows/outflows of resources depending on the nature of the change.

Statement of Fiduciary Net Position

	June 30, 2015	June 30, 2016
Assets		
Cash and cash equivalents	$3,194,842	$2,414,775
Receivables and prepaid expenses:		
Receivable contributions	362,012,703	386,888,140
Receivable investment income	3,012	33,129
Receivables from brokers for unsettled trades	0	0
Prepaid expenses	4,931,424	2,551,217
Total receivables	366,947,139	389,472,486
Investments:		
Pension Fund A	0	0
Pension Fund B	0	0
Pension Fund D	16,583,641,041	14,568,762,228
Pension Fund E	8,682,210,214	7,797,708,833
Short-term investments	384,497,340	394,124,066
Total investments	25,650,348,595	22,760,595,127
Invested securities lending cash collateral	0	0
Capital assets net of accumulated depreciation	0	0
Total assets	26,020,490,576	23,152,482,388
Liabilities		
Accrued expenses and benefits payable	415,238,657	435,116,731
Securities lending cash collateral	(437,814)	(497,310)
CGIPF Payable	892,173	0
Total liabilities	415,693,016	434,619,421
Net position restricted for pensions [1]	$25,604,797,560	$22,717,862,967

[1] Excludes any statutory pension and ERI contribution receivables not reflected in TPAF's financial statements.

Statement of Changes in Fiduciary Net Position

	June 30, 2016
Additions	
Member contributions	$761,711,695
Employer contributions (State, Local, and NCGI)	800,069,277
Transfers from other systems	1,564,002
Other	243,660
Total contributions	1,563,588,634
Investment income (loss):	
Interest	458,583,392
Dividends	0
Portion Attributable to CGIPF	0
Net increase in fair value of investments	(747,095,626)
Securities lending income	0
Less investment expenses:	
Direct investment expense	5,434,567
Securities lending management fees	0
Securities lending borrower rebates	0
Net investment income	(293,946,801)
Other income	26,262,448
Total additions	1,295,904,281
Deductions	
Pension benefits	4,075,562,467
Refunds of member contributions	57,928,018
Noncontributory Group Insurance Premium Payment	35,580,277
Administrative expenses	13,768,112
Total deductions	4,182,838,874
Net increase (decrease)	(2,886,934,593)
Net position restricted for pensions	
Beginning of year (06/30/2015)	25,604,797,560
End of year (06/30/2016)	$22,717,862,967

Schedule of Investment Returns

Fiscal Year Ending June 30	Net Money-Weighted Rate of Return
2007	N/A
2008	N/A
2009	N/A
2010	N/A
2011	N/A
2012	N/A
2013	N/A
2014	16.79%
2015	4.08%
2016	-1.15%

Calculation of Money-Weighted Rate of Return

The money-weighted rate of return considers the changing amounts actually invested during a period and weights the amount of pension plan investments by the proportion of time they are available to earn a return during that period. External cash flows are determined on a monthly basis and are assumed to occur at the end of each month. External cash inflows are netted with external cash outflows, resulting in a net external cash flow in each month. The money-weighted rate of return is calculated net of investment expenses and has been determined by the New Jersey Division of Investments.

Net Pension Liability

Net Pension Liability	June 30, 2015	June 30, 2016
Total pension liability	$89,182,662,000	$101,746,770,000
Fiduciary net position	25,604,797,560	22,717,862,967
Net pension liability	63,577,864,440	79,028,907,033
Fiduciary net position as a % of total pension liability	28.71%	22.33%
Covered payroll	10,162,263,470	10,305,472,484
Net pension liability as a % of covered payroll	625.63%	766.86%

The total pension liability was determined by an actuarial valuation as of the valuation date, calculated based on the discount rate and actuarial assumptions below, and was then projected forward to the measurement date. There have been no significant changes in the demographics or plan provisions that would warrant an adjustment to the projection of the results from the valuation date to the measurement date. However, the roll-forward results reflects new actuarial assumptions as described below. Any significant changes during this period must be reflected as prescribed by GASB 67 and 68. Covered Payroll is as of June 30, 2014 and June 30, 2015, respectively.

Discount Rate

The plan's fiduciary net position was not projected to be available to make all projected future benefit payments of current active and inactive employees. Therefore, the discount rate for calculating the total pension liability is equal to the single equivalent rate that results in the same actuarial present value as the long-term expected rate of return applied to benefit payments, to the extent that the plan's fiduciary net position is projected to be sufficient to make projected benefit payments, and the municipal bond rate applied to benefit payments, to the extent that the plan's fiduciary net position is not projected to be sufficient.

Discount rate	3.22%
Long-term expected rate of return net of investment expense	7.65%
Municipal bond rate [1]	2.85%

Other Key Actuarial Assumptions

The actuarial assumptions that determined the total pension liability as of June 30, 2016 were based on the results of an actuarial experience study for the period July 1, 2012 - July 1, 2015. Please refer to that report for more information.

Valuation date	July 1, 2015
Measurement date	June 30, 2016
Actuarial cost method	Entry Age Normal [2]

All other assumptions used are consistent with the assumptions used in the June 30, 2015 Actuarial Valuation Report prepared as of July 1, 2015 and modified by the 2015 Experience Study dated February 18, 2016 and January 16, 2017, respectively.

[1] Bond Buyer 20-Bond General Obligation Bond Index as of June 30, 2016; 3.80% as of June 25, 2015

[2] Total projected compensation is used to allocate costs under Entry Age Normal even if pensionable compensation is limited to the Social Security Taxable Wage Base. The select period for the salary scale is assumed to occur during the period July 1, 2011 through June 30, 2026. The ultimate scale applies to all other time periods.

Changes in Net Pension Liability

Changes in Net Pension Liability	Increase (Decrease) Total Pension Liability (a) [1]	Plan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)
Balances as of June 30, 2015	$89,182,662,000	$25,604,797,560	$63,577,864,440
Changes for the year:			
Service cost	$2,344,321,810		2,344,321,810
Interest on total pension liability	$3,694,844,118		3,694,844,118
Effect of plan changes	$0		0
Effect of economic/demographic (gains) or losses	($134,644,168)		(134,644,168)
Effect of assumptions changes or inputs	$10,827,093,000		10,827,093,000
Benefit payments	($4,169,070,762)	(4,169,070,762)	0
Transfers from other Systems	$1,564,002	1,564,002	0
Adminstrative expenses		(13,768,112)	13,768,112
Member contributions		761,711,695	(761,711,695)
Net investment income		(267,684,353)	267,684,353
Employer contributions		800,069,277	(800,069,277)
Other		243,660	(243,660)
Balances as of June 30, 2016	101,746,770,000	22,717,862,967	79,028,907,033

[1] Total Pension Liability as of June 30, 2015 is based on a single equivalent discount rate of 4.13%

Sensitivity Analysis

The following presents the net pension liability of the Teachers' Pension and Annuity Fund of New Jersey, calculated using the discount rate of 3.22%, 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 (2.22%) or 1 percentage point higher (4.22%) than the current rate.

	1% Decrease 2.22%	Current Discount Rate 3.22%	1% Increase 4.22%
Total pension liability	$117,096,039,000	$101,746,770,000	$89,212,111,000
Fiduciary net position	22,717,862,967	22,717,862,967	22,717,862,967
Net Pension liability	94,378,176,033	79,028,907,033	66,494,248,033

Long-Term Expected Rate of Return

The best-estimate range for the long-term expected rate of return is determined by adding expected inflation to expected long-term real returns and reflecting expected volatility and correlation. The capital market assumptions are per Milliman's investment consulting practice as of December 31, 2015.

Asset Class	Index	Target Allocation*	Long-Term Expected Real Rate of Return
US Cash	BAML 3-Mon Tbill	5.00%	0.39%
US Gvt Bonds	Barclays Gvt	1.50%	1.28%
US Credit Bonds	Barclays Credit	13.00%	2.76%
US Mortgages	Barclays MBS	2.00%	2.38%
US Inflation-Indexed Bonds	Barclays US TIPs	1.50%	1.41%
US High Yield Bonds	BAML High Yield	2.00%	4.70%
US Equity Market	Russell 3000	26.00%	5.14%
Foreign Developed Equity	MSCI EAFE NR	13.25%	5.91%
Emerging Markets Equity	MSCI EM NR	6.50%	8.16%
Private Real Estate Property	NCREIF Property	5.25%	3.64%
Timber	NCREIF Timber	1.00%	3.86%
Farmland	NCREIF Farmland	1.00%	4.39%
Private Equity	Cambridge Private Equity	9.00%	8.97%
Commodities	Dow Jones UBS	0.50%	2.87%
Hedge Funds - MultiStrategy	HFRI MultiStrategy	5.00%	3.70%
Hedge Funds - Equity Hedge	HFRI Equity Hedge	3.75%	4.72%
Hedge Funds - Distressed	HFRI Distressed	3.75%	3.49%
Assumed Inflation - Mean			2.50%
Assumed Inflation - Standard Deviation			1.89%
Portfolio Arithmetic Mean Return			7.31%
Portfolio Standard Deviation			11.74%
Long-Term Expected Rate of Return selected by State Treasurer			**7.65%**

* Based on target asset allocation for 2016 fiscal year

Schedule of Changes in Net Pension Liability and Related Ratios ($ in Millions)

	Fiscal Year Ending June 30									
	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007
Total Pension Liability										
Service cost	$2,344	$2,022	$1,871	$0	$0	$0	$0	$0	$0	$0
Interest on total pension iability	3,695	3,797	3,794	0	0	0	0	0	0	0
Effect of plan changes	0	0	0	0	0	0	0	0	0	0
Effect of assumption changes or inputs	10,827	5,914	2,614	0	0	0	0	0	0	0
Effect of economic/demographic (gains) or losses	(135)	365	(25)	0	0	0	0	0	0	0
Benefit payments	(4,169)	(4,015)	(3,838)	0	0	0	0	0	0	0
Transfers from other Systems	2	4	0	0	0	0	0	0	0	0
Net change in total pension liability	12,564	8,087	4,417	0	0	0	0	0	0	0
Total pension liability, beginning	89,183	81,095	76,679	0	0	0	0	0	0	0
Total pension liability, ending (a)	101,747	89,183	81,095	0	0	0	0	0	0	0
Fiduciary Net Position										
Employer contributions	$800	$541	$428	$0	$0	$0	$0	$0	$0	$0
Member contributions	762	740	716	0	0	0	0	0	0	0
Investment income net of investment expenses	(268)	1,040	4,078	0	0	0	0	0	0	0
Benefit payments	(4,169)	(4,015)	(3,838)	0	0	0	0	0	0	0
Administrative expenses	(14)	(14)	(12)	0	0	0	0	0	0	0
Transfers from other Systems + misc items	2	4								
Net change in plan fiduciary net position	(2,887)	(1,704)	1,372	0	0	0	0	0	0	0
Fiduciary net position, beginning	25,605	27,282	25,888	0	0	0	0	0	0	0
Fiduciary net position, ending (b)	22,718	25,605	27,282	0	0	0	0	0	0	0
Net pension liability, ending = (a) - (b)	$79,029	$63,578	$53,813	$0	$0	$0	$0	$0	$0	$0
Fiduciary net position as a % of total pension liability	22.33%	28.71%	33.64%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Covered payroll	$10,305	$10,162	$10,039	$9,779	$9,682	$10,025	$9,747	$9,419	$9,078	$8,749
Net pension liability as a % of covered payroll	766.86%	625.63%	536.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

This schedule is presented to illustrate the requirement to show information for 10 years. However, recalculations of prior years are not required, and if prior years are not reported in accordance with the current GASB standards, they should not be reported.

Schedule of Employer Pension Contributions [1]

Fiscal Year Ending June 30	Actuarially Determined Contribution	Actual Employer Contribution	Contribution Deficiency (Excess)	Covered Payroll	Contribution as a % of Covered Payroll
2007	1,156,140,571	663,415,668	$492,724,903	8,748,623,186	7.58%
2008	1,286,147,106	663,791,615	622,355,491	9,077,628,813	7.31%
2009	1,348,105,853	64,376,207	1,283,729,646	9,419,083,203	0.68%
2010	1,526,168,830	0	1,526,168,830	9,747,020,060	0.00%
2011	1,826,722,370	0	1,826,722,370	10,025,401,658	0.00%
2012	2,009,810,329	287,115,915	1,722,694,414	9,682,318,739	2.97%
2013	2,148,185,001	613,766,799	1,534,418,202	9,779,212,916	6.28%
2014	2,158,287,358	392,035,985	1,766,251,373	10,038,792,896	3.91%
2015	2,306,611,715	504,320,000	1,802,291,715	10,162,263,470	4.96%
2016	2,544,811,534	764,489,000	1,780,322,534	10,305,472,484	7.42%

[1] Only reflects State contributions towards the Actuarially Determined Contribution. Excludes other employer contributions such as NCGI premium reimbursement, delayed enrollments, delayed appropriations and other miscellaneous items.

Depletion Date Projection

In order to determine if the plan's fiduciary net position is projected to be sufficient to make projected benefit payments, we have prepared a depletion date projection using the following techniques and assumptions:

- Current active members (non-contributory members are not considered active) contribute the required employee contribution amounts.
- Employer contributions are assumed to equal 30% of the State's statutory contribution (see following page for details).
- Benefit payments are projected based on the actuarial assumptions and the current plan provisions.
- Members are assumed to receive pay increases, terminate, retire, become disabled, die, and so forth according to the actuarial assumptions adopted in the 2015 Experience Study dated January 16, 2017.
- Terminating and retiring members will not be replaced with new employees.
- Current administrative expenses are assumed to be equal to 0.340% of the expected benefit payments for the fiscal year.
- All cash flows are assumed to occur on average halfway through the year.
- The long-term expected rate of return on pension plan investments is 7.65%.
- The actuarial assumptions do not change.
- The plan provisions do not change.
- Excludes any liabilities associated with the contributory group life insurance benefits, but includes pay-as-you-go payments for the non-contributory insurance benefits.

Actual results at each point in time will yield different values, reflecting the actual experience of the plan membership and assets.

Actuarial Methods and Assumptions Used for Funding Policy

The following actuarial methods and assumptions were used in the July 1, 2015 funding valuation and modified in the 2015 Experience Study. Please see the valuation report and experience study dated February 18, 2016 and January 16, 2017, respectively for further details.

Valuation Timing	Actuarially determined contributions are calculated as of June 30, two years prior to the end of the fiscal year in which the contributions are reported (i.e. June 30, 2014 valuation determines June 30, 2016 fiscal year end contributions).
Actuarial Cost Method	Projected Unit Credit, per NJ Statue for pension benefits; Actual claims for noncontributory group insurance benefits are reimbursed monthly.
Amortization Method	Level Dollar Amortization: Per NJ Statute, the amortization period is 30 years until the June 30, 2019 valuation at which time the period declines by 1 each year until 20 years. The amortization amount in any future year cannot be lower then the amount from the prior year until the plan is fully funded on an actuarial value of assets basis.
Asset Valuation Method	Per NJ Statue, 20% of the difference between the expected Actuarial Value and market value is recognized each year in determining the Actuarial Value of Assets.
Inflation/ SSTWB Inflation	2.3%/ 3.3% until June 30, 2026; 2.6%/ 3.6% thereafter
Salary Increases	Varies by years of employment and valuation year
Investment Rate of Return	7.65%
Cost of Living Adjustments	None
Mortality	Based on experience of TPAF members reflecting mortality improvement on a generational basis based on a 60-year average of Social Security data from 1953 to 2013.
Other Assumptions	See June 30, 2015 Experience Study

Projection of Contributions
($ in Millions)

Fiscal Year End	Projected Payroll Current Employees	Projected Payroll Future Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for Current Employees	Contributions from Future Employees*	Total Contributions
2017	$10,322	$0	$10,322	$724	$859	$0	$1,582
2018	10,091	0	10,091	722	943	0	1,665
2019	9,895	0	9,895	725	1,010	0	1,735
2020	9,730	0	9,730	711	1,080	0	1,791
2021	9,514	0	9,514	697	1,163	0	1,860
2022	9,344	0	9,344	686	1,250	0	1,936
2023	9,198	0	9,198	673	1,344	0	2,016
2024	8,982	0	8,982	657	1,442	0	2,099
2025	8,759	0	8,759	642	1,546	0	2,188
2026	8,580	0	8,580	627	1,658	0	2,284
2027	8,331	0	8,331	606	1,777	0	2,383
2028	8,052	0	8,052	588	1,904	0	2,492
2029	7,853	0	7,853	571	2,040	0	2,611
2030	7,573	0	7,573	0	0	0	0
2031	7,233	0	7,233	0	0	0	0
2032	6,933	0	6,933	0	0	0	0
2033	6,580	0	6,580	0	0	0	0
2034	6,191	0	6,191	0	0	0	0
2035	5,839	0	5,839	0	0	0	0
2036	5,461	0	5,461	0	0	0	0
2037	5,072	0	5,072	0	0	0	0
2038	4,719	0	4,719	0	0	0	0
2039	4,370	0	4,370	0	0	0	0
2040	4,019	0	4,019	0	0	0	0
2041	3,705	0	3,705	0	0	0	0
2042	3,401	0	3,401	0	0	0	0
2043	3,055	0	3,055	0	0	0	0
2044	2,774	0	2,774	0	0	0	0
2045	2,403	0	2,403	0	0	0	0
2046	2,032	0	2,032	0	0	0	0

* Contributions from future employees that are above service cost and, therefore, can be allocated to payment of benefits of current employees under GASB rules.

Projection of Fiduciary Net Position
($ in Millions)

Fiscal Year End	Projected Beginning Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Adminstrative Expenses	Projected Investment Earnings	Projected Ending Fiduciary Net Position
2017	$22,718	$1,582	$4,246	$14	$1,607	$21,647
2018	21,647	1,665	4,375	15	1,520	20,442
2019	20,442	1,735	4,481	15	1,424	19,104
2020	19,104	1,791	4,588	16	1,317	17,609
2021	17,609	1,860	4,694	16	1,198	15,957
2022	15,957	1,936	4,774	16	1,068	14,171
2023	14,171	2,016	4,862	17	928	12,237
2024	12,237	2,099	4,952	17	776	10,143
2025	10,143	2,188	5,037	17	612	7,890
2026	7,890	2,284	5,120	17	436	5,473
2027	5,473	2,383	5,231	18	246	2,853
2028	2,853	2,492	5,333	18	42	36
2029	36	2,611	5,422	18	0	0
2030	0	0	5,533	0	0	0
2031	0	0	5,648	0	0	0
2032	0	0	5,751	0	0	0
2033	0	0	5,868	0	0	0
2034	0	0	5,978	0	0	0
2035	0	0	6,072	0	0	0
2036	0	0	6,171	0	0	0
2037	0	0	6,256	0	0	0
2038	0	0	6,317	0	0	0
2039	0	0	6,381	0	0	0
2040	0	0	6,427	0	0	0
2041	0	0	6,443	0	0	0
2042	0	0	6,482	0	0	0
2043	0	0	6,495	0	0	0
2044	0	0	6,497	0	0	0
2045	0	0	6,543	0	0	0
2046	0	0	6,536	0	0	0
2047	0	0	6,501	0	0	0
2048	0	0	6,490	0	0	0
2049	0	0	6,448	0	0	0

Actuarial Present Value of Projected Benefit Payments
($ in Millions)

Fiscal Year End	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments*	Present Value of "Unfunded" Benefit Payments**	Present Value of Total Benefit Payments***
Total					36,261 +	105,358 =	141,619

* Discounted at the long-term expected rate of return, 7.65%

** Discounted at the municipal bond rate, 2.85%

*** Discounted at the single interest rate that produces a total actuarial present value equal to the sum of the actuarial present values of "funded" and "unfunded" benefit payments, 3.22%

2017	22,718	4,246	4,246	0	3,944	0	4,113
2018	21,647	4,375	4,375	0	3,775	0	4,106
2019	20,442	4,481	4,481	0	3,592	0	4,075
2020	19,104	4,588	4,588	0	3,416	0	4,042
2021	17,609	4,694	4,694	0	3,247	0	4,006
2022	15,957	4,774	4,774	0	3,068	0	3,947
2023	14,171	4,862	4,862	0	2,902	0	3,894
2024	12,237	4,952	4,952	0	2,746	0	3,843
2025	10,143	5,037	5,037	0	2,594	0	3,787
2026	7,890	5,120	5,120	0	2,450	0	3,729
2027	5,473	5,231	5,231	0	2,325	0	3,691
2028	2,853	5,333	5,333	0	2,202	0	3,646
2029	36	5,422	0	5,422	0	3,763	3,591
2030	0	5,533	0	5,533	0	3,733	3,550
2031	0	5,648	0	5,648	0	3,705	3,511
2032	0	5,751	0	5,751	0	3,668	3,463
2033	0	5,868	0	5,868	0	3,639	3,424
2034	0	5,978	0	5,978	0	3,605	3,379
2035	0	6,072	0	6,072	0	3,560	3,325
2036	0	6,171	0	6,171	0	3,518	3,274
2037	0	6,256	0	6,256	0	3,468	3,216
2038	0	6,317	0	6,317	0	3,404	3,145
2039	0	6,381	0	6,381	0	3,343	3,078
2040	0	6,427	0	6,427	0	3,274	3,004
2041	0	6,443	0	6,443	0	3,191	2,917
2042	0	6,482	0	6,482	0	3,122	2,843

Actuarial Present Value of Projected Benefit Payments
($ in Millions)

Fiscal Year End	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments*	Present Value of "Unfunded" Benefit Payments**	Present Value of Total Benefit Payments***
2043	0	6,495	0	6,495	0	3,041	2,760
2044	0	6,497	0	6,497	0	2,958	2,675
2045	0	6,543	0	6,543	0	2,897	2,610
2046	0	6,536	0	6,536	0	2,813	2,525
2047	0	6,501	0	6,501	0	2,721	2,434
2048	0	6,490	0	6,490	0	2,641	2,354
2049	0	6,448	0	6,448	0	2,551	2,266
2050	0	6,400	0	6,400	0	2,462	2,179
2051	0	6,369	0	6,369	0	2,382	2,100
2052	0	6,299	0	6,299	0	2,291	2,013
2053	0	6,228	0	6,228	0	2,202	1,928
2054	0	6,169	0	6,169	0	2,121	1,850
2055	0	6,049	0	6,049	0	2,022	1,757
2056	0	5,950	0	5,950	0	1,933	1,675
2057	0	5,795	0	5,795	0	1,831	1,580
2058	0	5,628	0	5,628	0	1,729	1,487
2059	0	5,459	0	5,459	0	1,631	1,397
2060	0	5,268	0	5,268	0	1,530	1,306
2061	0	5,081	0	5,081	0	1,435	1,221
2062	0	4,877	0	4,877	0	1,339	1,135
2063	0	4,667	0	4,667	0	1,246	1,052
2064	0	4,450	0	4,450	0	1,155	972
2065	0	4,230	0	4,230	0	1,067	895
2066	0	4,006	0	4,006	0	983	821
2067	0	3,778	0	3,778	0	901	750
2068	0	3,547	0	3,547	0	823	683
2069	0	3,315	0	3,315	0	748	618
2070	0	3,082	0	3,082	0	676	557
2071	0	2,849	0	2,849	0	607	499
2072	0	2,618	0	2,618	0	543	444
2073	0	2,390	0	2,390	0	482	392
2074	0	2,166	0	2,166	0	424	345

Actuarial Present Value of Projected Benefit Payments
($ in Millions)

Fiscal Year End	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments*	Present Value of "Unfunded" Benefit Payments**	Present Value of Total Benefit Payments***
2075	0	1,949	0	1,949	0	371	300
2076	0	1,739	0	1,739	0	322	260
2077	0	1,538	0	1,538	0	277	222
2078	0	1,348	0	1,348	0	236	189
2079	0	1,169	0	1,169	0	199	159
2080	0	1,002	0	1,002	0	166	132
2081	0	850	0	850	0	137	108
2082	0	711	0	711	0	111	88
2083	0	587	0	587	0	89	70
2084	0	477	0	477	0	71	55
2085	0	381	0	381	0	55	43
2086	0	300	0	300	0	42	33
2087	0	232	0	232	0	32	24
2088	0	176	0	176	0	23	18
2089	0	131	0	131	0	17	13
2090	0	96	0	96	0	12	9
2091	0	69	0	69	0	8	6
2092	0	48	0	48	0	6	4
2093	0	33	0	33	0	4	3
2094	0	22	0	22	0	2	2
2095	0	15	0	15	0	2	1
2096	0	9	0	9	0	1	1
2097	0	6	0	6	0	1	0
2098	0	4	0	4	0	0	0
2099	0	2	0	2	0	0	0
2100	0	1	0	1	0	0	0
2101	0	1	0	1	0	0	0
2102	0	0	0	0	0	0	0
2103	0	0	0	0	0	0	0
2104	0	0	0	0	0	0	0
2105	0	0	0	0	0	0	0
2106	0	0	0	0	0	0	0

Actuarial Present Value of Projected Benefit Payments
($ in Millions)

Fiscal Year End	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments*	Present Value of "Unfunded" Benefit Payments**	Present Value of Total Benefit Payments***
2107	0	0	0	0	0	0	0
2108	0	0	0	0	0	0	0
2109	0	0	0	0	0	0	0
2110	0	0	0	0	0	0	0
2111	0	0	0	0	0	0	0
2112	0	0	0	0	0	0	0
2113	0	0	0	0	0	0	0
2114	0	0	0	0	0	0	0
2115	0	0	0	0	0	0	0

Glossary

Actuarially Determined Contribution	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined based on the funding policy and most recent measurement available when the contribution for the reporting period was adopted.
Deferred Inflows/Outflows of Resources	Portion of changes in net pension liability that is not immediately recognized in Pension Expense. These changes include differences between expected and actual experience, changes in assumptions, and differences between expected and actual earnings on plan investments.
Discount Rate	Single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the sum of: 1) The actuarial present value of benefit payments projected to be made in future periods where the plan assets are projected to be sufficient to meet benefit payments, calculated using the Long-Term Expected Rate of Return. 2) The actuarial present value of projected benefit payments not included in (1), calculated using the Municipal Bond Rate.
Fiduciary Net Position	Equal to market value of assets.
Long-Term Expected Rate of Return	Long-term expected rate of return on pension plan investments expected to be used to finance the payment of benefits, net of investment expenses.
Money-Weighted Rate of Return	The internal rate of return on pension plan investments, net of investment expenses.
Municipal Bond Rate	Yield or index rate for 20-year, tax-exempt general obligation municipal bonds with an average rating of AA/Aa or higher.
Net Pension Liability	Total Pension Liability minus the Plan's Fiduciary Net Position (unfunded accrued liability).
Projected Benefit Payments	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and expected future service.
Service Cost	The portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.
Total Pension Liability	The portion of actuarial present value of projected benefit payments that is attributable to past periods of member service using the Entry Age Normal cost method based on the requirements of GASB 67 and 68.