



# **The Teachers' Pension and Annuity Fund of New Jersey**

**GASB 68 Report  
as of June 30, 2018**

**Produced by Cheiron**

**February 2019**

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**TEACHERS' PENSION AND ANNUITY FUND OF NEW JERSEY  
GASB 68 REPORTING FOR JUNE 30, 2018 MEASUREMENT DATE**

**SECTION I – BOARD SUMMARY**

The purpose of this report is to provide accounting and financial disclosure information under Government Accounting Standards Board Statement 68 for the Teachers' Pension and Annuity Fund of New Jersey (TPAF). This information includes:

- Disclosure of Deferred Inflows and Outflows, and
- Calculation of the Annual Pension Expense.

**Highlights**

The reporting date for the TPAF is June 30, 2018. Measurements as of the reporting date are based on the fair value of assets as of June 30, 2018 and the Total Pension Liability as of the valuation date, July 1, 2017, updated to June 30, 2018. There was a change in assumptions as the discount rate used to measure the Total Pension Liability was changed as of the measurement date. We are not aware of any other significant events between the valuation date and the measurement date so the update procedures only included the addition of service cost and interest cost offset by actual benefit payments and an adjustment to reflect the change in discount rate. Additional information about the TPL can be found in the GASB 67 report. This report contains the GASB 68 collective employer reporting amounts. The individual employer reporting amounts can be found in the GASB 67-68 Employer Schedules provided separately in excel format.

The June 30, 2017 values shown in this report are based on the prior actuary's GASB report.

The table below provides a summary of the key results during this reporting period.

<b>Table I-1 Summary of Collective Results</b>		
<b>Measurement Date</b>	<b>6/30/2018</b>	<b>6/30/2017</b>
Net Pension Liability	\$ 63,806,350,446	\$ 67,670,209,171
Deferred Outflows	(12,473,998,870)	(14,160,879,261)
Deferred Inflows	<u>16,180,773,639</u>	<u>11,800,239,661</u>
Net Impact on Statement of Net Position	\$ 67,513,125,215	\$ 65,309,569,571
Total Pension Expense	\$ 3,720,032,991	\$ 4,687,849,430
Pension Expense (% of Payroll)	34.97%	44.92%

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**SECTION II – CERTIFICATION**

The purpose of this report is to provide accounting and financial reporting information under GASB 68 for Teachers' Pension and Annuity Fund of New Jersey (TPAF). This report is for the use of TPAF, the Division of Pensions and Benefits and their auditors in preparing financial reports in accordance with applicable law and accounting requirements. This report is not appropriate for other purposes, including the measurement of funding requirements for TPAF and estimating the price to settle TPAF's obligations.

In preparing our report, we relied on information (some oral and some written) supplied by the Division of Pensions and Benefits. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

Future actuarial measurements may differ significantly from the current measurements 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; and changes in plan provisions or applicable law.

For purposes of this report, the calculation of the Total Pension Liability and the projection of the Plan's contributions and projected benefit payments were based on the recommended demographic assumptions of the July 1, 2012 – June 30, 2015 Experience Study prepared by the prior actuary, which was subsequently approved by the Board of Trustees. While we consider these assumptions to be generally reasonable, we have not yet performed our own actuarial experience study.

Based on the State Treasurer's recommendation the following economic assumptions are used to determine the Total Pension Liability and the actuarially determined contributions:

- Effective with the July 1, 2017 valuation: 7.50% per annum,
- Effective with the July 1, 2019 valuation: 7.30% per annum,
- Effective with the July 1, 2021 valuation: 7.00% per annum.

In accordance with Paragraph 40 of GASB Statement No. 67, the projection of the Plan's fiduciary net position is based on a long-term expected rate of return of 7.00% per annum.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

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**SECTION II – CERTIFICATION**

This report was prepared for TPAF for the purposes described herein and for the use by the plan auditor in completing an audit related to the matters herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.



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**SECTION III – DETERMINATION OF DISCOUNT RATE**

The discount rate used to measure the Total Pension Liability was 4.25% as of June 30, 2017 and 4.86% as of June 30, 2018. As discussed with the Division of Pensions and Benefits, the projection of cash flows used to determine the discount rate as of June 30, 2018 assumed:

- In accordance with Paragraph 40 of GASB Statement No. 67, the projection of the Plan's fiduciary net position is based on a long-term expected rate of return of 7.00% per annum.
- In accordance with Paragraph 37 of GASB Statement No. 67, the projection of the Plan's contributions and projected benefit payments were based on the recommended demographic assumptions of the July 1, 2012 – June 30, 2015 Experience Study prepared by the prior actuary, which was approved by the Board of Trustees.

Based on the State Treasurer's recommendation the following economic assumptions are used to determine the actuarially determined contributions:

- Effective with the July 1, 2017 valuation: 7.50% per annum,
- Effective with the July 1, 2019 valuation: 7.30% per annum,
- Effective with the July 1, 2021 valuation: 7.00% per annum.
- It is assumed that the State will contribute 50% of the actuarially determined contribution and 100% of its Non-Contributory Group Insurance Premium Fund (NCGIPF) contribution. The 50% contribution rate is the actual total State contribution rate paid in fiscal year ending June 30, 2018 with respect to the actuarially determined contribution for the fiscal year ending June 30, 2018 for all State administered retirement systems.
- Prior to FYE 2018, it is assumed the State would make pension contributions the June 30<sup>th</sup> following the valuation date. Effective with FYE 2018, Chapter 83, P.L. 2016 requires the State to make pension contributions on a quarterly basis: at least 25 percent by September 30, at least 50 percent by December 31, at least 75 percent by March 31, and at least 100 percent by June 30.
- In accordance with Chapter 98, P. L. 2017, TPAF receives 77.78% of the proceeds of the Lottery Enterprise for a period of 30 years. Revenues received from lottery proceeds are assumed to be contributed to the System on a monthly basis.
- It is assumed that Local employers' contributions are expected to be received on April 1<sup>st</sup>, 21 months after the associated valuation date.
- The NCGIPF contributions are assumed to be paid monthly.

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**SECTION III – DETERMINATION OF DISCOUNT RATE**

The Fiduciary Net Position (FNP) includes Local employers' contributions receivable as reported in the financial statements provided to us by the Division of Pensions and Benefits. In determining the discount rate in Appendix D, the FNP at the beginning of each year does not reflect receivable contributions as those amounts are not available at the beginning of the year to pay benefits. The receivable contributions for the current year include receivable contributions of \$12,906,879 for Local employers' ERI.

Based on these assumptions, the pension Plan's fiduciary net position was projected to be available to make all projected future benefit payments of current Plan members through fiscal year 2040. Municipal bond rates of 3.58% as of June 30, 2017 and 3.87% as of June 30, 2018 were used in the development of the blended GASB discount rate after the Plan's fiduciary net position was no longer sufficient to make future benefit payments. As selected by the State Treasurer, the rates are based on the Bond Buyer GO 20-Bond Municipal Bond Index. Based on the long-term rate of return of 7.00% and the municipal bond rate of 3.58% as of June 30, 2017 and the long-term rate of return of 7.00% and the municipal bond rate of 3.87% as of June 30, 2018, the blended GASB discount rates are 4.25% as of June 30, 2017 and **4.86%** as of June 30, 2018. The assumed discount rates have been determined in accordance with the method prescribed by GASB Statement No. 67.

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**SECTION IV – COLLECTIVE EMPLOYER REPORTING AMOUNTS**

We understand the State and Local employers have elected to use the 2018 measurement date for their 2019 reporting date. As a result, the schedules in this section will be used by the State and Local employers for their 2019 reporting.

The impact of experience gains or losses and assumption changes on the TPL are recognized in expense over the average expected remaining service life of all active and inactive members of the System. As of the measurement date, this recognition period was 8.29 years.

The following tables summarize the current balances of deferred outflows and deferred inflows of resources along with the net recognition over the next five years.

<b>Table IV-1</b>		
<b>Schedule of Collective Deferred Inflows and Outflows of Resources</b>		
	<b>Deferred Outflows of Resources</b>	<b>Deferred Inflows of Resources</b>
Differences between expected and actual experience	\$ 1,420,239,017	\$ 96,229,812
Changes in assumptions	11,053,759,853	16,078,750,001
Net differences between projected and actual earnings on pension plan investments	0	5,793,826
<b>Total</b>	<b>\$ 12,473,998,870</b>	<b>\$ 16,180,773,639</b>
Amounts reported as deferred outflows and deferred inflows of resources will be recognized in pension expense as follows:		
<b>Measurement year ended June 30:</b>		
2019	401,574,312	
2020	208,932,249	
2021	(222,922,941)	
2022	(149,225,008)	
2023	(735,040,983)	
Thereafter	\$ (3,210,092,398)	



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**SECTION IV – COLLECTIVE EMPLOYER REPORTING AMOUNTS**

The annual pension expense recognized by the State and Local employers can be calculated two different ways. First, it is the change in the amounts reported on the Statement of Net Position that relate to TPAF and are not attributable to employer contributions. That is, it is the change in NPL plus the changes in deferred outflows and inflows plus employer contributions.

Alternatively, annual pension expense can be calculated by its individual components. While GASB does not require or suggest the organization of the individual components shown in the table below, we believe it helps to understand the level and volatility of pension expense.

First, there are components referred to as operating expenses. These are items directly attributable to the operation of the plan during the measurement year. Service cost less employee contributions represents the increase in employer-provided benefits attributable to the year, and administrative expenses are the cost of operating TPAF for the year.

Second, there are the financing expenses: the interest on the Total Pension Liability less the expected return on assets.

The final category is changes. This category will drive most of the volatility in pension expense from year to year. It includes any changes in benefits made during the year and the recognized amounts due to assumption changes, gains or losses on the TPL, and investment gains or losses.

The following table shows the development of pension expense for the State and Local employers through both of these methodologies.

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**SECTION IV – COLLECTIVE EMPLOYER REPORTING AMOUNTS**

<b>Table IV-3 Calculation of Collective Pension Expense</b>		
<b>Measurement Year Ending</b>	<b>2018</b>	<b>2017</b>
Change in Net Pension Liability	\$ (3,863,858,725)	\$ (11,358,697,862)
Change in Deferred Outflows	1,686,880,391	3,253,821,745
Change in Deferred Inflows	4,380,533,978	11,665,707,067
Employer Contributions*	<u>1,516,131,450</u>	<u>1,127,018,480</u>
<b>Subtotal</b>	<b>\$ 3,719,687,094</b>	<b>\$ 4,687,849,430</b>
Employer Contribution - delayed enrollments	313,642	321,917
Employer Contribution - delayed appropriations	<u>32,255</u>	<u>35,742</u>
<b>Total Pension Expense</b>	<b>\$ 3,720,032,991</b>	<b>\$ 4,688,207,089</b>
<b>Total Pension Expense as % of Payroll</b>	<b>34.97%</b>	<b>44.92%</b>
<b>Operating Expenses</b>		
Service cost	\$ 2,229,422,113	\$ 3,028,689,581
Employee contributions	(810,899,751)	(790,788,033)
Administrative expenses	<u>13,222,178</u>	<u>11,923,787</u>
Total	\$ 1,431,744,540	\$ 2,249,825,335
<b>Financing Expenses</b>		
Interest cost	\$ 3,858,188,355	\$ 3,304,988,177
Expected return on assets	<u>(1,536,165,072)</u>	<u>(1,606,947,478)</u>
Total	\$ 2,322,023,283	\$ 1,698,040,699
<b>Changes</b>		
Benefit changes	\$ 0	\$ 0
Recognition of assumption changes	(98,468,671)	723,829,969
Recognition of liability gains and losses	197,584,362	53,331,240
Recognition of investment gains and losses	<u>(132,850,523)</u>	<u>(36,820,154)</u>
Total	\$ (33,734,832)	\$ 740,341,055
<b>Total Pension Expense</b>	<b>\$ 3,720,032,991</b>	<b>\$ 4,688,207,089</b>

\* Includes appropriations and lottery revenue

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**APPENDIX A – MEMBERSHIP INFORMATION**

Plan Membership		
	July 1, 2017	July 1, 2016
Contributing Actives	141,020	140,563
Non-Contributing Members	13,869	13,600
Terminated Vested	197	222
Inactive Receiving Benefits	<u>102,573</u>	<u>101,246</u>
Total	257,659	255,631
Annual Compensation for Contributing Actives	\$ 10,636,814,121	\$ 10,436,205,103
Annual Retirement Allowances for Those Receiving Benefits	\$ 4,184,778,025	\$ 4,067,574,984

\* QDRO recipients are excluded from the July 1, 2017 counts

The July 1, 2017 membership information shown in the table above is based on Cheiron's processed data and may not match the prior actuary's report.

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**A. Actuarial Assumptions**

- |  |  |
|--|--|
| <b>1. Investment Rate of Return for determining Actuarially Determined Contributions</b> | <ul style="list-style-type: none"> <li>• July 1, 2017 valuation: 7.50% per annum, compounded annually.</li> <li>• July 1, 2018 valuation: 7.50% per annum, compounded annually.</li> <li>• July 1, 2019 valuation: 7.30% per annum, compounded annually.</li> <li>• July 1, 2020 valuation: 7.30% per annum, compounded annually.</li> <li>• July 1, 2021 and later valuations: 7.00% per annum, compounded annually.</li> </ul> |
| <b>2. Long-Term Expected Rate of Return</b>  | 7.00% per annum, compounded annually.  |
| <b>3. Interest Crediting Rate on Accumulated Deductions</b>                              | 7.50% per annum, compounded annually.  |
| <b>4. Member Annuity Conversion</b>  | Valuation mortality and interest crediting rate are assumed to be the basis for determining the member annuity in future years.  |
| <b>5. GASB 67 Effective Discount Rate</b>  | <ul style="list-style-type: none"> <li>• June 30, 2017: 4.25% per annum, compounded annually.</li> <li>• June 30, 2018: 4.86% per annum, compounded annually.</li> </ul>   |
| <b>6. Administrative Expenses</b>  | 0.30% of the expected benefit payments for the year.   |
| <b>7. Cost-of-Living Adjustments (COLAs)</b>   | No future COLAs are assumed. Previously granted COLAs are included in the data.  |
| <b>8. Salary Increases</b>   | Salary increases vary by years of service and time period. Annual salary increases are shown below.  |

Years of Service	Period Ending June 30, 2026	Ultimate Period
0-8	3.80%	4.90%
9-12	4.55	5.45
13	4.30	5.30
14	4.15	4.95
15	3.95	4.55
16	3.40	4.00
17	3.15	3.65
18	2.85	3.45
19	2.70	3.20
20	2.50	3.10
21	2.25	2.75
22	2.00	2.60
23-25	1.90	2.45
26-30	1.70	2.30
31+	1.55	2.00

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

Salary increases are assumed to occur on October 1.

For GASB purposes, the salary increases shown for the period ending June 30, 2026 were assumed for the period July 1, 2011 through June 30, 2026. The ultimate period rates were assumed to apply for all other time periods.

- 9. 401(a)(17) Pay Limit**                    \$270,000 in 2017 increasing 2.30% per annum through June 30, 2026 and 2.60% thereafter, compounded annually.
- 10. Social Security Wage Base**                    \$127,200 in 2017 increasing 3.30% per annum through June 30, 2026 and 3.60% thereafter, compounded annually.
- 11. Termination**                                    Representative termination rates are as follows:

Less than 10 Years of Service			
Years of Service	Male	Female	
		<Age 40	Age 40+
0	10.23%	9.66%	10.96%
1	7.64	6.80	7.57
2	6.89	6.58	6.85
3	5.12	5.39	5.16
4	3.46	4.76	3.18
5	2.77	4.49	2.75
6	2.09	4.30	2.07
7	1.85	3.98	1.78
8	1.50	3.80	1.38
9	1.25	3.23	1.39

Age	10-14 Years of Service		15-19 Years of Service		20-24 Years of Service	
	Male	Female	Male	Female	Male	Female
30	1.12%	3.07%	0.78%	2.77%	0.45%	0.74%
35	1.05	2.50	0.70	1.87	0.45	0.74
40	0.99	1.56	0.63	0.94	0.44	0.57
45	1.05	0.99	0.61	0.61	0.41	0.36
50	1.10	0.96	0.72	0.64	0.44	0.37
55	1.38	1.41	1.04	0.94	0.67	0.62

No termination is assumed after attainment of retirement eligibility.

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

Members with 10 or more years of service at termination are assumed to elect a deferred retirement benefit at the following rates:

Age	Male	Female
Under 50	60%	75%
50 – 54	70	75
55 or Older	80	85

All other members are assumed to receive a refund of Accumulated Deductions with applicable interest.

**12. Disability**

Representative disability rates are as follows:

Age	Ordinary		Accidental	
	Male	Female	Male	Female
25	0.0301%	0.0379%	0.0060%	0.0060%
30	0.0473	0.0550	0.0060	0.0060
35	0.0609	0.0674	0.0060	0.0060
40	0.0701	0.0893	0.0060	0.0060
45	0.1023	0.1317	0.0060	0.0060
50	0.1421	0.1759	0.0060	0.0060
55	0.4686	0.3506	0.0060	0.0060

Accidental disability rates apply at all ages.

Ordinary disability rates apply upon attainment of 10 years of service until the attainment of unreduced retirement eligibility with at least 25 years of service.

Members are assumed to receive the greater of the applicable disability benefit or the early or service retirement benefit, depending on eligibility.

Tier 4 and Tier 5 members are not eligible for the Ordinary or Accidental Disability benefits but the disability rates still apply. Such members terminating under the disability decrement are assumed to separate from service and elect a deferred retirement benefit.

**13. Mortality**

Pre-Retirement Mortality: RP-2006 Employee White Collar Mortality Tables, set back 3 years for males and 5 years for females, projected on a generational basis from a base year of 2006 using a 60-year average of improvement rates based on Social Security data from 1953 to 2013.

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

All pre-retirement deaths are assumed to be ordinary deaths.

Post-Retirement Healthy Mortality: RP-2006 Healthy Annuitant White Collar Mortality Tables, with adjustments as described in the latest experience study, projected on a generational basis from a base year of 2006 using a 60-year average of improvement rates based on Social Security data from 1953 to 2013.

Disabled Mortality: RP-2006 Disabled Retiree Mortality Tables with rates adjusted by 90%. No mortality improvement is assumed for disabled retiree mortality.

**14. Retirement**

Representative retirement rates for Tier 1 Members are as follows:

Age	Less Than Age 55 or Less Than 25 Years of Service		Attainment of Age 55 and 25 Years of Service			
	Male	Female	First Eligible		After First Eligible	
			Male	Female	Male	Female
<48	1.20%	1.20%	N/A	N/A	N/A	N/A
48	1.45	1.45	N/A	N/A	N/A	N/A
49	1.65	1.65	N/A	N/A	N/A	N/A
50	1.95	1.95	N/A	N/A	N/A	N/A
51	2.35	2.35	N/A	N/A	N/A	N/A
52	2.75	2.75	N/A	N/A	N/A	N/A
53	3.75	3.75	N/A	N/A	N/A	N/A
54	4.75	4.75	N/A	N/A	N/A	N/A
55	N/A	N/A	15.00%	17.00%	N/A	N/A
56	N/A	N/A	22.00	19.00	12.00%	13.00%
57	N/A	N/A	22.00	19.00	13.00	14.00
58	N/A	N/A	28.00	27.00	14.00	15.00
59	N/A	N/A	28.00	27.00	16.00	17.00
60	7.00	5.00	35.00	33.00	20.00	21.00
61	6.50	5.00	32.00	38.00	22.50	23.00
62	8.00	7.50	45.00	50.00	35.00	32.00
63	9.00	7.50	45.00	50.00	30.00	29.00
64	9.00	7.50	45.00	50.00	30.00	29.00
65	14.00	12.00	50.00	55.00	33.00	33.00
66-70	18.00	15.00	55.00	55.00	30.00	30.00
71-74	19.00	16.00	55.00	55.00	27.00	30.00
75	100.00	100.00	100.00	100.00	100.00	100.00

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

Representative retirement rates for Tier 2 Members are as follows:

Age	Less Than Age 60 or Less Than 25 Years of Service		Attainment of Age 60 and 25 Years of Service			
	Male	Female	First Eligible		After First Eligible	
			Male	Female	Male	Female
<48	0.60%	0.60%	N/A	N/A	N/A	N/A
48	0.75	0.75	N/A	N/A	N/A	N/A
49	0.85	0.85	N/A	N/A	N/A	N/A
50	1.00	1.00	N/A	N/A	N/A	N/A
51	1.20	1.20	N/A	N/A	N/A	N/A
52	1.40	1.40	N/A	N/A	N/A	N/A
53	1.90	1.90	N/A	N/A	N/A	N/A
54	2.40	2.40	N/A	N/A	N/A	N/A
55	11.50	11.50	N/A	N/A	N/A	N/A
56	12.00	12.00	N/A	N/A	N/A	N/A
57	12.50	12.50	N/A	N/A	N/A	N/A
58	13.50	13.50	N/A	N/A	N/A	N/A
59	14.00	14.00	N/A	N/A	N/A	N/A
60	7.00	5.00	32.00%	31.00%	N/A	N/A
61	6.50	5.00	32.00	38.00	22.50%	23.00%
62	8.00	7.50	45.00	50.00	35.00	32.00
63	9.00	7.50	45.00	50.00	30.00	29.00
64	9.00	7.50	45.00	50.00	30.00	29.00
65	14.00	12.00	50.00	55.00	33.00	33.00
66-70	18.00	15.00	55.00	55.00	30.00	30.00
71-74	19.00	16.00	55.00	55.00	27.00	30.00
75	100.00	100.00	100.00	100.00	100.00	100.00

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

Representative retirement rates for Tier 3 and Tier 4 Members are as follows:

Age	Less Than Age 62 or Less Than 25 Years of Service		Attainment of Age 62 and 25 Years of Service			
	Male	Female	First Eligible		After First Eligible	
			Male	Female	Male	Female
<48	0.55%	0.55%	N/A	N/A	N/A	N/A
48	0.70	0.70	N/A	N/A	N/A	N/A
49	0.75	0.75	N/A	N/A	N/A	N/A
50	0.90	0.90	N/A	N/A	N/A	N/A
51	1.10	1.10	N/A	N/A	N/A	N/A
52	1.25	1.25	N/A	N/A	N/A	N/A
53	1.70	1.70	N/A	N/A	N/A	N/A
54	2.15	2.15	N/A	N/A	N/A	N/A
55	10.50	10.50	N/A	N/A	N/A	N/A
56	10.75	10.75	N/A	N/A	N/A	N/A
57	11.00	11.00	N/A	N/A	N/A	N/A
58	12.00	12.00	N/A	N/A	N/A	N/A
59	12.50	12.50	N/A	N/A	N/A	N/A
60	20.00	20.00	N/A	N/A	N/A	N/A
61	22.00	22.00	N/A	N/A	N/A	N/A
62	30.00	24.00	50.00%	46.00%	N/A	N/A
63	9.00	7.50	45.00	50.00	30.00%	29.00%
64	9.00	7.50	45.00	50.00	30.00	29.00
65	14.00	12.00	50.00	55.00	33.00	33.00
66-70	18.00	15.00	55.00	55.00	30.00	30.00
71-74	19.00	16.00	55.00	55.00	27.00	30.00
75	100.00	100.00	100.00	100.00	100.00	100.00

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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

Representative retirement rates for Tier 5 Members are as follows:

Age	Less Than Age 65 or Less Than 30 Years of Service		Attainment of Age 65 and 30 Years of Service			
	Male	Female	First Eligible		After First Eligible	
			Male	Female	Male	Female
<48	0.30%	0.30%	N/A	N/A	N/A	N/A
48	0.35	0.35	N/A	N/A	N/A	N/A
49	0.40	0.40	N/A	N/A	N/A	N/A
50	0.45	0.45	N/A	N/A	N/A	N/A
51	0.55	0.55	N/A	N/A	N/A	N/A
52	0.65	0.65	N/A	N/A	N/A	N/A
53	0.85	0.85	N/A	N/A	N/A	N/A
54	1.10	1.10	N/A	N/A	N/A	N/A
55	5.00	5.00	N/A	N/A	N/A	N/A
56	6.00	6.00	N/A	N/A	N/A	N/A
57	7.00	7.00	N/A	N/A	N/A	N/A
58	8.00	8.00	N/A	N/A	N/A	N/A
59	9.00	9.00	N/A	N/A	N/A	N/A
60	15.00	15.00	N/A	N/A	N/A	N/A
61	16.00	16.00	N/A	N/A	N/A	N/A
62	36.00	32.00	N/A	N/A	N/A	N/A
63	28.00	28.00	N/A	N/A	N/A	N/A
64	28.00	28.00	N/A	N/A	N/A	N/A
65	40.00	40.00	50.00%	55.00%	N/A	N/A
66-70	18.00	15.00	55.00	55.00	30.00%	30.00%
71-74	19.00	16.00	55.00	55.00	27.00	30.00
75	100.00	100.00	100.00	100.00	100.00	100.00

**15. Family Composition Assumptions**

For members not currently in receipt, 100% of members are assumed married to spouses of the opposite sex. Males are assumed to be three years older than females.

For purposes of the optional form of payment death benefit for members currently in receipt, beneficiary status is based on the beneficiary allowance reported. If no beneficiary date of birth is provided, the beneficiary is assumed to be the member's spouse of the opposite sex with males assumed to be three years older than females.

No additional dependent children or parents are assumed.

TEACHERS' PENSION AND ANNUITY FUND OF NEW JERSEY  
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**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**16. Form of Payment**

Current actives are assumed to elect the Maximum Option.

**17. Data**

Information provided by the prior actuary was relied upon for the purposes of setting the status of and valuing non-contributing records. For non-contributing terminated members, a deferred retirement benefit is estimated, when applicable, based on the reported ASF and last known salary. For non-contributing members with incomplete information, the benefit is based on the ASF.

For current beneficiaries with incomplete information, reasonable assumptions were made based on information available in prior years.

Inactive participants receiving benefits according to the 2016 data but omitted from the 2017 data are assumed to have died without a beneficiary.

## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

### B. Actuarial Methods

The actuarial methods used for determining State contributions are described below.

#### 1. Actuarial Cost Method

The actuarial cost method for funding calculations is the Projected Unit Credit Cost Method. Non-contributory active members only use the Unit Credit Cost Method.

The actuarial liability is calculated as the actuarial present value of the projected benefits linearly allocated to periods prior to the valuation year based on service, not less than the value of the estimated member annuity as of the valuation date and the Accumulated Deductions with interest as of the valuation date provided by the Division of Pensions and Benefits. The unfunded actuarial liability is the actuarial liability on the valuation date less the actuarial value of assets.

In accordance with Chapter 78, P.L. 2011:

- Beginning with the July 1, 2010 actuarial valuation, the accrued liability contribution shall be computed so that if the contribution is paid annually in level dollars, it will amortize the unfunded accrued liability over an open 30 year period.
- Beginning with the July 1, 2019 actuarial valuation, the accrued liability contribution shall be computed so that if the contribution is paid annually in level dollars, it will amortize the unfunded accrued liability over a closed 30 year period (i.e., for each subsequent actuarial valuation the amortization period shall decrease by one year).
- Beginning with the July 1, 2029 actuarial valuation, when the remaining amortization period reaches 20 years, any increase or decrease in the unfunded accrued liability as a result of actuarial losses or gains for subsequent valuation years shall serve to increase or decrease, respectively, the amortization period for the unfunded accrued liability, unless an increase in the amortization period will cause it to exceed 20 years. If an increase in the amortization period as a result of actuarial losses for a valuation year would exceed 20 years, the accrued liability contribution shall be computed for the valuation year using a 20 year amortization period.

To the extent that the amortization period remains an open period in future years and depending upon the specific circumstances, it should be noted that in the absence of emerging actuarial gains or contributions made in excess of the actuarially determined contribution, any existing unfunded accrued liability may not be fully amortized in the future.

The non-contributory group life insurance benefit is funded separately through a term cost.

## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Early Retirement Incentive Program: The State and Local employers which elected to participate in the early retirement incentive programs authorized by Chapters 137, 229 and 231, P.L. 1991, Chapters 48, 138 and 163, P.L. 1993, Chapter 23, P.L. 2001 and Chapters 128 and 129, P.L. 2003 pay contributions to cover the additional liability for these programs over amortization periods chosen by the employer (15 years for Chapters 128 and 129) or the amortization period for the Unfunded Accrued Liability of the system (Chapter 23, P.L. 2002 and Chapter 21, P.L. 2008). The remaining present values are re-amortized upon changes to the interest rate assumption. Effective with the revised June 30, 2011 actuarial valuation, for any local employer with an increasing payment amortization schedule, the increase factor is 3.25%.

Chapter 113 Contributions: Certain School Districts have elected to exempt a select group of employees from the compensation limit under IRC Section 401(a)(17) incorporated under Chapter 113. These school districts will pay the full cost of this exemption at a member's date of retirement.

### 2. Asset Valuation Method

For the purposes of determining contribution rates, an actuarial value of assets is used that dampens the volatility in the market value of assets, resulting in a smoother pattern of contributions.

The actuarial value of assets is adjusted to reflect actual contributions and benefit payments, an assumed rate of return on the previous year's assets and current year's cash flow at the prior year's actuarial valuation interest rate, with a further adjustment to reflect 20% of the difference between the resulting value and the actual market value of Plan assets.

### 3. Contributions

Prior to FYE 2018, it was assumed the State would make pension contributions on June 30<sup>th</sup>, 24 months after the associated valuation date. Effective with FYE 2018, Chapter 83, P.L. 2016 requires the State to make pension contributions on a quarterly basis: at least 25 percent by September 30, at least 50 percent by December 31, at least 75 percent by March 31, and at least 100 percent by June 30. As such, contributions are assumed to be made on a quarterly basis with the first contribution 15 months after the associated valuation date.

Local employers' ERI contributions are expected to be paid on April 1<sup>st</sup>, 21 months after the associated valuation date.

Revenues from the Chapter 98, P.L. 2017 – Lottery Enterprise Contribution Act are assumed to be contributed to the trust on a monthly basis.

Contributions payable in the fiscal year starting on the valuation date are included in the actuarial value of assets as receivable contributions, discounted by the applicable valuation interest rate.

## APPENDIX C – SUMMARY OF PLAN PROVISIONS

This summary of Plan provisions provides an overview of the major provisions of the TPAF used in the actuarial valuation. It is not intended to replace the more precise language of the NJ State Statutes, Title 18A, Chapter 66, and if there is any difference between the description of the plan herein and the actual language in the NJ State Statutes, the NJ State Statutes will govern.

### 1. Eligibility for Membership

Employees appointed to positions requiring certification by the New Jersey Department of Education as members of a regular teaching or professional staff of a public school system in New Jersey are required to enroll as a condition of employment. Employees of the Department of Education holding unclassified, professional and certificated titles are eligible for membership. Temporary or substitute employees are not eligible. The eligible employee must be scheduled to work at least 32 hours per week effective May 22, 2010, per Chapter 1, P.L. 2010.

- a) Class B (or Tier 1) Member: Any member hired prior to July 1, 2007.
- b) Class D (or Tier 2) Member: Any member hired on or after July 1, 2007 and before November 2, 2008.
- c) Class E (or Tier 3) Member: Any member hired after November 1, 2008 and before May 22, 2010.
- d) Class F (or Tier 4) Member: Any member hired after May 21, 2010 and before June 28, 2011.
- e) Class G (or Tier 5) Member: Any member hired on or after June 28, 2011.

### 2. Plan Year

The 12-month period beginning on July 1 and ending on June 30.

### 3. Years of Service

A year of service for each year an employee is a Member of the Retirement System plus service, if any, covered by a prior service liability. Tier 4 members must be scheduled to work at least 32 hours per week, Tier 3 members must have an annual salary of \$7,500 (indexed for inflation) and other members must have an annual salary of \$500.

**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**4. Compensation**

Base salary upon which contributions by a Member to the Annuity Savings Fund were based. Chapter 113, P.L. 1997 provides that Compensation cannot exceed the compensation limitation of Section 401(a)(17) of the Internal Revenue Code. Chapter 103, P.L. 2007 provides that for a Tier 2, 3, 4 or 5 Member, Compensation cannot exceed the annual maximum wage contribution base for Social Security, pursuant to the Federal Insurance Contribution Act.

**5. Final Compensation**

The average annual compensation upon which contributions by a Member are made for the three consecutive years of service immediately preceding retirement, or the highest three fiscal years of service, if greater. Chapter 1, P. L. 1997 provides that for a Tier 4 or Tier 5 Member, Final Compensation is the average annual compensation upon which contributions by a Member are made for the five consecutive years of service immediately preceding retirement, or the highest five fiscal years of service, if greater.

**6. Final Year Compensation**

The compensation upon which contributions by a Member to the Annuity Savings Fund are based in the last year of service.

**7. Accumulated Deductions**

The sum of all amounts deducted from the compensation of a Member or contributed by the Member or on the Member's behalf without interest.

**8. Member Contributions**

Each Member contributes a percentage of Compensation. Effective October 1, 2011, Chapter 78, P.L. 2011 set the member contribution rate at 6.5% and causes it to increase by 1/7 of 1% each July thereafter until it attains an ultimate rate of 7.5% on July 1, 2018.

**9. Benefits**

- a) **Service Retirement:** For a Tier 1 or Tier 2 Member, age 60. For a Tier 3 or Tier 4 Member, age 62. For a Tier 5 Member, age 65.

Benefit is an annual retirement allowance comprised of a member annuity plus an employer pension which together equal:

- (1) For a Tier 1, 2 or 3 Member, 1/55 of Final Compensation for each Year of Service.
- (2) For a Tier 4 or 5 Member, 1/60 of Final Compensation for each Year of Service.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

- b) **Early Retirement:** Prior to eligibility for Service Retirement. For a Tier 1, 2, 3 or 4 Member, 25 Years of Service. For a Tier 5 Member, 30 Years of Service.

Benefit is an annual retirement allowance comprised of a member annuity plus an employer pension which together equal:

- (1) For a Tier 1 Member, the Service Retirement benefit reduced by 1/4 of one percent for each month the retirement date precedes age 55.
- (2) For a Tier 2 Member, the Service Retirement benefit reduced by 1/12 of one percent for each month the retirement date precedes age 60 through age 55 and by 1/4 of one percent for each month the retirement date precedes age 55.
- (3) For a Tier 3 or 4 Member, the Service Retirement benefit reduced by 1/12 of one percent for each month the retirement date precedes age 62 through age 55 and by 1/4 of one percent for each month the retirement date precedes age 55.
- (4) For a Tier 5 Member, the Service Retirement benefit reduced by 1/4 of one percent for each month the retirement date precedes age 65.

- c) **Veteran Retirement:** Age 55 with 25 Years of Service or Age 60 with 20 Years of Service for a qualified military veteran who retires directly from active service.

Benefit is an annual retirement allowance comprised of a member annuity plus an employer pension which together equal the greater of:

- (1) 54.5% of highest 12-month Compensation, or
- (2) For a member who is at least age 55 with 35 Years of Service, 1/55 of highest 12-month Compensation for each Year of Service.

Veterans may receive a Service Retirement benefit if greater.

- d) **Deferred Retirement:** Termination of service prior to eligibility for Service Retirement with 10 Years of Service.

Benefit is either:

- (1) A refund of Accumulated Deductions plus, if the member has completed three years of service, interest accumulated at 2.0% per annum; or
- (2) A deferred life annuity, commencing at age 60 for a Tier 1 or Tier 2 Member, age 62 for a Tier 3 or Tier 4 Member or age 65 for a Tier 5 Member, comprised of a member annuity plus an employer pension which together equal the Service Retirement benefit based on Final Compensation and Years of Service at date of termination.

For Members who die during the deferral period, the benefit is a return of Accumulated Deductions with credited interest.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

- e) **Non-Vested Termination:** Termination of service prior to eligibility for Service Retirement and less than 10 Years of Service.

Benefit is a refund of Accumulated Deductions plus, if the member has completed three years of service, interest accumulated at 2.0% per annum.

- f) **Death Benefits**

- (1) **Ordinary Death Before Retirement:** Death of an active contributing Member. Benefit is equal to:

- a. Lump sum payment equal to 150% of Final Year Compensation, also known as the non-contributory group life insurance benefit, plus
- b. Accumulated Deductions with credited interest.

- (2) **Accidental Death Before Retirement:** Death of an active Member resulting from injuries received from an accident during performance of duty and not a result of willful negligence. Benefit is equal to:

- a. Lump sum payment equal to 150% of Final Year Compensation, also known as the non-contributory group life insurance benefit, plus
- b. Spouse life annuity of 50% of Final Year Compensation payable until spouse's death or remarriage. If there is no surviving spouse or upon death or remarriage, a total of 20% (35%, 50%) of Final Year Compensation payable to one (two, three or more) dependent child(ren). If there is no surviving spouse or dependent child(ren), 25% (40%) of Final Year Compensation to one (two) dependent parent(s). If there is no surviving spouse, dependent child(ren) or parent(s), the benefit is a refund of Accumulated Deductions with credited interest.

- (3) **Death After Retirement:** Death of a retired Member. Benefit is equal to:

- a. Lump sum payment equal to 3/16 of Final Year Compensation for a Member retired under service, early, veteran or deferred retirement with 10 Years of Service. For a Member receiving a disability benefit, lump sum payment of 150% of Final Year Compensation if death occurs prior to age 60 and 3/16 of Final Compensation if death occurs after age 60. This benefit is also known as the non-contributory group life insurance benefit, plus
- b. Any survivor benefit due under the Member's optional form of payment election. Previously granted COLAs also apply to life annuities.

Members are also eligible for a voluntary, employee-paid life insurance policy, known as the contributory group life insurance policy. This benefit is not paid through the Fund and is not considered for valuation purposes.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

g) **Disability Retirement**

- (1) Ordinary Disability Retirement: 10 years of service and totally and permanently incapacitated from the performance of normal or assigned duties. Only available to Tier 1, 2 and 3 Members.

Benefit is an annual retirement allowance comprised of a member annuity plus an employer pension which together equal:

- a. 1.64% of Final Compensation for each Year of Service; or
- b. 43.6% of Final Compensation.

- (2) Accidental Disability Retirement: Total and permanent incapacitation as a direct result of a traumatic event occurring during and as a result of the performance of regular or assigned duties. Only available to Tier 1, 2 and 3 Members.

Benefit is an annual retirement allowance comprised of a member annuity plus an employer pension which together equal 72.7% of the Compensation at the date of injury.

The pension portion of the benefit will be offset for any periodic Workers' Compensation benefits.

Tier 4 and Tier 5 Members are eligible for long-term disability coverage. This benefit is not paid through the Fund and is not considered for valuation purposes. Both Member and employer contributions to the Fund continue while on long-term disability, with the policy covering the Member portion. The long-term disability benefit equals 60% of Final Year Compensation and may be offset for other periodic benefits, such as Workers' Compensation, short-term disability or Social Security. The long-term disability benefit may continue through the earlier of age 70 or commencement of a retirement benefit under the Fund.

**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**10. Optional Forms of Payment**

The member may elect the following forms of payment.

- a) Maximum Option: Single life annuity with a return of the balance of the Accumulated Deductions with credited interest.
- b) Option 1: Single life annuity with a return of the balance of the initial reserve.
- c) Option 2: 100% joint and survivor annuity.
- d) Option 3: 50% joint and survivor annuity.
- e) Option 4: Other percentage joint and survivor annuity.
- f) Option A: 100% pop-up joint and survivor annuity.
- g) Option B: 75% pop-up joint and survivor annuity.
- h) Option C: 50% pop-up joint and survivor annuity.
- i) Option D: 25% pop-up joint and survivor annuity.

**11. Cost-of-Living Adjustments**

Also known as Pension Adjustments. Provided annually to retirees and survivors after 24 months of retirement prior to July 1, 2011. Chapter 78, P.L. 2011 eliminated future adjustments effective July 1, 2011. Adjustments may be reinstated in the future subject to certain conditions outlined in Chapter 78, P.L. 2011.

**12. Changes in Plan Provisions Since Last Valuation**

None.

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**APPENDIX D – DETERMINATION OF DISCOUNT RATE**

**Table 1 - Projection of the Pension Plan's Fiduciary Net Position**  
(In Thousands)  
Projections Commence June 30, 2018

Year	Projected Beginning Fiduciary Net Position (a)	Projected Member Contributions (b)	Projected Employer Contributions (c)	Projected Lottery Contributions (d)	Projected Benefit Payments (e)	Projected Administrative Expenses (f)	Projected Investment Earnings (g)	Projected Ending Fiduciary Net Position (h) = (a) + (b) + (c) + (d) - (e) - (f) + (g)
1	\$ 22,978,210	\$ 779,273	\$ 842,347	\$ 807,049	\$ 4,540,111	\$ 13,639	\$ 1,528,485	\$ 22,381,614
2	22,381,614	764,839	893,567	833,471	4,644,885	13,954	1,484,859	21,699,511
3	21,699,511	751,452	1,008,526	845,005	4,741,284	14,244	1,436,712	20,985,679
4	20,985,679	738,565	1,093,623	854,907	4,829,283	14,508	1,385,853	20,214,837
5	20,214,837	725,349	1,393,284	864,863	4,912,979	14,760	1,336,665	19,607,259
6	19,607,259	711,367	1,536,295	875,357	4,996,196	15,010	1,294,860	19,013,933
7	19,013,933	696,222	1,681,208	886,031	5,081,306	15,265	1,254,003	18,434,824
8	18,434,824	679,410	1,825,477	896,822	5,170,941	15,535	1,213,916	17,863,974
9	17,863,974	663,710	1,969,329	907,789	5,266,774	15,823	1,174,227	17,296,431
10	17,296,431	647,395	2,112,481	918,117	5,349,754	16,072	1,135,152	16,743,750
11	16,743,750	629,685	2,256,789	925,241	5,450,379	16,374	1,096,381	16,185,093
12	16,185,093	610,040	2,403,372	934,591	5,554,321	16,686	1,057,146	15,619,235
13	15,619,235	588,374	2,552,639	944,034	5,661,626	17,009	1,017,295	15,042,942
14	15,042,942	564,847	2,637,363	953,571	5,770,607	17,336	974,925	14,385,705
15	14,385,705	539,793	2,720,165	963,204	5,878,467	17,660	926,828	13,639,568
16	13,639,568	513,609	2,801,102	972,933	5,983,518	17,976	872,524	12,798,241
17	12,798,241	486,538	2,881,284	982,760	6,084,959	18,281	811,630	11,857,214
18	11,857,214	459,105	2,960,608	992,685	6,178,814	18,563	743,987	10,816,222
19	10,816,222	431,955	3,039,632	1,002,709	6,261,708	18,812	669,728	9,679,728
20	9,679,728	405,530	3,118,979	1,012,833	6,331,859	19,022	589,259	8,455,448
21	8,455,448	379,865	3,199,077	1,023,058	6,389,550	19,196	503,121	7,151,824
22	7,151,824	355,065	3,280,057	1,033,386	6,432,976	19,326	411,975	5,780,004
23	5,780,004	331,247	3,361,967	1,043,817	6,462,848	19,416	316,581	4,351,352
24	0	0	0	0	6,483,547	19,478	0	0
25	0	0	0	0	6,502,043	19,534	0	0
26	0	0	0	0	6,517,352	19,580	0	0
27	0	0	0	0	6,532,630	19,625	0	0
28	0	0	0	0	6,546,696	19,668	0	0
29	0	0	0	0	6,560,521	19,709	0	0
30	0	0	0	0	6,567,582	19,730	0	0
31	0	0	0	0	6,565,924	19,725	0	0
32	0	0	0	0	6,557,601	19,700	0	0
33	0	0	0	0	6,538,231	19,642	0	0
34	0	0	0	0	6,511,181	19,561	0	0
35	0	0	0	0	6,476,946	19,458	0	0
36	0	0	0	0	6,432,470	19,325	0	0
37	0	0	0	0	6,369,565	19,136	0	0
38	0	0	0	0	6,281,504	18,871	0	0
39	0	0	0	0	6,165,221	18,522	0	0
40	0	0	0	0	6,022,870	18,094	0	0
41	0	0	0	0	5,857,234	17,596	0	0
42	0	0	0	0	5,671,553	17,039	0	0
43	0	0	0	0	5,471,762	16,438	0	0
44	0	0	0	0	5,263,878	15,814	0	0
45	0	0	0	0	5,049,542	15,170	0	0
46	0	0	0	0	4,829,651	14,509	0	0
47	0	0	0	0	4,604,941	13,834	0	0
48	0	0	0	0	4,376,112	13,147	0	0
49	0	0	0	0	4,143,885	12,449	0	0
50	0	0	0	0	3,909,104	11,744	0	0
51	0	0	0	0	3,672,625	11,033	0	0
52	0	0	0	0	3,435,395	10,321	0	0
53	0	0	0	0	3,198,600	9,609	0	0
54	0	0	0	0	2,963,408	8,903	0	0
55	0	0	0	0	2,730,866	8,204	0	0
56	0	0	0	0	2,502,110	7,517	0	0
57	0	0	0	0	2,278,294	6,844	0	0
58	0	0	0	0	2,060,606	6,191	0	0
59	0	0	0	0	1,850,241	5,559	0	0
60	0	0	0	0	1,648,359	4,952	0	0

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**APPENDIX D – DETERMINATION OF DISCOUNT RATE**

**Table 1 - Projection of the Pension Plan's Fiduciary Net Position**  
(In Thousands)  
Projections Commence June 30, 2018

Year	Projected Beginning Fiduciary Net Position (a)	Projected Member Contributions (b)	Projected Employer Contributions (c)	Projected Lottery Contributions (d)	Projected Benefit Payments (e)	Projected Administrative Expenses (f)	Projected Investment Earnings (g)	Projected Ending Fiduciary Net Position (h) = (a) + (b) + (c) + (d) - (e) - (f) + (g)
61	0	0	0	0	1,456,106	4,374	0	0
62	0	0	0	0	1,274,508	3,829	0	0
63	0	0	0	0	1,104,526	3,318	0	0
64	0	0	0	0	946,973	2,845	0	0
65	0	0	0	0	802,516	2,411	0	0
66	0	0	0	0	671,610	2,018	0	0
67	0	0	0	0	554,510	1,666	0	0
68	0	0	0	0	451,238	1,356	0	0
69	0	0	0	0	361,585	1,086	0	0
70	0	0	0	0	285,074	856	0	0
71	0	0	0	0	220,952	664	0	0
72	0	0	0	0	168,235	505	0	0
73	0	0	0	0	125,763	378	0	0
74	0	0	0	0	92,250	277	0	0
75	0	0	0	0	66,357	199	0	0
76	0	0	0	0	46,761	140	0	0
77	0	0	0	0	32,259	97	0	0
78	0	0	0	0	21,749	65	0	0
79	0	0	0	0	14,311	43	0	0
80	0	0	0	0	9,161	28	0	0
81	0	0	0	0	5,679	17	0	0
82	0	0	0	0	3,380	10	0	0
83	0	0	0	0	1,905	6	0	0
84	0	0	0	0	991	3	0	0
85	0	0	0	0	462	1	0	0
86	0	0	0	0	173	1	0	0
87	0	0	0	0	44	0	0	0
88	0	0	0	0	8	0	0	0
89	0	0	0	0	5	0	0	0
90	0	0	0	0	3	0	0	0
91	0	0	0	0	2	0	0	0
92	0	0	0	0	1	0	0	0
93	0	0	0	0	1	0	0	0
94	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0

**TEACHERS' PENSION AND ANNUITY FUND OF NEW JERSEY  
GASB 68 REPORTING FOR JUNE 30, 2018 MEASUREMENT DATE**

**APPENDIX D – DETERMINATION OF DISCOUNT RATE**

**Table 2 - Actuarial Present Values of Projected Benefit Payments**

(In Thousands)

Projections Commence June 30, 2018

\* From Table 1 - Projection of the Pension Plan's Fiduciary Net Position, column (a)

\*\* From Table 1 - Projection of the Pension Plan's Fiduciary Net Position, column (e)

Year	Projected Beginning Fiduciary Net Position*	Projected Benefit Payments for current Plan participants**	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments	Present Value of "Funded" Benefit Payments (f) = (d) / (1+7.00%) <sup>[(a) - .5]</sup>	Present Value of "Unfunded" Benefit Payments (g) = (e) / (1+3.87%) <sup>[(a) - .5]</sup>	Present Value of Benefit Payments Using the Single Discount Rate (h) = (c) / (1+4.86%) <sup>[(a) - .5]</sup>
(a)	(b)	(c)	(d) = (c) if (b) >= (c)	(e) = (c) - (d)			
1	\$ 22,978,210	\$ 4,540,111	\$ 4,540,111	\$ 0	\$ 4,389,091	\$ 0	\$ 4,433,641
2	22,381,614	4,644,885	4,644,885	0	4,196,617	0	4,325,709
3	21,699,511	4,741,284	4,741,284	0	4,003,470	0	4,210,818
4	20,985,679	4,829,283	4,829,283	0	3,811,004	0	4,090,169
5	20,214,837	4,912,979	4,912,979	0	3,623,414	0	3,968,184
6	19,607,259	4,996,196	4,996,196	0	3,443,726	0	3,848,349
7	19,013,933	5,081,306	5,081,306	0	3,273,262	0	3,732,489
8	18,434,824	5,170,941	5,170,941	0	3,113,087	0	3,622,271
9	17,863,974	5,266,774	5,266,774	0	2,963,348	0	3,518,392
10	17,296,431	5,349,754	5,349,754	0	2,813,118	0	3,408,172
11	16,743,750	5,450,379	5,450,379	0	2,678,533	0	3,311,331
12	16,185,093	5,554,321	5,554,321	0	2,551,042	0	3,218,067
13	15,619,235	5,661,626	5,661,626	0	2,430,211	0	3,128,192
14	15,042,942	5,770,607	5,770,607	0	2,314,944	0	3,040,619
15	14,385,705	5,878,467	5,878,467	0	2,203,937	0	2,953,879
16	13,639,568	5,983,518	5,983,518	0	2,096,564	0	2,867,302
17	12,798,241	6,084,959	6,084,959	0	1,992,624	0	2,780,755
18	11,857,214	6,178,814	6,178,814	0	1,890,989	0	2,692,764
19	10,816,222	6,261,708	6,261,708	0	1,790,989	0	2,602,401
20	9,679,728	6,331,859	6,331,859	0	1,692,574	0	2,509,578
21	8,455,448	6,389,550	6,389,550	0	1,596,257	0	2,415,061
22	7,151,824	6,432,976	6,432,976	0	1,501,968	0	2,318,771
23	5,780,004	6,462,848	5,780,004	682,844	1,261,227	290,598	2,221,560
24	0	6,483,547	0	6,483,547	0	2,656,407	2,125,372
25	0	6,502,043	0	6,502,043	0	2,564,730	2,032,639
26	0	6,517,352	0	6,517,352	0	2,474,987	1,942,987
27	0	6,532,630	0	6,532,630	0	2,388,359	1,857,269
28	0	6,546,696	0	6,546,696	0	2,304,324	1,774,995
29	0	6,560,521	0	6,560,521	0	2,223,154	1,696,296
30	0	6,567,582	0	6,567,582	0	2,142,627	1,619,410
31	0	6,565,924	0	6,565,924	0	2,062,276	1,543,958
32	0	6,557,601	0	6,557,601	0	1,982,923	1,470,526
33	0	6,538,231	0	6,538,231	0	1,903,404	1,398,222
34	0	6,511,181	0	6,511,181	0	1,824,905	1,327,895
35	0	6,476,946	0	6,476,946	0	1,747,675	1,259,687
36	0	6,432,470	0	6,432,470	0	1,671,006	1,193,049
37	0	6,369,565	0	6,369,565	0	1,593,015	1,126,623
38	0	6,281,504	0	6,281,504	0	1,512,459	1,059,548
39	0	6,165,221	0	6,165,221	0	1,429,153	991,731
40	0	6,022,870	0	6,022,870	0	1,344,136	923,925
41	0	5,857,234	0	5,857,234	0	1,258,468	856,868
42	0	5,671,553	0	5,671,553	0	1,173,172	791,246
43	0	5,471,762	0	5,471,762	0	1,089,674	727,989
44	0	5,263,878	0	5,263,878	0	1,009,218	667,870
45	0	5,049,542	0	5,049,542	0	932,054	610,979
46	0	4,829,651	0	4,829,651	0	858,252	557,286
47	0	4,604,941	0	4,604,941	0	787,831	506,728
48	0	4,376,112	0	4,376,112	0	720,787	459,227
49	0	4,143,885	0	4,143,885	0	657,107	414,700
50	0	3,909,104	0	3,909,104	0	596,782	373,072
51	0	3,672,625	0	3,672,625	0	539,790	334,256
52	0	3,435,395	0	3,435,395	0	486,110	298,173
53	0	3,198,600	0	3,198,600	0	435,741	264,752
54	0	2,963,408	0	2,963,408	0	388,660	233,916
55	0	2,730,866	0	2,730,866	0	344,817	205,568
56	0	2,502,110	0	2,502,110	0	304,161	179,618
57	0	2,278,294	0	2,278,294	0	266,635	155,970
58	0	2,060,606	0	2,060,606	0	232,173	134,529
59	0	1,850,241	0	1,850,241	0	200,704	115,196
60	0	1,648,359	0	1,648,359	0	172,143	97,870

**TEACHERS' PENSION AND ANNUITY FUND OF NEW JERSEY  
GASB 68 REPORTING FOR JUNE 30, 2018 MEASUREMENT DATE**

**APPENDIX D – DETERMINATION OF DISCOUNT RATE**

**Table 2 - Actuarial Present Values of Projected Benefit Payments**  
(In Thousands)

Projections Commence June 30, 2018

\* From Table 1 - Projection of the Pension Plan's Fiduciary Net Position, column (a)

\*\* From Table 1 - Projection of the Pension Plan's Fiduciary Net Position, column (e)

Year	Projected Beginning Fiduciary Net Position*	Projected Benefit Payments for current Plan participants**	"Funded" Portion of Benefit Payments (d) = (c) if (b) >= (c)	"Unfunded" Portion of Benefit Payments (e) = (c) - (d)	Present Value of "Funded" Benefit Payments (f) = (d) / (1+7.00%)^[a] - .5]	Present Value of "Unfunded" Benefit Payments (g) = (e) / (1+3.87%)^[a] - .5]	Present Value of Benefit Payments Using the Single Discount Rate (h) = (c) / (1+4.86%)^[a] - .5]
(a)	(b)	(c)	(d) = (c) if (b) >= (c)	(e) = (c) - (d)	(f) = (d) / (1+7.00%)^[a] - .5]	(g) = (e) / (1+3.87%)^[a] - .5]	(h) = (c) / (1+4.86%)^[a] - .5]
61	0	1,456,106	0	1,456,106	0	146,400	82,448
62	0	1,274,508	0	1,274,508	0	123,367	68,820
63	0	1,104,526	0	1,104,526	0	102,930	56,877
64	0	946,973	0	946,973	0	84,960	46,504
65	0	802,516	0	802,516	0	69,317	37,583
66	0	671,610	0	671,610	0	55,849	29,995
67	0	554,510	0	554,510	0	44,393	23,617
68	0	451,238	0	451,238	0	34,779	18,328
69	0	361,585	0	361,585	0	26,831	14,006
70	0	285,074	0	285,074	0	20,365	10,530
71	0	220,952	0	220,952	0	15,196	7,783
72	0	168,235	0	168,235	0	11,140	5,652
73	0	125,763	0	125,763	0	8,017	4,029
74	0	92,250	0	92,250	0	5,662	2,818
75	0	66,357	0	66,357	0	3,921	1,933
76	0	46,761	0	46,761	0	2,660	1,299
77	0	32,259	0	32,259	0	1,767	855
78	0	21,749	0	21,749	0	1,147	550
79	0	14,311	0	14,311	0	726	345
80	0	9,161	0	9,161	0	448	211
81	0	5,679	0	5,679	0	267	124
82	0	3,380	0	3,380	0	153	71
83	0	1,905	0	1,905	0	83	38
84	0	991	0	991	0	42	19
85	0	462	0	462	0	19	8
86	0	173	0	173	0	7	3
87	0	44	0	44	0	2	1
88	0	8	0	8	0	0	0
89	0	5	0	5	0	0	0
90	0	3	0	3	0	0	0
91	0	2	0	2	0	0	0
92	0	1	0	1	0	0	0
93	0	1	0	1	0	0	0
94	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0
					\$ 61,631,995	\$ 47,330,866	\$ 108,962,861

## APPENDIX E – GLOSSARY OF TERMS

### 1. Actuarially Determined Contribution

A target or recommended contribution for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.

### 2. Actuarial Valuation Date

The date as of which an actuarial valuation is performed. This date may be up to 24 months prior to the measurement date and up to 30 months prior to the employer's reporting date.

### 3. Deferred Inflow of Resources

An acquisition of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience gains on the Total Pension Liability, assumption changes reducing the Total Pension Liability, or investment gains that are recognized in future reporting periods.

### 4. Deferred Outflow of Resources

A consumption of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience losses on the Total Pension Liability, assumption changes increasing the Total Pension Liability, or investment losses that are recognized in future reporting periods.

### 5. Entry Age Actuarial Cost Method

The actuarial cost method required for GASB 68 calculations. Under this method, the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this actuarial present value allocated to a valuation year is called the Service Cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future service costs is called the Total Pension Liability.

### 6. Measurement Date

The date as of which the Total Pension Liability and Plan Fiduciary Net Position are measured. The Total Pension Liability may be projected from the Actuarial Valuation Date to the Measurement Date. The Measurement Date must be the same as the Reporting Date for the plan.

**APPENDIX E – GLOSSARY OF TERMS**

**7. Net Pension Liability**

The liability of employers and nonemployer contributing entities for employees for benefits provided through a defined benefit pension plan. It is calculated as the Total Pension Liability less the Plan Fiduciary Net Position.

**8. Plan Fiduciary Net Position**

The fair or market value of assets.

**9. Reporting Date**

The last day of the plan or employer's fiscal year.

**10. Service Cost**

The portion of the actuarial present value of projected benefit payments that is attributed to the current period of employee service in conformity with the requirements of GASB 68. The Service Cost is the normal cost calculated under the entry age actuarial cost method.

**11. Total Pension Liability**

The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of GASB 68. The Total Pension Liability is the actuarial liability calculated under the entry age actuarial cost method. This measurement generally is not appropriate for estimating the cost to settle the Plan's liabilities.