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The Teachers' Pension and Annuity Fund of New Jersey

GASB 68 Report as of June 30, 2019

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SECTION I – BOARD SUMMARY

The purpose of this report is to provide accounting and financial disclosure information under Governmental Accounting Standards Board Statement 68 for the Teachers' Pension and Annuity Fund of New Jersey (TPAF, Plan or Fund). 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, 2019. Measurements as of the reporting date are based on the fair value of assets as of June 30, 2019 and the Total Pension Liability as of the valuation date, July 1, 2018, updated to June 30, 2019. As a result of the Experience Study covering the period July 1, 2015 through June 30, 2018, the assumed rates of termination, retirement, disability, mortality, salary increase and inflation were updated. To see a detailed comparison of the changes refer to the Experience Study. The assumed discount rate used to measure the Total Pension Liability was also 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 assumptions.

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

Table I-1
Summary of Collective Results

Measurement Date	6/30/2019	6/30/2018
Net Pension Liability	$ 61,519,112,443	$ 63,806,350,446
Deferred Outflows	(9,932,767,606)	(12,473,998,870)
Deferred Inflows	17,539,845,423	16,180,773,639
Net Impact on Statement of Net Position	$ 69,126,190,260	$ 67,513,125,215
Total Pension Expense	$ 3,628,861,805	$ 3,720,032,991
Pension Expense (% of Payroll)	33.53%	34.97%

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 (DPB) 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, and the projection of the Plan's contributions and projected benefit payments as of June 30, 2019 was based on the recommended demographic assumptions of the July 1, 2015 – June 30, 2018 Experience Study, approved by the Board of Trustees on February 6, 2020. The calculation of the Total Pension Liability as of June 30, 2019 was based on the same demographic assumptions except for the mortality assumption, which was based on the SOA's MP-2019 mortality improvement scale upon direction from the DPB. While we do not find the use of the SOA's Scale MP-2019 unreasonable, it does not reflect the analysis of actual mortality experience from our Experience Study which was the basis for our recommended mortality assumptions, including the mortality improvement scale.

Based on the State Treasurer's recommendation the following investment return 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.

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.

SECTION II – CERTIFICATION

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. 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.

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 such other users.

Janet Cranna, FSA, FCA, MAAA, EA
Principal Consulting Actuary

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Principal Consulting Actuary

SECTION III – DETERMINATION OF DISCOUNT RATE

The discount rate used to measure the Total Pension Liability was 4.86% as of June 30, 2018 and 5.60% as of June 30, 2019. As discussed with the Division of Pensions and Benefits, the projection of cash flows used to determine the discount rate as of June 30, 2019 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 are based on the same assumptions used to determine the expected contributions for the Fund. The demographic assumptions are based on the recommendations of the July 1, 2015 – June 30, 2018 Experience Study as approved by the Board of Trustees on February 6, 2020.

  Based on the State Treasurer's recommendation the following investment return 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 70% of the actuarially determined contribution and 100% of its Non-Contributory Group Insurance Premium Fund (NCGIPF) contribution for all years of the projection. The 70% contribution rate is the total State contribution rate expected to be paid in fiscal year ending June 30, 2020 with respect to the actuarially determined contribution for the fiscal year ending June 30, 2020 for all State-administered retirement systems.

- Consistent with Chapter 83, P.L. 2016, it is assumed that the State will make pension contributions in equal amounts at the end of each quarter.

- 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 1st, 21 months after the associated valuation date.

- The NCGIPF contributions are assumed to be paid monthly.

- Annual administrative expenses are assumed to be 0.31% of expected pension benefit payments.

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 $9,798,143 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 2054. Municipal bond rates of 3.87% as of June 30, 2018 and 3.50% as of June 30, 2019 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 3.87% as of June 30, 2018 and the long-term rate of return of 7.00% and the municipal bond rate of 3.50% as of June 30, 2019, the blended GASB discount rates are 4.86% as of June 30, 2018 and **5.60%** as of June 30, 2019. The assumed discount rates have been determined in accordance with the method prescribed by GASB Statement No. 67.

SECTION IV – COLLECTIVE EMPLOYER REPORTING AMOUNTS

We understand the State and Local employers have elected to use the 2019 measurement date for their 2020 reporting date. As a result, the schedules in this section will be used by the State and Local employers for their 2020 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 8.04 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 and thereafter.

Table IV-1
Schedule of Collective Deferred Inflows and Outflows of Resources

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$ 1,203,503,264	$ 213,344,311
Changes in assumptions	8,729,264,342	17,163,131,436
Net differences between projected and actual earnings on pension plan investments	0	163,369,676
Total	**$ 9,932,767,606**	**$ 17,539,845,423**

Amounts reported as deferred outflows and deferred inflows of resources will be recognized in pension expense as follows:

Measurement year ended June 30:	
2020	(272,405,510)
2021	(704,260,700)
2022	(630,562,767)
2023	(1,216,378,743)
2024	(2,381,316,232)
Thereafter	$ (2,402,153,865)

SECTION IV – COLLECTIVE EMPLOYER REPORTING AMOUNTS

Table IV-2
Detailed Schedule of Collective Deferred Inflows and Outflows of Resources

Recognition of differences between expected and actual experience

From Measurement Year Ending	Remaining Recognition Period	Remaining Deferred (Inflows) and Outflows*	Recognition Year 2019	2020	2021	2022	2023	2024	Thereafter
2019	8.04	$ (155,621,840)	$ (19,355,950)	$ (19,355,950)	$ (19,355,950)	$ (19,355,950)	$ (19,355,950)	$ (19,355,950)	$ (39,486,140)
2018	7.29	1,051,605,259	144,253,122	144,253,122	144,253,122	144,253,122	144,253,122	144,253,122	186,086,527
2017	6.30	179,419,108	28,479,224	28,479,224	28,479,224	28,479,224	28,479,224	28,479,224	8,543,764
2016	5.30	(85,977,601)	(16,222,189)	(16,222,189)	(16,222,189)	(16,222,189)	(16,222,189)	(4,866,656)	0
2015	4.30	189,214,650	44,003,407	44,003,407	44,003,407	44,003,407	13,201,022	0	0
2014	3.50	(10,252,211)	(2,929,202)	(2,929,202)	(2,929,202)	(1,464,605)	0	0	0
Total		$ 1,168,387,365	$ 178,228,412	$ 178,228,412	$ 178,228,412	$ 179,693,009	$ 150,355,229	$ 148,509,740	$ 155,144,151

Recognition of changes in assumptions

From Measurement Year Ending	Remaining Recognition Period	Remaining Deferred (Inflows) and Outflows*	Recognition Year 2019	2020	2021	2022	2023	2024	Thereafter
2019	8.04	$ (4,005,548,119)	$ (498,202,502)	$ (498,202,502)	$ (498,202,502)	$ (498,202,502)	$ (498,202,502)	$ (498,202,502)	$ (1,016,333,107)
2018	7.29	(5,994,557,085)	(822,298,640)	(822,298,640)	(822,298,640)	(822,298,640)	(822,298,640)	(822,298,640)	(1,060,765,245)
2017	6.30	(10,084,192,916)	(1,600,665,542)	(1,600,665,542)	(1,600,665,542)	(1,600,665,542)	(1,600,665,542)	(1,600,665,542)	(480,199,664)
2016	5.30	6,913,685,892	1,304,469,036	1,304,469,036	1,304,469,036	1,304,469,036	1,304,469,036	391,340,712	0
2015	4.30	3,063,649,492	712,476,627	712,476,627	712,476,627	712,476,627	213,742,984	0	0
2014	3.50	1,076,424,469	307,549,848	307,549,848	307,549,848	153,774,925	0	0	0
Total		$ (9,030,538,267)	$ (596,671,173)	$ (596,671,173)	$ (596,671,173)	$ (750,446,096)	$ (1,402,954,664)	$ (2,529,825,972)	$ (2,557,298,016)

Recognition of net differences between projected and actual earnings on pension plan investments

From Measurement Year Ending	Remaining Recognition Period	Remaining Deferred (Inflows) and Outflows*	Recognition Year 2019	2020	2021	2022	2023	2024	Thereafter
2019	5.00	$ 181,103,464	$ 36,220,693	$ 36,220,693	$ 36,220,693	$ 36,220,693	$ 36,220,692	$ 0	$ 0
2018	4.00	(384,121,486)	(96,030,371)	(96,030,371)	(96,030,371)	(96,030,373)	0	0	0
2017	3.00	(678,024,787)	(226,008,263)	(226,008,263)	(226,008,261)	0	0	0	0
2016	2.00	863,710,385	431,855,193	431,855,192	0	0	0	0	0
2015	1.00	192,642,062	192,642,062	0	0	0	0	0	0
Total		$ 175,309,638	$ 338,679,314	$ 146,037,251	$ (285,817,939)	$ (59,809,680)	$ 36,220,692	$ 0	$ 0
Grand Total		**$ (7,686,841,264)**	**$ (79,763,447)**	**$ (272,405,510)**	**$ (704,260,700)**	**$ (630,562,767)**	**$ (1,216,378,743)**	**$ (2,381,316,232)**	**$ (2,402,153,865)**

** As of the beginning of the measurement year*

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.

SECTION IV – COLLECTIVE EMPLOYER REPORTING AMOUNTS

Table IV-3
Calculation of Collective Pension Expense

Measurement Year Ending	2019	2018
Change in Net Pension Liability	$ (2,287,238,003)	$ (3,863,858,725)
Change in Deferred Outflows	2,541,231,264	1,686,880,391
Change in Deferred Inflows	1,359,071,784	4,380,533,978
Employer Contributions*	2,015,496,648	1,516,131,450
Subtotal	**$ 3,628,561,693**	**$ 3,719,687,094**
Employer Contribution - delayed enrollments	272,985	313,642
Employer Contribution - delayed appropriations	27,127	32,255
Total Pension Expense	**$ 3,628,861,805**	**$ 3,720,032,991**
Total Pension Expense as % of Payroll	**33.53%**	**34.97%**
Operating Expenses		
Service cost	$ 1,882,081,572	$ 2,229,422,113
Employee contributions	(846,166,328)	(810,899,751)
Administrative expenses	13,922,385	13,222,178
Total	$ 1,049,837,629	$ 1,431,744,540
Financing Expenses		
Interest cost	$ 4,201,672,382	$ 3,858,188,355
Expected return on assets	(1,542,884,759)	(1,536,165,072)
Total	$ 2,658,787,623	$ 2,322,023,283
Changes		
Benefit changes	$ 0	$ 0
Recognition of assumption changes	(596,671,173)	(98,468,671)
Recognition of liability gains and losses	178,228,412	197,584,362
Recognition of investment gains and losses	338,679,314	(132,850,523)
Total	$ (79,763,447)	$ (33,734,832)
Total Pension Expense	**$ 3,628,861,805**	**$ 3,720,032,991**

** Includes appropriations and lottery revenue*

APPENDIX A – MEMBERSHIP INFORMATION

Plan Membership	July 1, 2018	July 1, 2017
Contributing Actives	141,128	141,020
Non-Contributing Members	14,368	13,869
Terminated Vested	219	197
Inactive Receiving Benefits	104,703	102,573
Total	260,418	257,659
Annual Compensation for Contributing Actives	$ 10,823,504,797	$ 10,636,814,121
Annual Retirement Allowances for Those Receiving Benefits	$ 4,295,446,681	$ 4,184,778,025

* QDRO recipients are excluded from the 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.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

1. Investment Rate of Return for determining Actuarially Determined Contributions	• July 1, 2018 valuation: 7.50% per annum, compounded annually. • July 1, 2019 valuation: 7.30% per annum, compounded annually. • July 1, 2020 valuation: 7.30% per annum, compounded annually. • July 1, 2021 and later valuations: 7.00% per annum, compounded annually.
2. Long-Term Expected Rate of Return	7.00% per annum, compounded annually.
3. Interest Crediting Rate on Accumulated Deductions	7.50% per annum, compounded annually.
4. GASB 67 Effective Discount Rate	• June 30, 2018: 4.86% per annum, compounded annually. • June 30, 2019: 5.60% per annum, compounded annually.
5. Price Inflation	2.75% per annum, compounded annually.
6. Wage Inflation	3.25% per annum, compounded annually.
7. Cost-of-Living Adjustments (COLAs)	No future COLAs are assumed. Previously granted COLAs are included in the data.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

8. Salary Increases

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
0-2	3.05%	4.25%
3	3.20	4.40
4	3.35	4.55
5	3.50	4.70
6	3.65	4.85
7	3.80	5.00
8	3.95	5.15
9	4.10	5.30
10	4.20	5.40
11	4.30	5.50
12-16	4.45	5.65
17	3.70	4.90
18	3.30	4.50
19	3.05	4.25
20	2.85	4.05
21	2.65	3.85
22	2.45	3.65
23	2.25	3.45
24	2.05	3.25
25	1.85	3.05
26	1.75	2.95
27-28	1.65	2.85
29+	1.55	2.75

Salary increases are assumed to occur on October 1.

9. 401(a)(17) Pay Limit

$275,000 in 2018 increasing 2.75% per annum, compounded annually.

10. Social Security Wage Base

$128,400 in 2018 increasing 3.25% per annum, compounded annually.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

11. Termination

Termination rates are as follows:

Service	Rates
0	7.00%
1	7.00
2	6.25
3	5.50
4	4.25
5	3.75
6	3.25
7	3.00
8	2.50
9	2.50
10	2.25
11	2.20
12	1.95
13	1.70
14	1.40
15	1.20
16	1.00
17	0.90
18	0.90
19	0.70
20	0.55
21	0.55
22	0.55
23	0.40
24-29	0.30

No termination is assumed after attainment of retirement eligibility.

67% of members with 10 or more years of service at termination are assumed to elect a deferred retirement benefit.

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

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

12. Disability

Disability rates are as follows:

Age	Ordinary Disability	Accidental Disability	Age	Ordinary Disability	Accidental Disability
20	0.005%	0.006%	48	0.170%	0.006%
21	0.005	0.006	49	0.180	0.006
22	0.005	0.006	50	0.200	0.006
23	0.005	0.006	51	0.220	0.006
24	0.005	0.006	52	0.240	0.006
25	0.005	0.006	53	0.260	0.006
26	0.005	0.006	54	0.280	0.006
27	0.005	0.006	55	0.350	0.006
28	0.005	0.006	56	0.420	0.006
29	0.005	0.006	57	0.490	0.006
30	0.005	0.006	58	0.560	0.006
31	0.010	0.006	59	0.630	0.006
32	0.015	0.006	60	0.710	0.006
33	0.020	0.006	61	0.790	0.006
34	0.030	0.006	62	0.870	0.006
35	0.040	0.006	63	0.950	0.006
36	0.050	0.006	64	1.030	0.006
37	0.060	0.006	65	1.120	0.006
38	0.070	0.006	66	1.210	0.006
39	0.080	0.006	67	1.300	0.006
40	0.090	0.006	68	1.390	0.006
41	0.100	0.006	69	1.480	0.006
42	0.110	0.006	70	1.580	0.006
43	0.120	0.006	71	1.680	0.006
44	0.130	0.006	72	1.780	0.006
45	0.140	0.006	73	1.880	0.006
46	0.150	0.006	74	1.980	0.006
47	0.160	0.006			

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.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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: The Pub-2010 Teachers Above-Median Income Employee mortality table *[PubT-2010(A) Employee]* as published by the Society of Actuaries with a 93.9% adjustment for males and 85.3% adjustment for females, and with future improvement from the base year of 2010 on a generational basis. For purposes of calculating projected cash flows used to determine the GASB discount rate, mortality improvement is based on SOA's Scale MP-2018. Upon direction from the DPB, for purposes of calculating the Total Pension Liability, mortality improvement is based on SOA's Scale MP-2019.

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

Healthy Retirees and Beneficiaries (Healthy Annuitants): The Pub-2010 Teachers Above-Median Income Healthy Retiree mortality table *[PubT-2010(A) Healthy Retiree]* as published by the Society of Actuaries with a 114.7% adjustment for males and 99.6% adjustment for females, and with future improvement from the base year of 2010 on a generational basis. For purposes of calculating projected cash flows used to determine the GASB discount rate, mortality improvement is based on SOA's Scale MP-2018. Upon direction from the DPB, for purposes of calculating the Total Pension Liability, mortality improvement is based on SOA's Scale MP-2019.

Disabled Retirees (Disabled Annuitants): The Pub-2010 Non-Safety Disabled Retiree mortality table *[PubNS-2010 Disabled Retiree]* as published by the Society of Actuaries with a 106.3% adjustment for males and 100.3% adjustment for females, and with future improvement from the base year of 2010 on a generational basis. For purposes of calculating projected cash flows used to determine the GASB discount rate, mortality improvement is based on SOA's Scale MP-2018. Upon direction from the DPB, for purposes of calculating the Total Pension Liability, mortality improvement is based on SOA's Scale MP-2019.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

14. Retirement

Retirement rates for Tier 1-4 members are as follows:

Age	Less Than 25 Years of Service	25 Years of Service	26 or More Years of Service
< 50	N/A	1.5%	1.5%
50	N/A	1.5	1.5
51	N/A	2.0	2.0
52	N/A	3.0	2.5
53	N/A	4.0	3.0
54	N/A	6.0	3.5
55	N/A	10.0	13.0
56	N/A	18.0	17.0
57	N/A	18.0	17.0
58	N/A	20.0	17.0
59	N/A	25.0	17.0
60	4.0	25.0	20.0
61	6.0	25.0	22.0
62	6.0	33.0	27.0
63	8.0	42.0	30.0
64	8.0	42.0	30.0
65	12.0	42.0	30.0
66	18.0	55.0	35.0
67	18.0	55.0	40.0
68	18.0	55.0	30.0
69	18.0	55.0	30.0
70	18.0	55.0	30.0
71	18.0	55.0	30.0
72	18.0	55.0	30.0
73	18.0	55.0	30.0
74	18.0	55.0	30.0
75	100.0	100.0	100.0

Rates apply upon retirement eligibility by tier.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Retirement rates for Tier 5 members are as follows:

Age	Less Than 25 Years of Service	25 Years of Service	26 to 29 Years of Service	30 Years of Service	31 or More Years of Service
< 50	N/A	N/A	N/A	1.5%	1.5%
50	N/A	N/A	N/A	1.5	1.5
51	N/A	N/A	N/A	2.0	2.0
52	N/A	N/A	N/A	3.0	2.5
53	N/A	N/A	N/A	4.0	3.0
54	N/A	N/A	N/A	6.0	3.5
55	N/A	N/A	N/A	10.0	13.0
56	N/A	N/A	N/A	18.0	17.0
57	N/A	N/A	N/A	18.0	17.0
58	N/A	N/A	N/A	20.0	17.0
59	N/A	N/A	N/A	25.0	17.0
60	N/A	N/A	N/A	25.0	20.0
61	N/A	N/A	N/A	25.0	22.0
62	N/A	N/A	N/A	33.0	27.0
63	N/A	N/A	N/A	42.0	30.0
64	N/A	N/A	N/A	42.0	30.0
65	12.0	42.0	42.0	42.0	30.0
66	18.0	55.0	35.0	35.0	35.0
67	18.0	55.0	40.0	40.0	40.0
68	18.0	55.0	30.0	30.0	30.0
69	18.0	55.0	30.0	30.0	30.0
70	18.0	55.0	30.0	30.0	30.0
71	18.0	55.0	30.0	30.0	30.0
72	18.0	55.0	30.0	30.0	30.0
73	18.0	55.0	30.0	30.0	30.0
74	18.0	55.0	30.0	30.0	30.0
75	100.0	100.0	100.0	100.0	100.0

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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.

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 2017 data but omitted from the 2018 data are assumed to have died without a beneficiary.

18. Rationale for Assumptions

The demographic assumptions used in this report reflect the results of the July 1, 2015 – June 30, 2018 Experience Study, approved by the Board of Trustees on February 6, 2020. The investment return assumption was recommended by the State Treasurer. The MP-2019 mortality improvement scale was used to calculate the Total Pension Liability upon direction from the DPB.

19. Changes in Assumptions Since Last Valuation

The assumed rates of termination, retirement, disability, mortality, salary increase and inflation were updated based on the July 1, 2015 – June 30, 2018 Experience Study.

The GASB 67 effective discount rate has been updated in accordance with the method prescribed by GASB Statement No. 67.

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. Refunds are valued as 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

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 and administrative expenses, and 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 Fund assets.

3. Contributions

Chapter 83, P.L. 2016 requires the State to make the required pension contributions on a quarterly basis in each fiscal year according to the following schedule: at least 25% by September 30, at least 50% by December 31, at least 75% by March 31, and at least 100% 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.

Chapter 98, P.L. 2017, the Lottery Enterprise Contribution Act, allows the TPAF to receive 77.78% of the proceeds of the Lottery Enterprise, based upon their members' past or present employment in schools and institutions in the State for a term of 30 years. Revenues from Chapter 98, P.L. 2017, the Lottery Enterprise Contribution Act, are assumed to be contributed to the trust on a monthly basis. The State's pension contribution is reduced by the product of the allocable percentage for the TPAF, the adjustment percentage, and the special asset value.

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.

Legislation has provided for additional benefits and/or funding requirements which are included in this valuation and are described as follows.

<u>Early Retirement Incentive Programs</u>

State and Local employers which elected to participate in various early retirement incentive programs authorized by NJ Statute make contributions to cover the cost of these programs over amortization periods elected by the employer to the extent permitted by NJ Statute.

<u>Chapter 133, P.L. 2001</u>

Chapter 133, P.L. 2001 increased the accrual rate from 1/60 to 1/55. In addition, it lowered the age required for a veteran benefit equal to 1/55 of highest 12-month Compensation for each Year of Service from 60 to 55.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Chapter 133, P.L. 2001 established the Benefit Enhancement Fund (BEF) to fund the additional annual employer normal contribution due to the Statute's increased benefits. (Chapter 353, P.L. 2001 extended this coverage to this Statute's additional annual employer normal contribution.) If the assets in the BEF are insufficient to cover the normal contribution for the increased benefits for a valuation period, the State will pay such amount. As of July 1, 2018, there are no assets in the BEF.

4. Changes Since Last Valuation

Based on clarification from the Division of Pensions and Benefits, the actuarial liability is based solely on the formula benefit without any comparison to the value of the estimated member annuity.

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

(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 will provide a total allowance of:

(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 will provide a total allowance of 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 will provide a total allowance of 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 will provide a total allowance of:

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 will provide a total allowance of 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.

APPENDIX D – DETERMINATION OF DISCOUNT RATE

Table 1 - Projection of the Pension Plan's Fiduciary Net Position
(In Thousands)
Projections Commence June 30, 2019

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	$ 22,686,936	$ 794,581	$ 1,482,527	$ 833,471	$ 4,652,871	$ 14,361	$ 1,522,189	$ 22,652,473
2	22,652,473	780,873	1,777,190	845,005	4,761,966	14,697	1,523,579	22,802,458
3	22,802,458	768,260	1,869,279	854,907	4,860,794	15,002	1,533,007	22,952,115
4	22,952,115	755,740	2,198,867	864,863	4,954,788	15,293	1,548,698	23,350,203
5	23,350,203	742,641	2,299,153	875,357	5,046,857	15,577	1,575,911	23,780,831
6	23,780,831	728,447	2,403,475	886,031	5,140,054	15,864	1,605,435	24,248,302
7	24,248,302	712,516	2,508,798	896,822	5,237,437	16,165	1,637,365	24,750,201
8	24,750,201	700,682	2,616,338	907,789	5,342,345	16,489	1,671,649	25,287,825
9	25,287,825	689,041	2,726,138	918,117	5,450,105	16,821	1,708,380	25,862,573
10	25,862,573	675,953	2,833,777	925,241	5,563,259	17,171	1,747,307	26,464,422
11	26,464,422	661,060	2,941,757	934,591	5,681,111	17,534	1,787,992	27,091,177
12	27,091,177	644,170	3,049,880	944,034	5,804,106	17,914	1,830,182	27,737,423
13	27,737,423	625,243	3,076,092	953,571	5,931,837	18,308	1,871,385	28,313,569
14	28,313,569	604,322	3,099,631	963,204	6,062,166	18,710	1,907,456	28,807,305
15	28,807,305	581,365	3,120,343	972,933	6,195,363	19,121	1,937,523	29,204,985
16	29,204,985	556,403	3,138,972	982,760	6,330,918	19,540	1,960,660	29,493,322
17	29,493,322	529,959	3,155,277	992,685	6,464,565	19,952	1,976,101	29,662,827
18	29,662,827	502,780	3,169,918	1,002,709	6,591,810	20,345	1,983,378	29,709,457
19	29,709,457	475,361	3,183,732	1,012,833	6,710,731	20,712	1,982,313	29,632,252
20	29,632,252	448,049	3,197,249	1,023,058	6,818,721	21,045	1,972,954	29,433,797
21	29,433,797	421,199	3,210,918	1,033,386	6,912,101	21,334	1,955,634	29,121,498
22	29,121,498	395,020	3,225,123	1,043,817	6,989,835	21,574	1,930,924	28,704,974
23	28,704,974	368,637	3,240,140	1,054,352	7,056,238	21,778	1,899,324	28,189,411
24	28,189,411	340,426	3,255,269	1,064,993	7,119,912	21,975	1,860,826	27,569,039
25	27,569,039	310,320	3,269,034	1,075,740	7,180,305	22,161	1,815,006	26,836,672
26	26,836,672	278,680	3,282,787	1,086,595	7,236,723	22,336	1,761,432	25,987,108
27	25,987,108	245,460	3,299,008	1,097,558	7,290,365	22,501	1,699,761	25,016,027
28	25,016,027	211,089	3,317,676	1,108,630	7,341,358	22,658	1,629,701	23,919,107
29	23,919,107	176,221	3,725,533	0	7,388,129	22,803	1,522,505	21,932,434
30	21,932,434	143,477	3,699,773	0	7,418,683	22,897	1,380,582	19,714,685
31	19,714,685	115,124	3,703,886	0	7,421,029	22,904	1,224,382	17,314,144
32	17,314,144	90,865	3,710,256	0	7,385,486	22,795	1,056,893	14,763,878
33	14,763,878	70,563	3,718,724	0	7,335,965	22,642	879,598	12,074,156
34	12,074,156	53,895	3,729,425	0	7,263,933	22,420	693,501	9,264,625
35	9,264,625	40,408	3,742,380	0	7,171,301	22,134	499,897	6,353,876
36	6,353,876	29,688	3,757,498	0	7,058,920	21,787	300,043	3,360,399
37	0	0	0	0	6,927,415	21,381	0	0
38	0	0	0	0	6,777,926	20,919	0	0
39	0	0	0	0	6,612,715	20,410	0	0
40	0	0	0	0	6,433,372	19,856	0	0
41	0	0	0	0	6,242,321	19,266	0	0
42	0	0	0	0	6,041,550	18,647	0	0
43	0	0	0	0	5,833,534	18,005	0	0
44	0	0	0	0	5,620,022	17,346	0	0
45	0	0	0	0	5,401,918	16,673	0	0
46	0	0	0	0	5,179,944	15,987	0	0
47	0	0	0	0	4,954,554	15,292	0	0
48	0	0	0	0	4,726,145	14,587	0	0
49	0	0	0	0	4,495,264	13,874	0	0
50	0	0	0	0	4,262,469	13,156	0	0
51	0	0	0	0	4,028,445	12,433	0	0
52	0	0	0	0	3,793,963	11,710	0	0
53	0	0	0	0	3,559,899	10,987	0	0
54	0	0	0	0	3,327,155	10,269	0	0
55	0	0	0	0	3,096,639	9,558	0	0
56	0	0	0	0	2,869,290	8,856	0	0
57	0	0	0	0	2,646,084	8,167	0	0
58	0	0	0	0	2,427,997	7,494	0	0
59	0	0	0	0	2,216,029	6,840	0	0
60	0	0	0	0	2,011,150	6,207	0	0

APPENDIX D – DETERMINATION OF DISCOUNT RATE

Table 1 - Projection of the Pension Plan's Fiduciary Net Position
(In Thousands)
Projections Commence June 30, 2019

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	1,814,285	5,600	0	0
62	0	0	0	0	1,626,287	5,019	0	0
63	0	0	0	0	1,447,909	4,469	0	0
64	0	0	0	0	1,279,816	3,950	0	0
65	0	0	0	0	1,122,548	3,465	0	0
66	0	0	0	0	976,517	3,014	0	0
67	0	0	0	0	841,990	2,599	0	0
68	0	0	0	0	719,090	2,219	0	0
69	0	0	0	0	607,811	1,876	0	0
70	0	0	0	0	508,028	1,568	0	0
71	0	0	0	0	419,497	1,295	0	0
72	0	0	0	0	341,863	1,055	0	0
73	0	0	0	0	274,651	848	0	0
74	0	0	0	0	217,288	671	0	0
75	0	0	0	0	169,093	522	0	0
76	0	0	0	0	129,282	399	0	0
77	0	0	0	0	96,986	299	0	0
78	0	0	0	0	71,290	220	0	0
79	0	0	0	0	51,267	158	0	0
80	0	0	0	0	36,016	111	0	0
81	0	0	0	0	24,678	76	0	0
82	0	0	0	0	16,464	51	0	0
83	0	0	0	0	10,677	33	0	0
84	0	0	0	0	6,721	21	0	0
85	0	0	0	0	4,102	13	0	0
86	0	0	0	0	2,425	7	0	0
87	0	0	0	0	1,388	4	0	0
88	0	0	0	0	770	2	0	0
89	0	0	0	0	416	1	0	0
90	0	0	0	0	219	1	0	0
91	0	0	0	0	112	0	0	0
92	0	0	0	0	56	0	0	0
93	0	0	0	0	28	0	0	0
94	0	0	0	0	13	0	0	0
95	0	0	0	0	6	0	0	0
96	0	0	0	0	2	0	0	0
97	0	0	0	0	1	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

APPENDIX D – DETERMINATION OF DISCOUNT RATE

Table 2 - Actuarial Present Values of Projected Benefit Payments
(In Thousands)
Projections Commence June 30, 2019
* 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	Present Value of "Unfunded" Benefit Payments	Present Value of Benefit Payments Using the Single Discount Rate
(a)	(b)	(c)	(d) = (c) if (b) >= (c)	(e) = (c) - (d)	(f) = (d) / (1+7.00%)^[(a) - .5]	(g) = (e) / (1+3.50%)^[(a) - .5]	(h) = (c) / (1+5.60%)^[(a) - .5]
1	$ 22,686,936	$ 4,652,871	$ 4,652,871	$ 0	$ 4,498,100	$ 0	$ 4,527,718
2	22,652,473	4,761,966	4,761,966	0	4,302,399	0	4,387,949
3	22,802,458	4,860,794	4,860,794	0	4,104,382	0	4,241,303
4	22,952,115	4,954,788	4,954,788	0	3,910,046	0	4,093,870
5	23,350,203	5,046,857	5,046,857	0	3,722,151	0	3,948,633
6	23,780,831	5,140,054	5,140,054	0	3,542,884	0	3,808,117
7	24,248,302	5,237,437	5,237,437	0	3,373,838	0	3,674,331
8	24,750,201	5,342,345	5,342,345	0	3,216,278	0	3,549,018
9	25,287,825	5,450,105	5,450,105	0	3,066,499	0	3,428,452
10	25,862,573	5,563,259	5,563,259	0	2,925,388	0	3,313,899
11	26,464,422	5,681,111	5,681,111	0	2,791,924	0	3,204,498
12	27,091,177	5,804,106	5,804,106	0	2,665,765	0	3,100,123
13	27,737,423	5,931,837	5,931,837	0	2,546,197	0	3,000,196
14	28,313,569	6,062,166	6,062,166	0	2,431,906	0	2,903,389
15	28,807,305	6,195,363	6,195,363	0	2,322,747	0	2,809,706
16	29,204,985	6,330,918	6,330,918	0	2,218,289	0	2,718,802
17	29,493,322	6,464,565	6,464,565	0	2,116,932	0	2,628,858
18	29,662,827	6,591,810	6,591,810	0	2,017,384	0	2,538,337
19	29,709,457	6,710,731	6,710,731	0	1,919,420	0	2,446,985
20	29,632,252	6,818,721	6,818,721	0	1,822,717	0	2,354,405
21	29,433,797	6,912,101	6,912,101	0	1,726,802	0	2,259,984
22	29,121,498	6,989,835	6,989,835	0	1,631,983	0	2,164,108
23	28,704,974	7,056,238	7,056,238	0	1,539,708	0	2,068,722
24	28,189,411	7,119,912	7,119,912	0	1,451,964	0	1,976,607
25	27,569,039	7,180,305	7,180,305	0	1,368,486	0	1,887,580
26	26,836,672	7,236,723	7,236,723	0	1,289,008	0	1,801,446
27	25,987,108	7,290,365	7,290,365	0	1,213,610	0	1,718,484
28	25,016,027	7,341,358	7,341,358	0	1,142,148	0	1,638,662
29	23,919,107	7,388,129	7,388,129	0	1,074,229	0	1,561,580
30	21,932,434	7,418,683	7,418,683	0	1,008,104	0	1,484,819
31	19,714,685	7,421,029	7,421,029	0	942,451	0	1,406,461
32	17,314,144	7,385,486	7,385,486	0	876,577	0	1,325,438
33	14,763,878	7,335,965	7,335,965	0	813,738	0	1,246,679
34	12,074,156	7,263,933	7,263,933	0	753,035	0	1,168,923
35	9,264,625	7,171,301	7,171,301	0	694,796	0	1,092,770
36	6,353,876	7,058,920	6,353,876	705,043	575,327	207,890	1,018,558
37	0	6,927,415	0	6,927,415	0	1,973,551	946,533
38	0	6,777,926	0	6,777,926	0	1,865,665	876,957
39	0	6,612,715	0	6,612,715	0	1,758,638	810,174
40	0	6,433,372	0	6,433,372	0	1,653,084	746,369
41	0	6,242,321	0	6,242,321	0	1,549,751	685,769
42	0	6,041,550	0	6,041,550	0	1,449,185	628,488
43	0	5,833,534	0	5,833,534	0	1,351,969	574,642
44	0	5,620,022	0	5,620,022	0	1,258,441	524,228
45	0	5,401,918	0	5,401,918	0	1,168,698	477,142
46	0	5,179,944	0	5,179,944	0	1,082,777	433,253
47	0	4,954,554	0	4,954,554	0	1,000,641	392,408
48	0	4,726,145	0	4,726,145	0	922,233	354,452
49	0	4,495,264	0	4,495,264	0	847,517	319,243
50	0	4,262,469	0	4,262,469	0	776,451	286,645
51	0	4,028,445	0	4,028,445	0	709,006	256,530
52	0	3,793,963	0	3,793,963	0	645,157	228,776
53	0	3,559,899	0	3,559,899	0	584,883	203,269
54	0	3,327,155	0	3,327,155	0	528,159	179,897
55	0	3,096,639	0	3,096,639	0	474,943	158,547
56	0	2,869,290	0	2,869,290	0	425,192	139,110
57	0	2,646,084	0	2,646,084	0	378,856	121,480
58	0	2,427,997	0	2,427,997	0	335,875	105,552
59	0	2,216,029	0	2,216,029	0	296,186	91,224
60	0	2,011,150	0	2,011,150	0	259,713	78,396

APPENDIX D – DETERMINATION OF DISCOUNT RATE

Table 2 - Actuarial Present Values of Projected Benefit Payments
(In Thousands)
Projections Commence June 30, 2019
* 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	Present Value of "Unfunded" Benefit Payments	Present Value of Benefit Payments Using the Single Discount Rate
(a)	(b)	(c)	(d) = (c) if (b) >= (c)	(e) = (c) - (d)	(f) = (d) / (1+7.00%)^[(a) - .5]	(g) = (e) / (1+3.50%)^[(a) - .5]	(h) = (c) / (1+5.60%)^[(a) - .5]
61	0	1,814,285	0	1,814,285	0	226,368	66,969
62	0	1,626,287	0	1,626,287	0	196,049	56,844
63	0	1,447,909	0	1,447,909	0	168,643	47,923
64	0	1,279,816	0	1,279,816	0	144,024	40,111
65	0	1,122,548	0	1,122,548	0	122,054	33,315
66	0	976,517	0	976,517	0	102,586	27,443
67	0	841,990	0	841,990	0	85,462	22,407
68	0	719,090	0	719,090	0	70,520	18,120
69	0	607,811	0	607,811	0	57,591	14,503
70	0	508,028	0	508,028	0	46,509	11,479
71	0	419,497	0	419,497	0	37,105	8,976
72	0	341,863	0	341,863	0	29,216	6,926
73	0	274,651	0	274,651	0	22,678	5,269
74	0	217,288	0	217,288	0	17,335	3,948
75	0	169,093	0	169,093	0	13,034	2,909
76	0	129,282	0	129,282	0	9,628	2,106
77	0	96,986	0	96,986	0	6,979	1,496
78	0	71,290	0	71,290	0	4,956	1,041
79	0	51,267	0	51,267	0	3,444	709
80	0	36,016	0	36,016	0	2,337	472
81	0	24,678	0	24,678	0	1,547	306
82	0	16,464	0	16,464	0	997	193
83	0	10,677	0	10,677	0	625	119
84	0	6,721	0	6,721	0	380	71
85	0	4,102	0	4,102	0	224	41
86	0	2,425	0	2,425	0	128	23
87	0	1,388	0	1,388	0	71	12
88	0	770	0	770	0	38	7
89	0	416	0	416	0	20	3
90	0	219	0	219	0	10	2
91	0	112	0	112	0	5	1
92	0	56	0	56	0	2	0
93	0	28	0	28	0	1	0
94	0	13	0	13	0	1	0
95	0	6	0	6	0	0	0
96	0	2	0	2	0	0	0
97	0	1	0	1	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
					$ 77,617,213	**$ 24,875,028**	**$ 102,492,241**

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.