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January 31, 2023

CONFIDENTIAL

Mr. Doug Anderson
Executive Director
Public Employees Retirement Association of Minnesota
60 Empire Drive, Suite 200
St. Paul, MN 55103

Re: Projection of Contributions and Funding Status – Police and Fire Plan

Dear Mr. Anderson:

Attached are 30-year projections of estimated funded status, required contributions, and statutory contributions under three asset return scenarios for the Public Employees Police and Fire Plan. These projections, including the underlying investment return assumptions, are required by the Minnesota Standards for Actuarial Work. Unless noted otherwise, the estimates are based on participant data, assets, and plan provisions as outlined in the Public Employees Police and Fire Plan actuarial funding valuation as of July 1, 2022.

Basis for Projections

For all enclosed projections, liabilities are determined using the statutory investment return assumption of 7.5%. As required by the Minnesota Standards for Actuarial Work, the projections reflect three asset return scenarios (7.5%, 6.0% and 9.0%). Note that we believe the 7.5% and 9.0% rate of return assumptions are outside of the range of reasonable expected returns for this plan.

The estimates are based on the market value of assets with no smoothing of investment gains or losses. Consequently, the required contributions for the fiscal year will not match the figures based on the actuarial value of assets shown in our valuation report. Payroll is assumed to increase approximately 3.00% per year over the long term, consistent with the valuation assumption for total payroll growth.

The projection is an open group projection; meaning, active members projected to retire or otherwise terminate in the future are replaced with new active members so that the total active membership of the fund remains at 11,629 members. The profile of these new members is the same as new members hired between July 1, 2016 and June 30, 2021. Average salary at hire increases at the assumed payroll growth rate.

- Average age at hire is 29.3
- Average salary at hire is $68,100
- Approximately 15% female, 85% male

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If actuarial accrued liability exceeds assets, the unfunded actuarial accrued liability is amortized through June 30, 2048 per Minnesota Statute 356.215, Subdivision 11. Per Minnesota Statute 356.215, Subdivision 11 (l), a negative unfunded actuarial accrued liability (i.e., when assets exceed liability) is amortized over a rolling 30-year period.

The State of Minnesota provides a $9.0 million contribution to the fund each October 1 until both the MSRS State Patrol Fund and the PERA Police and Fire Plan become 90% funded (on an Actuarial Value of Assets basis) or July 1, 2048 if earlier. For purposes of the enclosed projections, this state contribution is projected to be eliminated in fiscal years ending 2026 for both the 9.0% and 7.5% investment return scenarios and in fiscal year ending 2049 for the 6.0% investment return scenario, based on the combined projected funded status of the MSRS State Patrol Fund and the PERA Police and Fire Plan.

The State of Minnesota provides additional state contributions of $9.0 million until the plan reaches 100% funding (on an Actuarial Value of Assets basis) or July 1, 2048 if earlier. The additional state contributions are projected to be eliminated in fiscal years ending 2028, 2033 and 2049 in the 9.0%, 7.5% and 6.0% investment return scenarios, respectively.

Comments

The reader should keep the following in mind when reviewing these results:

- Statutory contributions are defined in statutes as a fixed percentage of payroll plus any statutory supplemental contributions and represent the amount that is actually contributed to the plan. Required contributions are defined in statutes and the LCPR Standard for Actuarial Work and represent the amount needed to fully fund the plan by June 30, 2048 (normal cost, expenses and a payment to amortize the unfunded liability).

- Investment experience that has occurred since the measurement date is not reflected in this report.

- The enclosed projections are based on assumptions as outlined in the Public Employees Police and Fire Plan actuarial funding valuation as of July 1, 2022. Please see that report for comments regarding the 7.5% statutory investment return assumption, and sensitivity test results based on alternate assumptions.

- Note that plan changes may result in behavior changes that are not anticipated in the current assumptions.

- In the 7.5% and 9.0% investment return scenarios, surplus assets reduce the projected required contributions to amounts less than normal cost. We typically recommend the contribution be at least equal to the normal cost of the plan and suggest that plans with considerable surplus assets investigate the pros and cons of reducing the risk of the plan’s investment allocation to preserve surplus assets.

- A 2022 analysis of long-term rate of investment return and inflation assumptions concluded that the probability of exceeding the current 7.5% assumption over 10 years is only 34%. The statutory requirement for projections that are 1.5% above and 1.5% below the assumed rate may give the reader the impression that the 7.5% projection is an accurate (middle of the road) representation of the expected future results. Based on our modeling, the 7.5% scenario is optimistic and not representative of the expected (median) result. We caution against adjusting contribution rates without full consideration of the median results.

- Note that as funding ratios decline, as they are expected to in one of the investment return scenarios shown in this letter, it will be increasingly difficult for the plan to attain the assumed scenario investment return. Each year, a larger proportion of assets is paid out in benefits, and less capital is available to invest.

Disclosures

The purpose of this report is to estimate the Fund's funding progress and required contribution rates over a 30-year period according to prescribed assumptions and the Minnesota Standards for Actuarial Work. To the best of our knowledge and belief, the calculations were completed in accordance with the requirements of Minnesota Statutes, Section 356.215, and the requirements of the Standards for Actuarial Work established by the Legislative Commission on Pensions and Retirement.

This report should not be relied upon for any purpose other than the purpose described herein. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results. GRS is not responsible for the consequences of any unauthorized use.

Actuarial assumptions, including discount rates, mortality tables and others identified in this report, are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Board of Trustees. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods, and assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis section of the valuation report, except as noted. PERA is solely responsible for communicating to GRS any changes required thereto.

In a 2022 analysis of long-term rate of investment return and inflation assumptions, GRS suggested that an investment return assumption in the range of 5.64% to 6.84% would be reasonable for this valuation. This implies that the 7.5% and 9.0% rate of return assumptions would be outside the range of reasonable returns for this plan. Please see our letter dated July 12, 2022 for additional information. For informational purposes, results based on a 6.5% discount rate are shown on page 5 of the July 1, 2022 valuation report.

The projections assume the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The contribution rates shown in this report have been determined using the actuarial assumptions and methods disclosed in the Actuarial Basis section of the July 1, 2022 valuation report. This valuation report includes risk metrics on pages 6 through 9, but does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

The valuation was based upon information furnished by the Public Employees Retirement Association (PERA), concerning benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by PERA.

This report was prepared using our proprietary valuation model and related software which, in our professional judgement, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report reflects the impact of COVID-19 through June 30, 2022. It does not reflect the ongoing impact of COVID-19, which is likely to influence demographic and investment experience, at least in the short term. We will continue to monitor these developments and their impact on the plan.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan’s funded status); and changes in plan provisions or applicable law.

Professional Qualifications

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief, the information contained in this report is accurate and fairly presents the actuarial position of the Public Employees Police and Fire Plan as of the valuation date and was performed in accordance with the requirements of Minnesota Statutes Section 356.215, and the requirements of the Standards for Actuarial Work established by the LCPR. All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Brian B. Murphy, Bonita J. Wurst and Sheryl L. Christensen are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

Respectfully submitted,

Gabriel, Roeder, Smith & Company

Brian B. Murphy

Brian B. Murphy, FSA, EA, FCA, MAAA, PhD

Bonita J. Wurst

Bonita J. Wurst, ASA, EA, FCA, MAAA

Sheryl Christensen

Sheryl L. Christensen, FSA, EA, FCA, MAAA

BBM/BJW/SLC:dj
Enclosures

Other Observations

General Implications of the Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if there are no changes in benefits, Chapter 356 required contributions are made, and all actuarial assumptions are met (including the assumption of the plan earning 7.50% on the market value of assets, as prescribed by statutes), it is expected that:

(1) The normal cost of the plan is expected to remain approximately level as a percent of pay;
(2) The funded status of the plan is expected to gradually improve and is expected to be 100% funded within the next 26 years; and
(3) The unfunded liability is expected to grow initially as a dollar amount before beginning to decline.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the market value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations; in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
(3) The measurement would produce a different result if the actuarial value of assets were used instead of the market value of assets.

Limitations of Project Scope

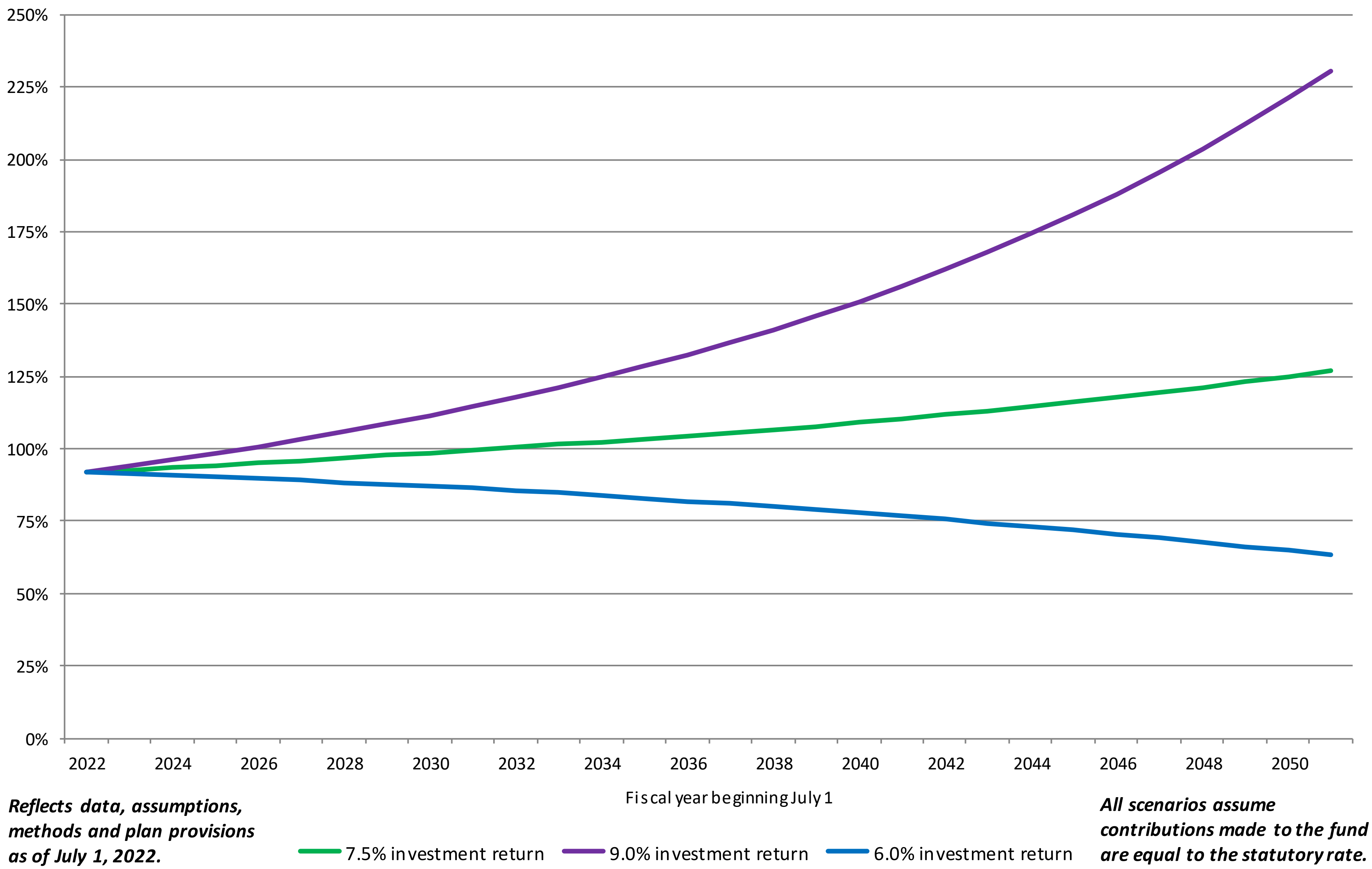
Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.

PERA Public Employees Police and Fire Plan Estimated Accrued Liability Funded Ratio

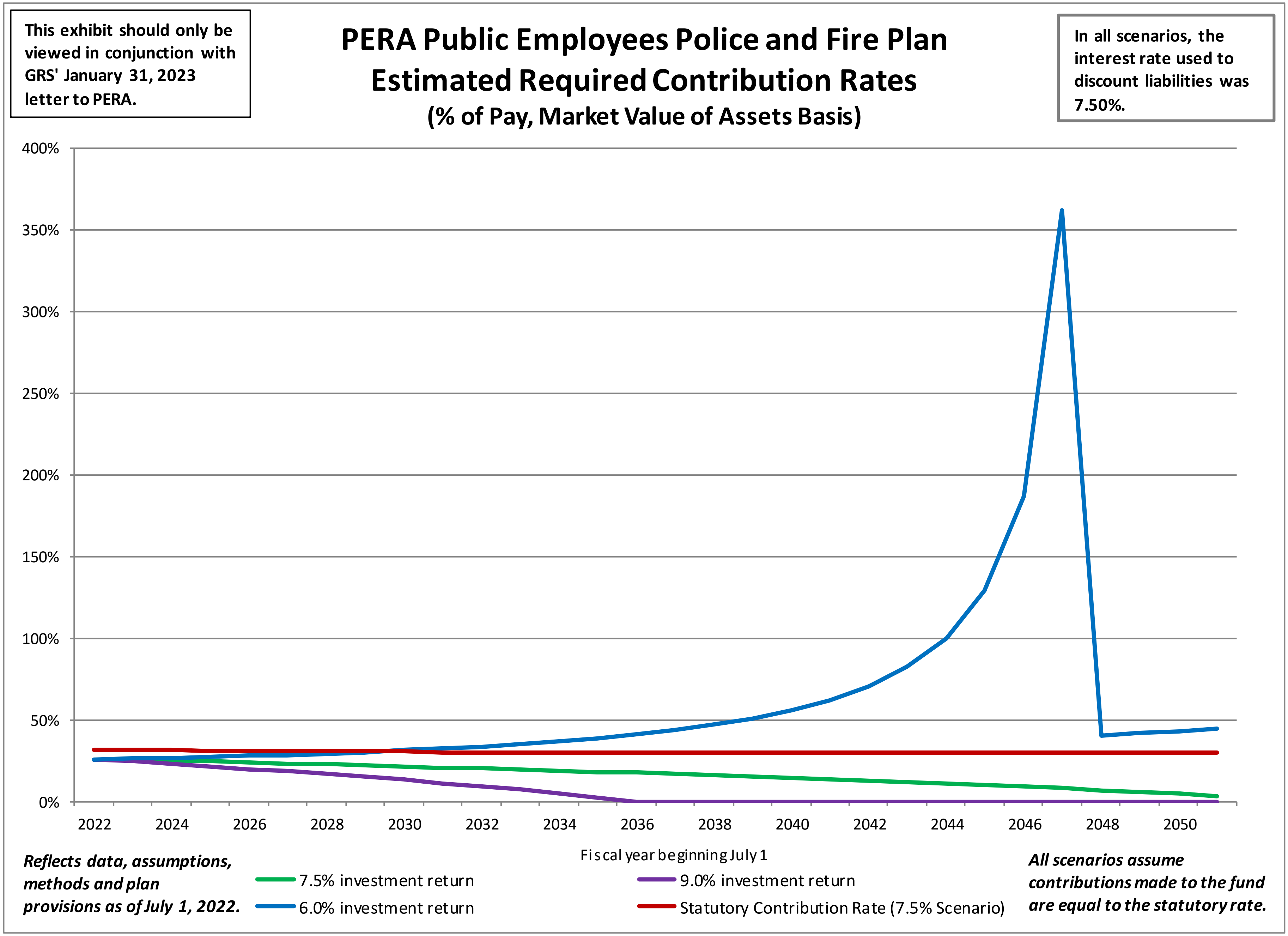
(Market Value of Assets Basis)

In all scenarios, the interest rate used to discount liabilities was 7.50%.



Reflects data, assumptions, methods and plan provisions as of July 1, 2022.

All scenarios assume contributions made to the fund are equal to the statutory rate.



This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.
PERA Public Employees Police and Fire Plan
Estimated Required Contribution Rates
(% of Pay, Market Value of Assets Basis)
In all scenarios, the interest rate used to discount liabilities was 7.50%.
400%
350%
300%
250%
200%
150%
100%
50%
0%
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050
Fiscal year beginning July 1
Reflects data, assumptions, methods and plan provisions as of July 1, 2022.
7.5% investment return
6.0% investment return
9.0% investment return
Statutory Contribution Rate (7.5% Scenario)
All scenarios assume contributions made to the fund are equal to the statutory rate.

This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.

Public Employees Police and Fire Plan
Scenario: 7.5% Investment Return for All Years
Fiscal Year Beginning July 1

$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Contributions (% of Payroll)										
Statutory - Chapter 353	31.77%	31.71%	31.66%	30.87%	30.83%	30.80%	30.77%	30.73%	30.70%	30.13%
Required - Chapter 356 (MVA)	25.86%	25.29%	24.83%	24.33%	23.85%	23.33%	22.76%	22.12%	21.42%	20.63%
Sufficiency / (Deficiency)	5.91%	6.42%	6.83%	6.54%	6.98%	7.47%	8.01%	8.61%	9.28%	9.50%
Contributions										
Statutory - Chapter 353	$ 359,803	$ 368,430	$ 377,028	$ 376,697	$ 385,635	$ 395,060	$ 405,081	$ 415,307	$ 426,053	$ 429,507
Required - Chapter 356 (MVA)	292,883	293,811	295,677	296,964	298,347	299,264	299,614	298,936	297,213	294,004
Sufficiency / (Deficiency)	66,920	74,618	81,351	79,733	87,288	95,796	105,467	116,370	128,840	135,504
Funding Ratios										
Current Assets (MVA)	$10,415,493	$10,872,487	$11,346,570	$11,837,360	$12,334,974	$12,848,302	$13,377,968	$13,927,058	$14,496,280	$15,087,175
Actuarial Accrued Liability (AAL)	11,351,467	11,743,499	12,144,319	12,553,003	12,968,423	13,390,088	13,817,801	14,253,698	14,697,771	15,150,467
Unfunded AAL	935,974	871,012	797,748	715,644	633,448	541,786	439,833	326,641	201,490	63,292
Funding Ratio	91.8%	92.6%	93.4%	94.3%	95.1%	96.0%	96.8%	97.7%	98.6%	99.6%
Benefit Payments	$ 670,555	$ 695,702	$ 722,425	$ 750,951	$ 780,670	$ 811,407	$ 840,945	$ 871,407	$ 902,358	$ 933,474
Ratio of Assets to Benefit Payments	15.53	15.63	15.71	15.76	15.80	15.83	15.91	15.98	16.06	16.16

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.

Public Employees Police and Fire Plan

Scenario: 7.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Contributions (% of Payroll)										
Statutory - Chapter 353	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	19.93%	19.36%	18.75%	18.13%	17.47%	16.78%	16.07%	15.32%	14.54%	13.73%
Sufficiency / (Deficiency)	9.57%	10.14%	10.75%	11.37%	12.03%	12.72%	13.43%	14.18%	14.96%	15.77%
Contributions										
Statutory - Chapter 353	$ 432,045	$ 444,021	$ 456,417	$ 469,312	$ 482,559	$ 496,289	$ 510,540	$ 525,312	$ 540,692	$ 556,585
Required - Chapter 356 (MVA)	291,895	291,328	290,161	288,377	285,787	282,379	278,088	272,819	266,509	258,970
Sufficiency / (Deficiency)	140,150	152,693	166,257	180,935	196,772	213,910	232,452	252,493	274,184	297,616
Funding Ratios										
Current Assets (MVA)	$15,693,629	$16,315,647	$16,963,508	$17,639,138	$18,344,374	$19,080,426	$19,849,845	$20,654,905	$21,497,865	$22,382,080
Actuarial Accrued Liability (AAL)	15,612,584	16,084,921	16,567,884	17,062,132	17,568,096	18,085,551	18,615,396	19,158,146	19,714,173	20,284,730
Unfunded AAL	(81,045)	(230,726)	(395,624)	(577,005)	(776,278)	(994,875)	(1,234,449)	(1,496,758)	(1,783,692)	(2,097,350)
Funding Ratio	100.5%	101.4%	102.4%	103.4%	104.4%	105.5%	106.6%	107.8%	109.1%	110.3%
Benefit Payments	$ 964,792	$ 996,764	$ 1,029,165	$ 1,062,298	$ 1,096,757	$ 1,131,464	$ 1,166,912	$ 1,203,274	$ 1,239,751	$ 1,276,360
Ratio of Assets to Benefit Payments	16.27	16.37	16.48	16.60	16.73	16.86	17.01	17.17	17.34	17.54

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Public Employees Police and Fire Plan

Scenario: 7.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Contributions (% of Payroll)										
Statutory - Chapter 353	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	12.88%	11.99%	11.06%	10.10%	9.09%	8.05%	6.96%	5.82%	4.64%	3.41%
Sufficiency / (Deficiency)	16.62%	17.51%	18.44%	19.40%	20.41%	21.45%	22.54%	23.68%	24.86%	26.09%
Contributions										
Statutory - Chapter 353	$ 573,039	$ 590,085	$ 607,703	$ 625,797	$ 644,385	$ 663,650	$ 683,687	$ 704,397	$ 725,758	$ 747,827
Required - Chapter 356 (MVA)	250,113	239,815	227,933	214,259	198,634	181,011	161,244	139,042	114,165	86,407
Sufficiency / (Deficiency)	322,926	350,270	379,769	411,538	445,750	482,639	522,443	565,355	611,594	661,420
Funding Ratios										
Current Assets (MVA)	$23,311,033	$24,288,167	$25,317,475	$26,402,202	$27,545,537	$28,750,414	$30,020,280	$31,359,849	$32,774,183	$34,268,074
Actuarial Accrued Liability (AAL)	20,871,133	21,474,452	22,096,133	22,736,697	23,396,489	24,075,380	24,773,383	25,491,489	26,230,842	26,992,038
Unfunded AAL	(2,439,900)	(2,813,715)	(3,221,343)	(3,665,505)	(4,149,047)	(4,675,035)	(5,246,898)	(5,868,361)	(6,543,341)	(7,276,036)
Funding Ratio	111.7%	113.1%	114.6%	116.1%	117.7%	119.4%	121.2%	123.0%	125.0%	127.0%
Benefit Payments	$ 1,313,445	$ 1,350,751	$ 1,389,272	$ 1,429,199	$ 1,471,024	$ 1,514,651	$ 1,559,201	$ 1,604,579	$ 1,651,391	$ 1,699,810
Ratio of Assets to Benefit Payments	17.75	17.98	18.22	18.47	18.73	18.98	19.25	19.54	19.85	20.16

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.

Public Employees Police and Fire Plan
Scenario: 6.0% Investment Return for All Years
Fiscal Year Beginning July 1

$ in Thousands	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
Contributions (% of Payroll)										
Statutory - Chapter 353	31.77%	31.71%	31.66%	31.60%	31.55%	31.50%	31.45%	31.40%	31.35%	30.76%
Required - Chapter 356 (MVA)	25.86%	26.14%	26.63%	27.18%	27.80%	28.50%	29.28%	30.16%	31.15%	32.26%
Sufficiency / (Deficiency)	5.91%	5.57%	5.03%	4.42%	3.75%	3.00%	2.17%	1.24%	0.20%	(1.50)%
Contributions										
Statutory - Chapter 353	$ 359,803	$ 368,430	$ 377,028	$ 385,697	$ 394,635	$ 404,060	$ 414,081	$ 424,307	$ 435,053	$ 438,507
Required - Chapter 356 (MVA)	292,883	303,768	317,130	331,685	347,728	365,588	385,542	407,587	432,271	459,851
Sufficiency / (Deficiency)	66,920	64,662	59,898	54,012	46,907	38,471	28,539	16,720	2,782	(21,344)
Funding Ratios										
Current Assets (MVA)	$10,415,493	$10,718,598	$11,022,828	$11,326,599	$11,628,098	$11,926,235	$12,220,259	$12,511,771	$12,799,877	$13,084,400
Actuarial Accrued Liability (AAL)	11,351,467	11,743,499	12,144,319	12,553,003	12,968,423	13,390,088	13,817,801	14,253,698	14,697,771	15,150,467
Unfunded AAL	935,974	1,024,901	1,121,490	1,226,405	1,340,325	1,463,853	1,597,541	1,741,927	1,897,894	2,066,066
Funding Ratio	91.8%	91.3%	90.8%	90.2%	89.7%	89.1%	88.4%	87.8%	87.1%	86.4%
Benefit Payments	$ 670,555	$ 695,702	$ 722,425	$ 750,951	$ 780,670	$ 811,407	$ 840,945	$ 871,407	$ 902,358	$ 933,474
Ratio of Assets to Benefit Payments	15.53	15.41	15.26	15.08	14.90	14.70	14.53	14.36	14.18	14.02

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.

Public Employees Police and Fire Plan

Scenario: 6.0% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Contributions (% of Payroll)										
Statutory - Chapter 353	30.73%	30.70%	30.66%	30.63%	30.60%	30.57%	30.54%	30.51%	30.48%	30.45%
Required - Chapter 356 (MVA)	33.56%	35.04%	36.73%	38.68%	40.96%	43.65%	46.87%	50.80%	55.70%	61.99%
Sufficiency / (Deficiency)	(2.83)%	(4.34)%	(6.07)%	(8.05)%	(10.36)%	(13.08)%	(16.33)%	(20.29)%	(25.22)%	(31.54)%
Contributions										
Statutory - Chapter 353	$ 450,045	$ 462,021	$ 474,417	$ 487,312	$ 500,559	$ 514,289	$ 528,540	$ 543,312	$ 558,692	$ 574,585
Required - Chapter 356 (MVA)	491,528	527,402	568,293	615,374	670,019	734,331	811,171	904,642	1,020,932	1,169,620
Sufficiency / (Deficiency)	(41,483)	(65,381)	(93,876)	(128,062)	(169,461)	(220,042)	(282,632)	(361,330)	(462,240)	(595,034)
Funding Ratios										
Current Assets (MVA)	$13,357,447	$13,626,441	$13,890,917	$14,150,592	$14,404,934	$14,652,618	$14,893,486	$15,126,898	$15,352,000	$15,568,798
Actuarial Accrued Liability (AAL)	15,612,584	16,084,921	16,567,884	17,062,132	17,568,096	18,085,551	18,615,396	19,158,146	19,714,173	20,284,730
Unfunded AAL	2,255,137	2,458,480	2,676,966	2,911,541	3,163,162	3,432,932	3,721,910	4,031,248	4,362,173	4,715,932
Funding Ratio	85.6%	84.7%	83.8%	82.9%	82.0%	81.0%	80.0%	79.0%	77.9%	76.8%
Benefit Payments	$ 964,792	$ 996,764	$ 1,029,165	$ 1,062,298	$ 1,096,757	$ 1,131,464	$ 1,166,912	$ 1,203,274	$ 1,239,751	$ 1,276,360
Ratio of Assets to Benefit Payments	13.84	13.67	13.50	13.32	13.13	12.95	12.76	12.57	12.38	12.20

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Public Employees Police and Fire Plan

Scenario: 6.0% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Contributions (% of Payroll)										
Statutory - Chapter 353	30.43%	30.40%	30.37%	30.35%	30.32%	30.30%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	70.36%	82.07%	99.60%	128.81%	187.23%	362.35%	40.33%	41.63%	43.01%	44.48%
Sufficiency / (Deficiency)	(39.93)%	(51.67)%	(69.23)%	(98.46)%	(156.91)%	(332.05)%	(10.83)%	(12.13)%	(13.51)%	(14.98)%
Contributions										
Statutory - Chapter 353	$ 591,039	$ 608,085	$ 625,703	$ 643,797	$ 662,385	$ 681,650	$ 683,687	$ 704,397	$ 725,758	$ 747,827
Required - Chapter 356 (MVA)	1,366,837	1,641,568	2,051,757	2,732,565	4,089,678	8,151,613	934,788	993,921	1,058,021	1,127,680
Sufficiency / (Deficiency)	(775,798)	(1,033,483)	(1,426,054)	(2,088,768)	(3,427,294)	(7,469,963)	(251,101)	(289,524)	(332,262)	(379,852)
Funding Ratios										
Current Assets (MVA)	$15,777,182	$15,976,734	$16,167,302	$16,347,681	$16,516,301	$16,671,006	$16,809,799	$16,913,027	$16,996,932	$17,059,545
Actuarial Accrued Liability (AAL)	20,871,133	21,474,452	22,096,133	22,736,697	23,396,489	24,075,380	24,773,383	25,491,489	26,230,842	26,992,038
Unfunded AAL	5,093,950	5,497,717	5,928,831	6,389,015	6,880,189	7,404,374	7,963,584	8,578,462	9,233,910	9,932,493
Funding Ratio	75.6%	74.4%	73.2%	71.9%	70.6%	69.3%	67.9%	66.4%	64.8%	63.2%
Benefit Payments	$ 1,313,445	$ 1,350,751	$ 1,389,272	$ 1,429,199	$ 1,471,024	$ 1,514,651	$ 1,559,201	$ 1,604,579	$ 1,651,391	$ 1,699,810
Ratio of Assets to Benefit Payments	12.01	11.83	11.64	11.44	11.23	11.01	10.78	10.54	10.29	10.04

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2023 letter to PERA.

Public Employees Police and Fire Plan

Scenario: 9.0% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Contributions (% of Payroll)										
Statutory - Chapter 353	31.77%	31.71%	31.66%	30.87%	30.83%	30.10%	30.08%	30.07%	30.05%	29.50%
Required - Chapter 356 (MVA)	25.86%	24.43%	23.00%	21.41%	19.68%	18.22%	16.60%	14.88%	13.07%	11.14%
Sufficiency / (Deficiency)	5.91%	7.28%	8.66%	9.46%	11.15%	11.88%	13.48%	15.19%	16.98%	18.36%
Contributions										
Statutory - Chapter 353	$ 359,803	$ 368,430	$ 377,028	$ 376,697	$ 385,635	$ 386,060	$ 396,081	$ 406,307	$ 417,053	$ 420,507
Required - Chapter 356 (MVA)	292,883	283,855	273,919	261,242	246,125	233,645	218,548	201,128	181,363	158,845
Sufficiency / (Deficiency)	66,920	84,574	103,109	115,455	139,510	152,414	177,534	205,179	235,690	261,662
Funding Ratios										
Current Assets (MVA)	$10,415,493	$11,026,376	$11,674,929	$12,362,866	$13,082,515	$13,845,169	$14,644,736	$15,495,816	$16,402,291	$17,369,178
Actuarial Accrued Liability (AAL)	11,351,467	11,743,499	12,144,319	12,553,003	12,968,423	13,390,088	13,817,801	14,253,698	14,697,771	15,150,467
Unfunded AAL	935,974	717,123	469,389	190,138	(114,093)	(455,082)	(826,935)	(1,242,117)	(1,704,521)	(2,218,711)
Funding Ratio	91.8%	93.9%	96.1%	98.5%	100.9%	103.4%	106.0%	108.7%	111.6%	114.6%
Benefit Payments	$ 670,555	$ 695,702	$ 722,425	$ 750,951	$ 780,670	$ 811,407	$ 840,945	$ 871,407	$ 902,358	$ 933,474
Ratio of Assets to Benefit Payments	15.53	15.85	16.16	16.46	16.76	17.06	17.41	17.78	18.18	18.61

Numbers may not add due to rounding.

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Public Employees Police and Fire Plan
Scenario: 9.0% Investment Return for All Years
Fiscal Year Beginning July 1

$ in Thousands	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
Contributions (% of Payroll)										
Statutory - Chapter 353	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	9.13%	7.00%	4.75%	2.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sufficiency / (Deficiency)	20.37%	22.50%	24.75%	27.14%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Contributions										
Statutory - Chapter 353	$ 432,045	$ 444,021	$ 456,417	$ 469,312	$ 482,559	$ 496,289	$ 510,540	$ 525,312	$ 540,692	$ 556,585
Required - Chapter 356 (MVA)	133,767	105,419	73,433	37,497	-	-	-	-	-	-
Sufficiency / (Deficiency)	298,278	338,602	382,984	431,815	482,559	496,289	510,540	525,312	540,692	556,585
Funding Ratios										
Current Assets (MVA)	$18,394,120	$19,490,574	$20,664,750	$21,923,631	$23,274,594	$24,724,906	$26,283,753	$27,960,669	$29,765,868	$31,711,407
Actuarial Accrued Liability (AAL)	15,612,584	16,084,921	16,567,884	17,062,132	17,568,096	18,085,551	18,615,396	19,158,146	19,714,173	20,284,730
Unfunded AAL	(2,781,536)	(3,405,653)	(4,096,867)	(4,861,499)	(5,706,498)	(6,639,356)	(7,668,357)	(8,802,523)	(10,051,695)	(11,426,677)
Funding Ratio	117.8%	121.2%	124.7%	128.5%	132.5%	136.7%	141.2%	146.0%	151.0%	156.3%
Benefit Payments	$ 964,792	$ 996,764	$ 1,029,165	$ 1,062,298	$ 1,096,757	$ 1,131,464	$ 1,166,912	$ 1,203,274	$ 1,239,751	$ 1,276,360
Ratio of Assets to Benefit Payments	19.07	19.55	20.08	20.64	21.22	21.85	22.52	23.24	24.01	24.85

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Public Employees Police and Fire Plan
Scenario: 9.0% Investment Return for All Years
Fiscal Year Beginning July 1

$ in Thousands	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**
Contributions (% of Payroll)										
Statutory - Chapter 353	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sufficiency / (Deficiency)	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Contributions										
Statutory - Chapter 353	$ 573,039	$ 590,085	$ 607,703	$ 625,797	$ 644,385	$ 663,650	$ 683,687	$ 704,397	$ 725,758	$ 747,827
Required - Chapter 356 (MVA)	-	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	573,039	590,085	607,703	625,797	644,385	663,650	683,687	704,397	725,758	747,827
Funding Ratios										
Current Assets (MVA)	$33,810,311	$36,076,470	$38,525,321	$41,172,631	$44,035,288	$47,131,202	$50,480,188	$54,104,860	$58,029,864	$62,281,409
Actuarial Accrued Liability (AAL)	20,871,133	21,474,452	22,096,133	22,736,697	23,396,489	24,075,380	24,773,383	25,491,489	26,230,842	26,992,038
Unfunded AAL	(12,939,178)	(14,602,019)	(16,429,189)	(18,435,935)	(20,638,799)	(23,055,822)	(25,706,805)	(28,613,371)	(31,799,022)	(35,289,371)
Funding Ratio	162.0%	168.0%	174.4%	181.1%	188.2%	195.8%	203.8%	212.3%	221.2%	230.7%
Benefit Payments	$ 1,313,445	$ 1,350,751	$ 1,389,272	$ 1,429,199	$ 1,471,024	$ 1,514,651	$ 1,559,201	$ 1,604,579	$ 1,651,391	$ 1,699,810
Ratio of Assets to Benefit Payments	25.74	26.71	27.73	28.81	29.94	31.12	32.38	33.72	35.14	36.64

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.