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January 29, 2021

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 & Fire Plan

Dear Doug:

Attached are 30-year projections of estimated funded status, required contributions, and statutory contributions under three asset return scenarios for the Public Employees Police & 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 & Fire Plan actuarial funding valuation as of July 1, 2020.

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 9.0% rate of return assumption is 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. Payroll is assumed to increase approximately 3.25% 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 12,025 members. The profile of these new members is the same as new members hired between July 1, 2014 and June 30, 2019:

- Average age at hire is 29.1
- Average salary at hire is $63,200
- Approximately 14% female, 86% male

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.

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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 & Fire Plan become 90% funded (on an Actuarial Value basis) or July 1, 2048, if earlier. For purposes of the enclosed projections, we have assumed these contributions stop when the PERA Police & Fire Plan becomes 90% funded, or July 1, 2048 if earlier. These state contributions are projected to be eliminated in fiscal years ending 2023, 2024, and 2049 in the 9.0%, 7.5% and 6.0% investment return scenarios, respectively.

Additional state contributions of $9.0 million are expected until the plan reaches 100% funding (on an Actuarial Value basis), or July 1, 2048, if earlier. The additional state contributions are projected to be eliminated in fiscal years ending 2028, 2037, 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 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 & Fire Plan actuarial funding valuation as of July 1, 2020. 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 2019 analysis of long-term rate of investment return and inflation assumptions concluded that the probability of exceeding the current 7.5% assumption over 20 years is less than 50%. 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 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 2019 analysis of long-term rate of investment return and inflation assumptions, GRS determined that an investment return assumption of 7.5% was reasonable. Please see our experience study report dated June 27, 2019 for additional information. This report also concluded that the probability of exceeding the current 7.50% assumption over 10 years is 44%. If capital market assumptions decline from present levels, the 7.50% return assumption might not comply with the actuarial standards for the July 1, 2021 valuation. For informational purposes, results based on a 6.5% discount rate are shown on page 4 of the July 1, 2020 valuation report.

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, 2020 valuation report. The valuation report includes risk metrics on page 8, 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 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 valuation was based upon information furnished by the Public Employees Retirement Association of Minnesota (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 does not fully reflect the recent and still developing 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 & 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.

Bonita J. Wurst and Brian B. Murphy 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.

Sincerely,

Bonita J. Wurst

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

Brian B. Murphy

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

BJW/BBM:bd
Enclosures

GRS

Other Observations

General Implications of 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 or contributions and all actuarial assumptions are met (including the assumption of the plan earning 7.5% on the market value of assets), 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 28 years, and
(3) The unfunded liability will 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.

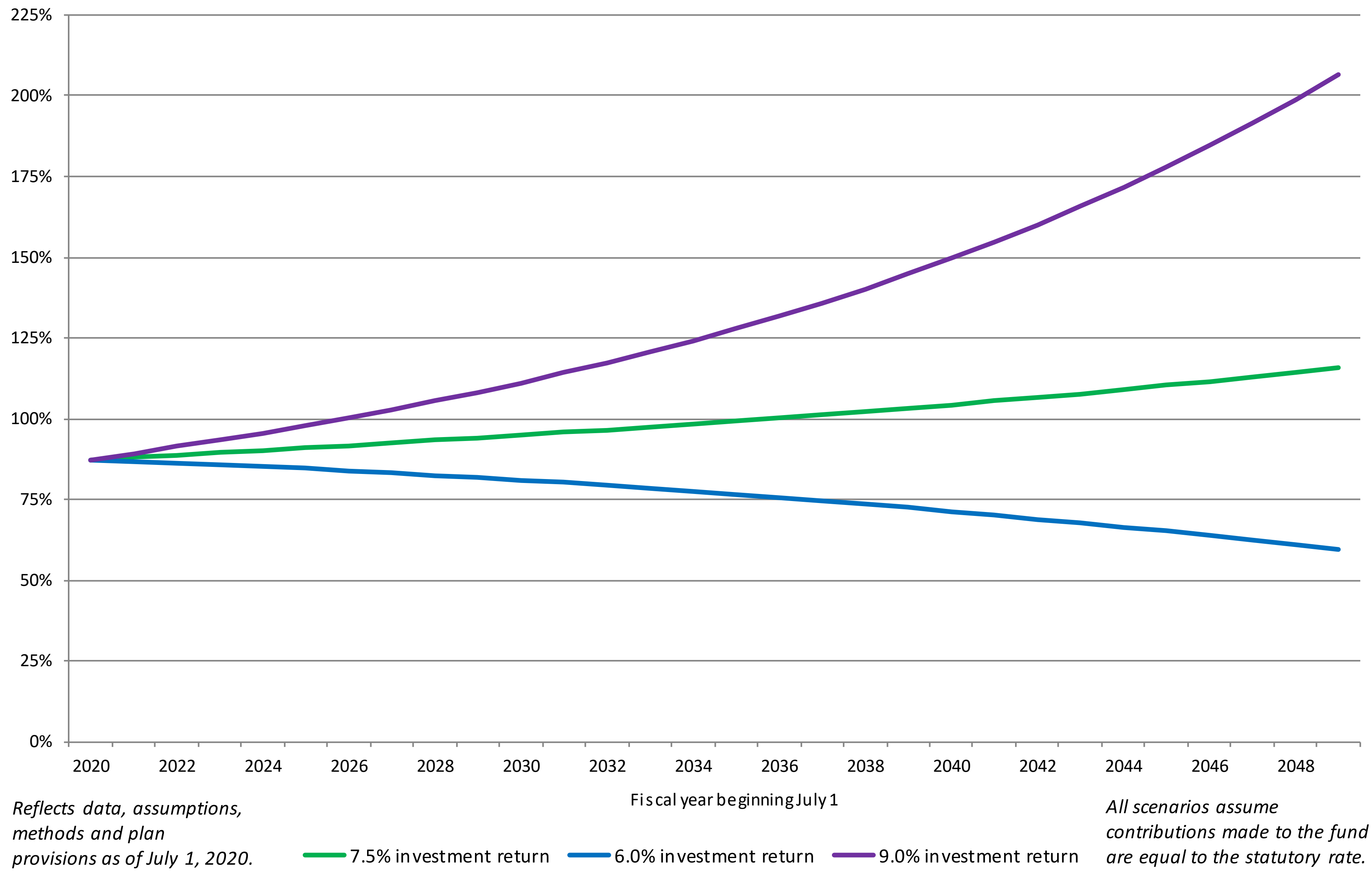
Limitations of Project Scope

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 29, 2021 letter to PERA.

PERA Public Employees Police & Fire Plan
Estimated Funded Ratio

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



Reflects data, assumptions, methods and plan provisions as of July 1, 2020.

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

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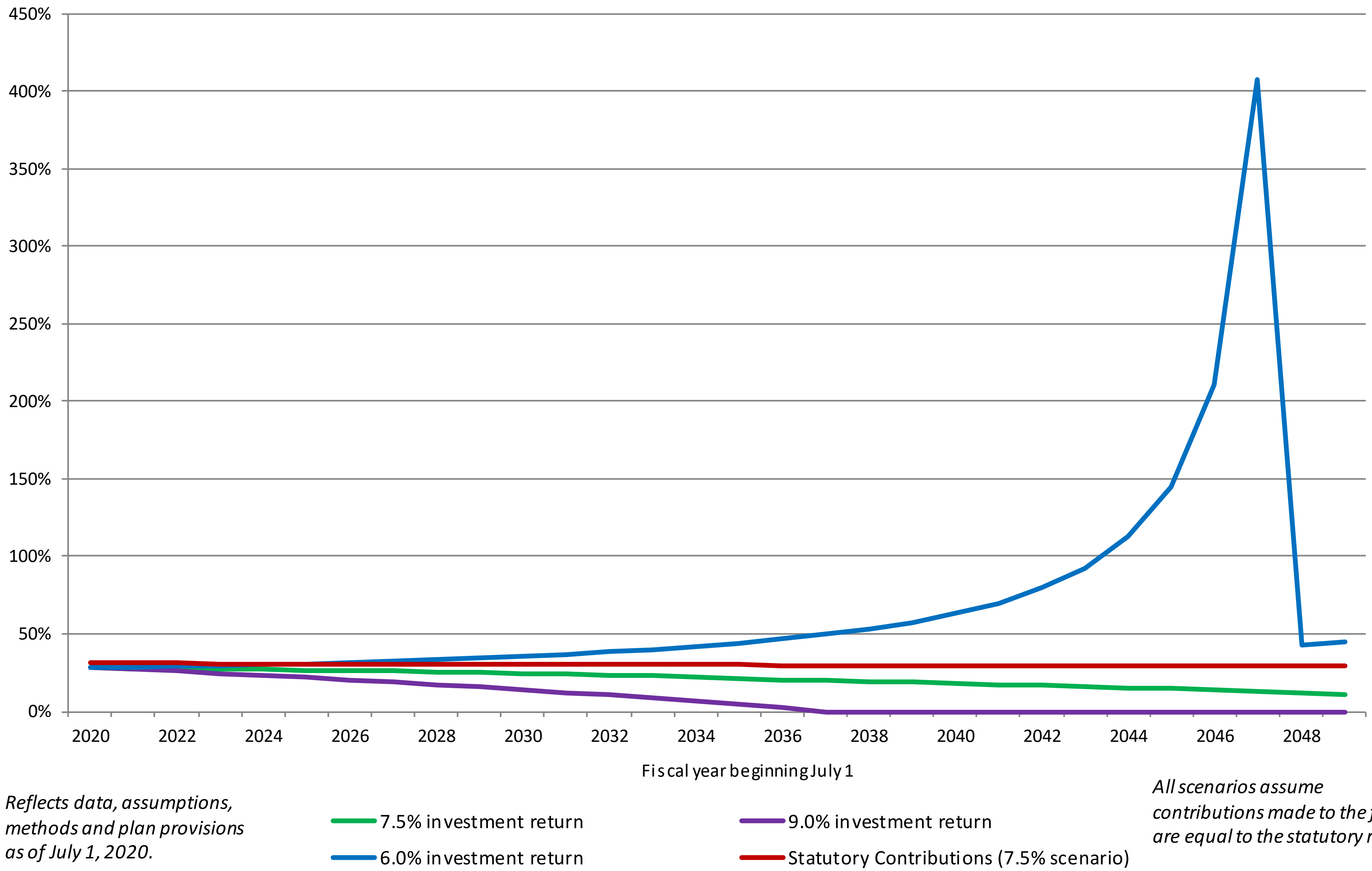
PERA Public Employees Police & Fire Plan Estimated Required Contribution Rates (% of Pay)

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



Reflects data, assumptions, methods and plan provisions as of July 1, 2020.

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

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Public Employees Police & Fire Plan

Scenario: 7.5% investment return for all years

Fiscal year beginning July 1

$ in Thousands	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Contributions (% of Payroll)										
Statutory - Chapter 353	31.84%	31.78%	31.71%	30.90%	30.86%	30.82%	30.78%	30.74%	30.70%	30.66%
Required - Chapter 356 (MVA)	28.05%	27.75%	27.44%	27.11%	26.82%	26.51%	26.18%	25.82%	25.42%	24.99%
Sufficiency / (Deficiency)	3.79%	4.03%	4.27%	3.79%	4.04%	4.31%	4.60%	4.92%	5.28%	5.67%
Contributions										
Statutory - Chapter 353	348,552	358,209	368,063	369,211	379,600	390,485	401,844	413,687	426,195	439,113
Required - Chapter 356 (MVA)	307,036	312,786	318,449	324,016	330,001	335,969	341,820	347,475	352,937	357,870
Sufficiency / (Deficiency)	41,516	45,423	49,614	45,196	49,599	54,517	60,024	66,212	73,258	81,243
Funding Ratios										
Current Assets (MVA)	8,973,460	9,391,380	9,825,628	10,276,020	10,732,963	11,205,829	11,694,885	12,200,890	12,725,502	13,271,588
Actuarial Accrued Liability (AAL)	10,291,567	10,677,416	11,073,569	11,479,374	11,894,052	12,317,867	12,750,434	13,191,853	13,643,099	14,106,163
Unfunded AAL	1,318,107	1,286,036	1,247,941	1,203,354	1,161,089	1,112,038	1,055,549	990,963	917,597	834,575
Funding Ratio	87.2%	88.0%	88.7%	89.5%	90.2%	91.0%	91.7%	92.5%	93.3%	94.1%
Benefit Payments	593,437	617,537	643,193	670,553	698,596	728,026	758,367	788,818	818,512	849,402
Ratio of Assets to Benefit Payments	15.12	15.21	15.28	15.32	15.36	15.39	15.42	15.47	15.55	15.62

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 29, 2021 letter to PERA.

Public Employees Police & Fire Plan

Scenario: 7.5% investment return for all years

Fiscal year beginning July 1

$ in Thousands	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Contributions (% of Payroll)										
Statutory - Chapter 353	30.63%	30.09%	30.07%	30.05%	30.04%	30.02%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	24.51%	23.98%	23.42%	22.79%	22.07%	21.23%	20.38%	19.83%	19.26%	18.66%
Sufficiency / (Deficiency)	6.12%	6.11%	6.65%	7.26%	7.97%	8.79%	9.12%	9.67%	10.24%	10.84%
Contributions										
Statutory - Chapter 353	452,653	458,979	473,449	488,500	504,061	520,213	527,882	545,144	563,048	581,592
Required - Chapter 356 (MVA)	362,259	365,749	368,742	370,414	370,291	367,876	364,729	366,499	367,604	367,959
Sufficiency / (Deficiency)	90,395	93,230	104,708	118,086	133,770	152,337	163,153	178,645	195,444	213,633
Funding Ratios										
Current Assets (MVA)	13,839,945	14,432,564	15,043,892	15,683,058	16,352,283	17,053,653	17,789,092	18,551,446	19,351,703	20,192,730
Actuarial Accrued Liability (AAL)	14,581,130	15,069,011	15,571,266	16,088,600	16,622,081	17,172,625	17,740,808	18,327,437	18,933,314	19,559,670
Unfunded AAL	741,185	636,447	527,373	405,541	269,797	118,972	(48,284)	(224,009)	(418,389)	(633,060)
Funding Ratio	94.9%	95.8%	96.6%	97.5%	98.4%	99.3%	100.3%	101.2%	102.2%	103.2%
Benefit Payments	880,603	911,692	943,479	975,717	1,008,624	1,042,592	1,077,431	1,113,217	1,149,621	1,187,256
Ratio of Assets to Benefit Payments	15.72	15.83	15.95	16.07	16.21	16.36	16.51	16.66	16.83	17.01

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 29, 2021 letter to PERA.

Public Employees Police & Fire Plan

Scenario: 7.5% investment return for all years

Fiscal year beginning July 1

$ in Thousands	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**
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)	18.04%	17.40%	16.73%	16.03%	15.30%	14.54%	13.75%	12.94%	12.09%	11.20%
Sufficiency / (Deficiency)	11.46%	12.10%	12.77%	13.47%	14.20%	14.96%	15.75%	16.56%	17.41%	18.30%
Contributions										
Statutory - Chapter 353	600,786	620,608	641,097	662,310	684,189	706,708	729,929	753,969	778,857	804,586
Required - Chapter 356 (MVA)	367,466	365,999	363,473	359,799	354,808	348,353	340,323	330,632	319,108	305,546
Sufficiency / (Deficiency)	233,320	254,609	277,623	302,511	329,381	358,355	389,606	423,337	459,749	499,040
Funding Ratios										
Current Assets (MVA)	21,076,967	22,007,744	22,988,358	24,022,347	25,113,429	26,264,803	27,479,407	28,760,283	30,110,906	31,535,742
Actuarial Accrued Liability (AAL)	20,207,216	20,877,402	21,571,537	22,290,989	23,037,125	23,810,677	24,611,944	25,441,107	26,298,473	27,185,116
Unfunded AAL	(869,752)	(1,130,341)	(1,416,821)	(1,731,359)	(2,076,305)	(2,454,127)	(2,867,463)	(3,319,176)	(3,812,433)	(4,350,626)
Funding Ratio	104.3%	105.4%	106.6%	107.8%	109.0%	110.3%	111.7%	113.1%	114.5%	116.0%
Benefit Payments	1,225,455	1,264,466	1,304,334	1,345,199	1,387,772	1,432,510	1,479,587	1,528,920	1,579,837	1,632,524
Ratio of Assets to Benefit Payments	17.20	17.40	17.62	17.86	18.10	18.33	18.57	18.81	19.06	19.32

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 29, 2021 letter to PERA.

Public Employees Police & Fire Plan
Scenario: 6.0% investment return for all years
Fiscal year beginning July 1

$ in Thousands	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Contributions (% of Payroll)										
Statutory - Chapter 353	31.84%	31.78%	31.71%	31.65%	31.59%	31.53%	31.47%	31.41%	31.35%	31.29%
Required - Chapter 356 (MVA)	28.05%	28.48%	28.96%	29.51%	30.11%	30.79%	31.54%	32.36%	33.28%	34.30%
Sufficiency / (Deficiency)	3.79%	3.30%	2.75%	2.14%	1.48%	0.74%	(0.07)%	(0.95)%	(1.93)%	(3.01)%
Contributions										
Statutory - Chapter 353	348,552	358,209	368,063	378,211	388,600	399,485	410,844	422,687	435,195	448,113
Required - Chapter 356 (MVA)	307,036	321,009	336,139	352,594	370,477	390,134	411,741	435,548	461,955	491,111
Sufficiency / (Deficiency)	41,516	37,200	31,924	25,617	18,123	9,351	(897)	(12,861)	(26,761)	(42,998)
Funding Ratios										
Current Assets (MVA)	8,973,460	9,258,622	9,545,987	9,834,287	10,122,124	10,409,016	10,693,986	10,976,466	11,256,691	11,535,989
Actuarial Accrued Liability (AAL)	10,291,567	10,677,416	11,073,569	11,479,374	11,894,052	12,317,867	12,750,434	13,191,853	13,643,099	14,106,163
Unfunded AAL	1,318,107	1,418,794	1,527,583	1,645,087	1,771,928	1,908,852	2,056,449	2,215,387	2,386,407	2,570,174
Funding Ratio	87.2%	86.7%	86.2%	85.7%	85.1%	84.5%	83.9%	83.2%	82.5%	81.8%
Benefit Payments	593,437	617,537	643,193	670,553	698,596	728,026	758,367	788,818	818,512	849,402
Ratio of Assets to Benefit Payments	15.12	14.99	14.84	14.67	14.49	14.30	14.10	13.92	13.75	13.58

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Public Employees Police & Fire Plan

Scenario: 6.0% investment return for all years

Fiscal year beginning July 1

$ in Thousands	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Contributions (% of Payroll)										
Statutory - Chapter 353	31.24%	30.68%	30.64%	30.61%	30.57%	30.54%	30.51%	30.47%	30.44%	30.41%
Required - Chapter 356 (MVA)	35.43%	36.70%	38.17%	39.84%	41.75%	43.94%	46.50%	49.51%	53.13%	57.53%
Sufficiency / (Deficiency)	(4.19)%	(6.02)%	(7.53)%	(9.23)%	(11.18)%	(13.40)%	(15.99)%	(19.04)%	(22.69)%	(27.12)%
Contributions										
Statutory - Chapter 353	461,653	467,979	482,449	497,500	513,061	529,213	545,882	563,144	581,048	599,592
Required - Chapter 356 (MVA)	523,593	559,782	600,998	647,583	700,567	761,431	832,025	914,986	1,013,975	1,134,250
Sufficiency / (Deficiency)	(61,940)	(91,803)	(118,549)	(150,082)	(187,506)	(232,218)	(286,143)	(351,842)	(432,927)	(534,659)
Funding Ratios										
Current Assets (MVA)	11,813,493	12,089,415	12,356,341	12,621,402	12,884,617	13,145,708	13,404,065	13,659,154	13,910,415	14,157,641
Actuarial Accrued Liability (AAL)	14,581,130	15,069,011	15,571,266	16,088,600	16,622,081	17,172,625	17,740,808	18,327,437	18,933,314	19,559,670
Unfunded AAL	2,767,637	2,979,597	3,214,924	3,467,198	3,737,464	4,026,917	4,336,743	4,668,282	5,022,898	5,402,029
Funding Ratio	81.0%	80.2%	79.4%	78.5%	77.5%	76.6%	75.6%	74.5%	73.5%	72.4%
Benefit Payments	880,603	911,692	943,479	975,717	1,008,624	1,042,592	1,077,431	1,113,217	1,149,621	1,187,256
Ratio of Assets to Benefit Payments	13.42	13.26	13.10	12.94	12.77	12.61	12.44	12.27	12.10	11.92

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Public Employees Police & Fire Plan

Scenario: 6.0% investment return for all years

Fiscal year beginning July 1

$ in Thousands	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Contributions (% of Payroll)										
Statutory - Chapter 353	30.38%	30.36%	30.33%	30.30%	30.28%	30.25%	30.23%	30.20%	29.50%	29.50%
Required - Chapter 356 (MVA)	63.03%	70.10%	79.51%	92.66%	112.39%	145.27%	211.01%	408.13%	43.20%	44.50%
Sufficiency / (Deficiency)	(32.65)%	(39.74)%	(49.18)%	(62.36)%	(82.11)%	(115.02)%	(180.78)%	(377.93)%	(13.70)%	(15.00)%
Contributions										
Statutory - Chapter 353	618,786	638,608	659,097	680,310	702,189	724,708	747,929	771,969	778,857	804,586
Required - Chapter 356 (MVA)	1,283,692	1,474,665	1,727,843	2,080,424	2,606,695	3,480,095	5,221,012	10,431,217	1,140,461	1,213,700
Sufficiency / (Deficiency)	(664,906)	(836,057)	(1,068,747)	(1,400,114)	(1,904,506)	(2,755,388)	(4,473,083)	(9,659,248)	(361,603)	(409,114)
Funding Ratios										
Current Assets (MVA)	14,399,978	14,637,220	14,868,870	15,094,393	15,313,139	15,523,627	15,723,788	15,911,314	16,083,965	16,221,546
Actuarial Accrued Liability (AAL)	20,207,216	20,877,402	21,571,537	22,290,989	23,037,125	23,810,677	24,611,944	25,441,107	26,298,473	27,185,116
Unfunded AAL	5,807,237	6,240,183	6,702,667	7,196,596	7,723,985	8,287,050	8,888,156	9,529,792	10,214,508	10,963,570
Funding Ratio	71.3%	70.1%	68.9%	67.7%	66.5%	65.2%	63.9%	62.5%	61.2%	59.7%
Benefit Payments	1,225,455	1,264,466	1,304,334	1,345,199	1,387,772	1,432,510	1,479,587	1,528,920	1,579,837	1,632,524
Ratio of Assets to Benefit Payments	11.75	11.58	11.40	11.22	11.03	10.84	10.63	10.41	10.18	9.94

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 29, 2021 letter to PERA.

Public Employees Police & Fire Plan

Scenario: 9.0% investment return for all years

Fiscal year beginning July 1

$ in Thousands	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Contributions (% of Payroll)										
Statutory - Chapter 353	31.84%	31.78%	30.94%	30.90%	30.86%	30.82%	30.78%	30.07%	30.05%	30.04%
Required - Chapter 356 (MVA)	28.05%	27.02%	25.89%	24.70%	23.39%	21.94%	20.32%	18.89%	17.39%	15.80%
Sufficiency / (Deficiency)	3.79%	4.76%	5.05%	6.20%	7.47%	8.88%	10.46%	11.18%	12.66%	14.24%
Contributions										
Statutory - Chapter 353	348,552	358,209	359,063	369,211	379,600	390,485	401,844	404,687	417,195	430,113
Required - Chapter 356 (MVA)	307,036	304,563	300,507	295,221	287,792	277,991	265,310	254,204	241,341	226,246
Sufficiency / (Deficiency)	41,516	53,646	58,556	73,990	91,808	112,495	136,534	150,484	175,853	203,867
Funding Ratios										
Current Assets (MVA)	8,973,460	9,524,137	10,109,252	10,721,078	11,369,949	12,058,737	12,790,102	13,567,417	14,385,802	15,259,842
Actuarial Accrued Liability (AAL)	10,291,567	10,677,416	11,073,569	11,479,374	11,894,052	12,317,867	12,750,434	13,191,853	13,643,099	14,106,163
Unfunded AAL	1,318,107	1,153,279	964,317	758,295	524,103	259,130	(39,668)	(375,564)	(742,703)	(1,153,679)
Funding Ratio	87.2%	89.2%	91.3%	93.4%	95.6%	97.9%	100.3%	102.9%	105.4%	108.2%
Benefit Payments	593,437	617,537	643,193	670,553	698,596	728,026	758,367	788,818	818,512	849,402
Ratio of Assets to Benefit Payments	15.12	15.42	15.72	15.99	16.28	16.56	16.87	17.20	17.58	17.97

Numbers may not add due to rounding.

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Public Employees Police & Fire Plan

Scenario: 9.0% investment return for all years

Fiscal year beginning July 1

$ in Thousands	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Contributions (% of Payroll)										
Statutory - Chapter 353	30.02%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%	29.50%
Required - Chapter 356 (MVA)	14.13%	12.37%	10.54%	8.61%	6.57%	4.42%	2.16%	0.00%	0.00%	0.00%
Sufficiency / (Deficiency)	15.89%	17.13%	18.96%	20.89%	22.93%	25.08%	27.34%	29.50%	29.50%	29.50%
Contributions										
Statutory - Chapter 353	443,653	449,979	464,449	479,500	495,061	511,213	527,882	545,144	563,048	581,592
Required - Chapter 356 (MVA)	208,824	188,665	165,925	139,939	110,298	76,669	38,581	-	-	-
Sufficiency / (Deficiency)	234,829	261,314	298,525	339,562	384,763	434,544	489,301	545,144	563,048	581,592
Funding Ratios										
Current Assets (MVA)	16,193,724	17,193,157	18,256,616	19,397,645	20,623,359	21,941,210	23,358,998	24,885,347	26,529,654	28,302,559
Actuarial Accrued Liability (AAL)	14,581,130	15,069,011	15,571,266	16,088,600	16,622,081	17,172,625	17,740,808	18,327,437	18,933,314	19,559,670
Unfunded AAL	(1,612,593)	(2,124,146)	(2,685,351)	(3,309,046)	(4,001,278)	(4,768,585)	(5,618,191)	(6,557,910)	(7,596,340)	(8,742,889)
Funding Ratio	111.1%	114.1%	117.3%	120.6%	124.1%	127.8%	131.7%	135.8%	140.1%	144.7%
Benefit Payments	880,603	911,692	943,479	975,717	1,008,624	1,042,592	1,077,431	1,113,217	1,149,621	1,187,256
Ratio of Assets to Benefit Payments	18.39	18.86	19.35	19.88	20.45	21.04	21.68	22.35	23.08	23.84

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Public Employees Police & Fire Plan

Scenario: 9.0% investment return for all years

Fiscal year beginning July 1

$ in Thousands	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
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	600,786	620,608	641,097	662,310	684,189	706,708	729,929	753,969	778,857	804,586
Required - Chapter 356 (MVA)	-	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	600,786	620,608	641,097	662,310	684,189	706,708	729,929	753,969	778,857	804,586
Funding Ratios										
Current Assets (MVA)	30,215,016	32,279,673	34,510,034	36,920,811	39,527,953	42,348,043	45,398,650	48,698,810	52,269,475	56,134,221
Actuarial Accrued Liability (AAL)	20,207,216	20,877,402	21,571,537	22,290,989	23,037,125	23,810,677	24,611,944	25,441,107	26,298,473	27,185,116
Unfunded AAL	(10,007,801)	(11,402,271)	(12,938,497)	(14,629,822)	(16,490,828)	(18,537,366)	(20,786,706)	(23,257,703)	(25,971,002)	(28,949,105)
Funding Ratio	149.5%	154.6%	160.0%	165.6%	171.6%	177.9%	184.5%	191.4%	198.8%	206.5%
Benefit Payments	1,225,455	1,264,466	1,304,334	1,345,199	1,387,772	1,432,510	1,479,587	1,528,920	1,579,837	1,632,524
Ratio of Assets to Benefit Payments	24.66	25.53	26.46	27.45	28.48	29.56	30.68	31.85	33.09	34.38

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.