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January 31, 2023

CONFIDENTIAL

Ms. Erin Leonard
Executive Director
Minnesota State Retirement System
60 Empire Drive, Suite 300
St. Paul, MN 55103

Re: Projection of Contributions and Funding Status – State Employees Retirement Fund

Dear Ms. Leonard:

Attached are 30-year projections of estimated funded status, required contributions, and statutory contributions under three asset return scenarios for the State Employees Retirement Fund. 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 State Employees Retirement Fund 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 51,219 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 37.9
- Average salary at hire is $52,100
- Approximately 58% female, 42% 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.

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 State Employees Retirement Fund 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 Directors. 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. MSRS 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 4 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 5-8, 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 valuation was based upon information furnished by the Minnesota State Retirement System (MSRS), 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 MSRS.

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 State Employees Retirement Fund 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
Enclosure

GRS

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.

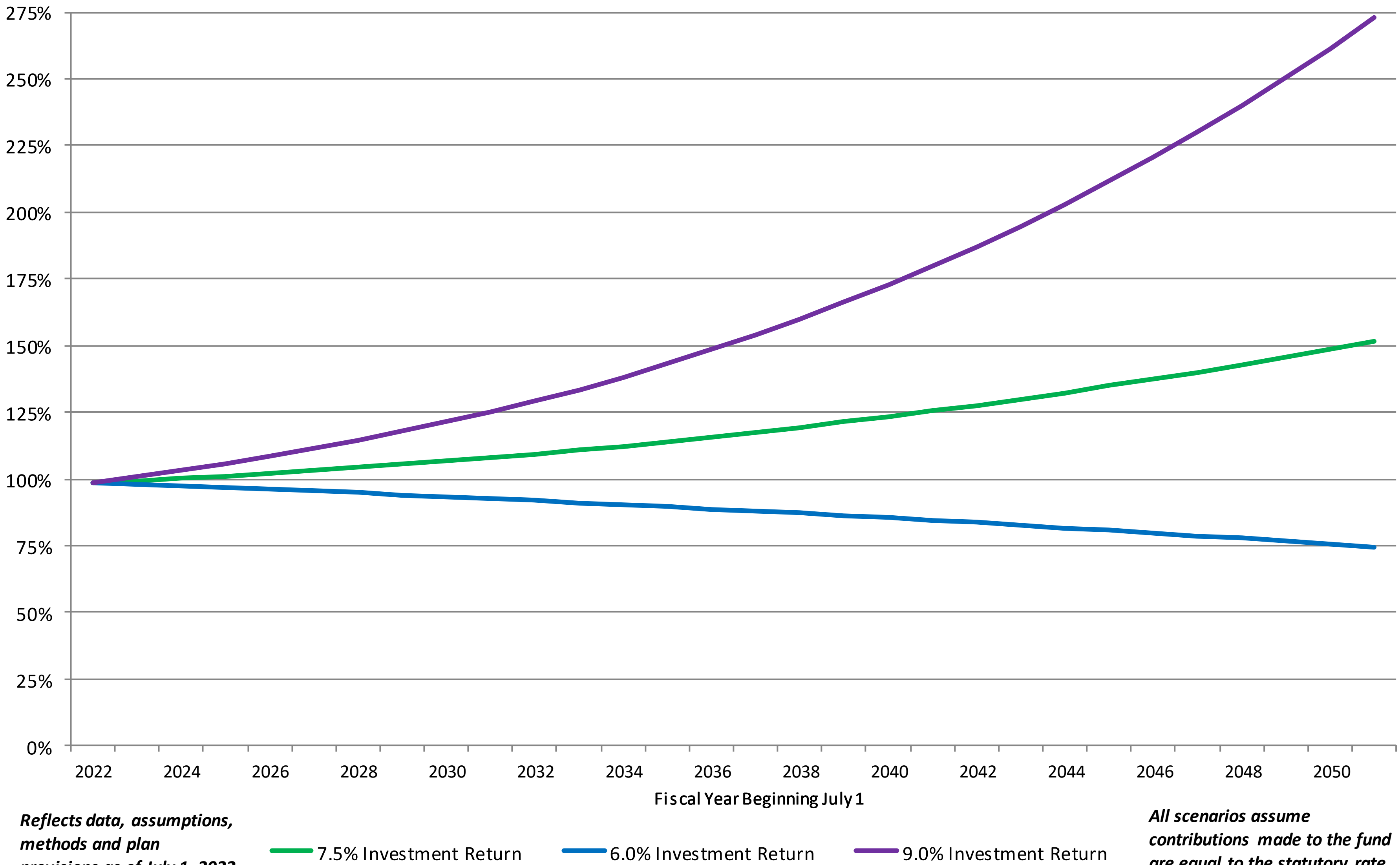
Limitations of Project Scope

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 MSRS.

MSRS State Employees Retirement Fund
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.

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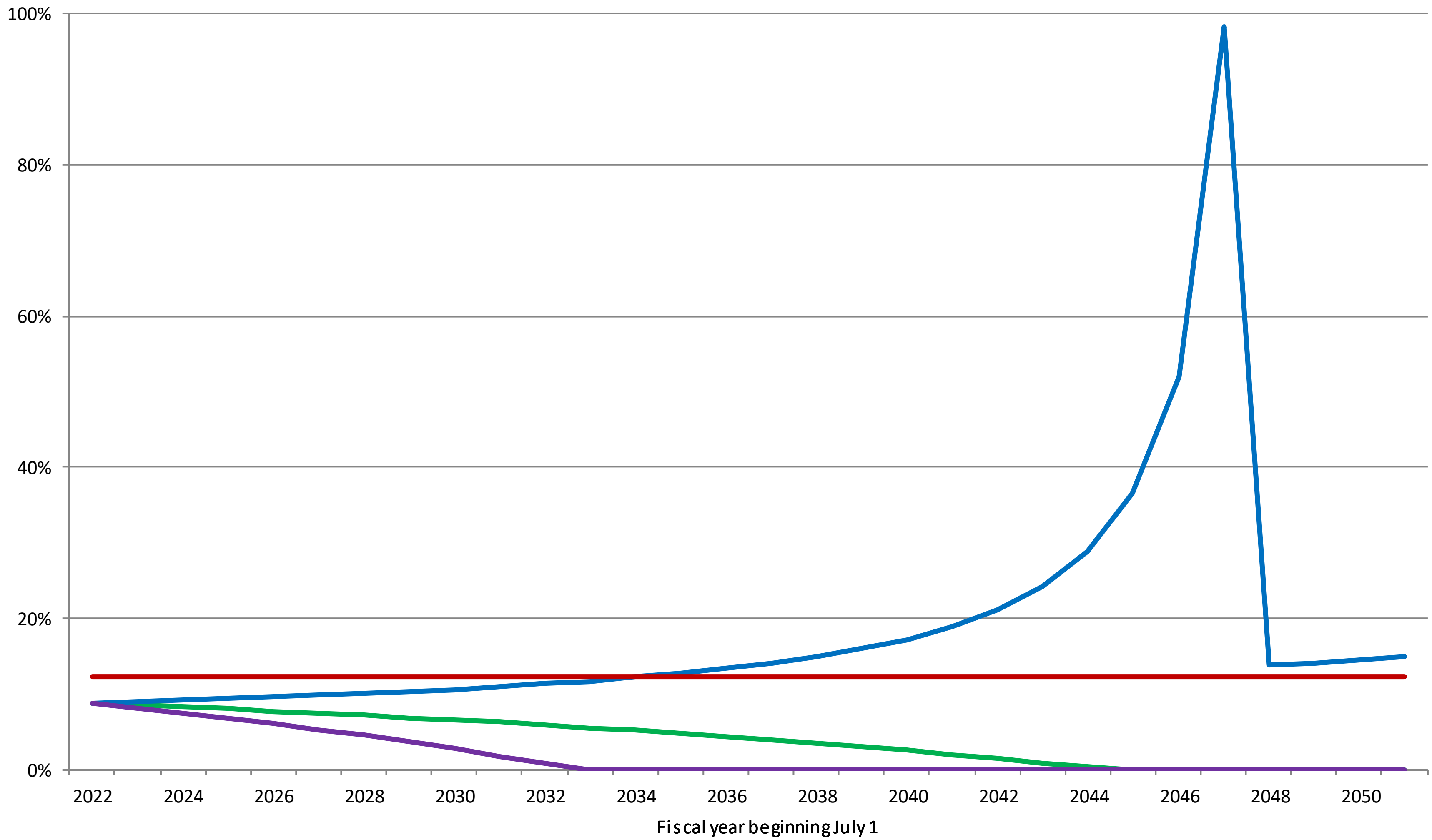
MSRS State Employees Retirement Fund

Estimated Required Contribution Rates

(% of Pay, 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.

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State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	8.73%	8.48%	8.21%	7.96%	7.70%	7.42%	7.14%	6.84%	6.52%	6.19%
Sufficiency / (Deficiency)	3.52%	3.77%	4.04%	4.29%	4.55%	4.83%	5.11%	5.41%	5.73%	6.06%
Contributions										
Statutory - Chapter 352	$ 432,747	$ 444,015	$ 458,835	$ 473,182	$ 487,747	$ 502,669	$ 517,918	$ 533,502	$ 549,498	$ 565,974
Required - Chapter 356 (MVA)	308,549	307,318	307,479	307,411	306,427	304,552	301,671	297,681	292,535	286,175
Sufficiency / (Deficiency)	124,197	136,697	151,356	165,771	181,321	198,117	216,247	235,821	256,963	279,799
Funding Ratios										
Current Assets (MVA)	$15,829,850	$16,393,863	$16,966,042	$17,546,035	$18,140,116	$18,751,857	$19,384,526	$20,042,303	$20,728,887	$21,448,414
Actuarial Accrued Liability (AAL)	16,068,758	16,502,100	16,930,394	17,349,243	17,764,925	18,179,657	18,595,152	19,013,998	19,438,105	19,869,692
Unfunded AAL	238,908	108,237	(35,648)	(196,792)	(375,191)	(572,200)	(789,374)	(1,028,306)	(1,290,781)	(1,578,722)
Funding Ratio	98.5%	99.3%	100.2%	101.1%	102.1%	103.2%	104.3%	105.4%	106.6%	108.0%
Benefit Payments	$ 1,022,849	$ 1,066,741	$ 1,115,030	$ 1,157,374	$ 1,197,506	$ 1,236,113	$ 1,272,523	$ 1,307,511	$ 1,340,994	$ 1,373,148
Ratio of Assets to Benefit Payments	15.48	15.37	15.22	15.16	15.15	15.17	15.23	15.33	15.46	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 31, 2023 letter to MSRS.

State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	5.85%	5.49%	5.12%	4.72%	4.32%	3.89%	3.44%	2.97%	2.48%	1.97%
Sufficiency / (Deficiency)	6.40%	6.76%	7.13%	7.53%	7.93%	8.36%	8.81%	9.28%	9.77%	10.28%
Contributions										
Statutory - Chapter 352	$ 582,844	$ 600,112	$ 617,800	$ 635,916	$ 654,571	$ 673,724	$ 693,363	$ 713,400	$ 733,858	$ 754,820
Required - Chapter 356 (MVA)	278,396	269,074	258,078	245,270	230,572	213,769	194,657	172,984	148,563	121,233
Sufficiency / (Deficiency)	304,448	331,038	359,721	390,646	423,998	459,955	498,706	540,417	585,294	633,587
Funding Ratios										
Current Assets (MVA)	$22,205,222	$23,004,267	$23,850,584	$24,749,095	$25,703,779	$26,720,687	$27,806,335	$28,967,300	$30,210,288	$31,540,246
Actuarial Accrued Liability (AAL)	20,310,997	20,764,762	21,233,654	21,720,015	22,225,071	22,751,856	23,303,679	23,883,683	24,494,956	25,138,534
Unfunded AAL	(1,894,225)	(2,239,505)	(2,616,930)	(3,029,081)	(3,478,708)	(3,968,832)	(4,502,656)	(5,083,616)	(5,715,332)	(6,401,712)
Funding Ratio	109.3%	110.8%	112.3%	114.0%	115.7%	117.4%	119.3%	121.3%	123.3%	125.5%
Benefit Payments	$ 1,403,603	$ 1,432,648	$ 1,460,773	$ 1,489,257	$ 1,516,492	$ 1,542,433	$ 1,567,477	$ 1,591,891	$ 1,617,874	$ 1,644,387
Ratio of Assets to Benefit Payments	15.82	16.06	16.33	16.62	16.95	17.32	17.74	18.20	18.67	19.18

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	1.43%	0.87%	0.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sufficiency / (Deficiency)	10.82%	11.38%	11.96%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Contributions										
Statutory - Chapter 352	$ 776,376	$ 798,471	$ 821,100	$ 844,295	$ 868,167	$ 892,816	$ 918,243	$ 944,477	$ 971,625	$ 999,710
Required - Chapter 356 (MVA)	90,794	56,929	19,356	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	685,582	741,542	801,744	844,295	868,167	892,816	918,243	944,477	971,625	999,710
Funding Ratios										
Current Assets (MVA)	$32,963,660	$34,487,224	$36,118,048	$37,862,339	$39,725,849	$41,715,083	$43,837,560	$46,101,221	$48,513,961	$51,084,668
Actuarial Accrued Liability (AAL)	25,816,672	26,531,461	27,285,133	28,078,651	28,912,122	29,785,899	30,700,857	31,657,797	32,656,935	33,698,829
Unfunded AAL	(7,146,987)	(7,955,763)	(8,832,914)	(9,783,687)	(10,813,727)	(11,929,184)	(13,136,703)	(14,443,424)	(15,857,025)	(17,385,839)
Funding Ratio	127.7%	130.0%	132.4%	134.8%	137.4%	140.1%	142.8%	145.6%	148.6%	151.6%
Benefit Payments	$ 1,671,782	$ 1,700,090	$ 1,730,690	$ 1,764,500	$ 1,801,319	$ 1,840,739	$ 1,882,894	$ 1,928,433	$ 1,977,073	$ 2,028,950
Ratio of Assets to Benefit Payments	19.72	20.29	20.87	21.46	22.05	22.66	23.28	23.91	24.54	25.18

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 MSRS.

State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	8.73%	8.90%	9.09%	9.29%	9.51%	9.75%	10.00%	10.28%	10.58%	10.91%
Sufficiency / (Deficiency)	3.52%	3.35%	3.16%	2.96%	2.74%	2.50%	2.25%	1.97%	1.67%	1.34%
Contributions										
Statutory - Chapter 352	$ 432,747	$ 444,015	$ 458,835	$ 473,182	$ 487,747	$ 502,669	$ 517,918	$ 533,502	$ 549,498	$ 565,974
Required - Chapter 356 (MVA)	308,549	322,754	340,307	358,884	378,665	399,914	422,791	447,517	474,430	503,933
Sufficiency / (Deficiency)	124,197	121,261	118,528	114,298	109,082	102,755	95,127	85,985	75,068	62,041
Funding Ratios										
Current Assets (MVA)	$15,829,850	$16,160,920	$16,477,967	$16,779,191	$17,069,288	$17,350,091	$17,622,969	$17,890,040	$18,152,756	$18,412,820
Actuarial Accrued Liability (AAL)	16,068,758	16,502,100	16,930,394	17,349,243	17,764,925	18,179,657	18,595,152	19,013,998	19,438,105	19,869,692
Unfunded AAL	238,908	341,179	452,427	570,052	695,637	829,566	972,182	1,123,957	1,285,349	1,456,872
Funding Ratio	98.5%	97.9%	97.3%	96.7%	96.1%	95.4%	94.8%	94.1%	93.4%	92.7%
Benefit Payments	$ 1,022,849	$ 1,066,741	$ 1,115,030	$ 1,157,374	$ 1,197,506	$ 1,236,113	$ 1,272,523	$ 1,307,511	$ 1,340,994	$ 1,373,148
Ratio of Assets to Benefit Payments	15.48	15.15	14.78	14.50	14.25	14.04	13.85	13.68	13.54	13.41

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	11.27%	11.68%	12.15%	12.67%	13.28%	14.00%	14.85%	15.89%	17.19%	18.85%
Sufficiency / (Deficiency)	0.98%	0.57%	0.10%	(0.42)%	(1.03)%	(1.75)%	(2.60)%	(3.64)%	(4.94)%	(6.60)%
Contributions										
Statutory - Chapter 352	$ 582,844	$ 600,112	$ 617,800	$ 635,916	$ 654,571	$ 673,724	$ 693,363	$ 713,400	$ 733,858	$ 754,820
Required - Chapter 356 (MVA)	536,380	572,333	612,524	657,908	709,833	769,976	840,737	925,557	1,029,716	1,161,537
Sufficiency / (Deficiency)	46,464	27,779	5,275	(21,992)	(55,262)	(96,252)	(147,374)	(212,156)	(295,858)	(406,717)
Funding Ratios										
Current Assets (MVA)	$18,671,924	$18,932,155	$19,195,435	$19,463,315	$19,736,132	$20,016,010	$20,305,206	$20,605,691	$20,919,192	$21,245,295
Actuarial Accrued Liability (AAL)	20,310,997	20,764,762	21,233,654	21,720,015	22,225,071	22,751,856	23,303,679	23,883,683	24,494,956	25,138,534
Unfunded AAL	1,639,073	1,832,606	2,038,218	2,256,700	2,488,939	2,735,846	2,998,474	3,277,993	3,575,764	3,893,239
Funding Ratio	91.9%	91.2%	90.4%	89.6%	88.8%	88.0%	87.1%	86.3%	85.4%	84.5%
Benefit Payments	$ 1,403,603	$ 1,432,648	$ 1,460,773	$ 1,489,257	$ 1,516,492	$ 1,542,433	$ 1,567,477	$ 1,591,891	$ 1,617,874	$ 1,644,387
Ratio of Assets to Benefit Payments	13.30	13.21	13.14	13.07	13.01	12.98	12.95	12.94	12.93	12.92

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	21.06%	24.15%	28.78%	36.50%	51.93%	98.17%	13.70%	14.07%	14.47%	14.90%
Sufficiency / (Deficiency)	(8.81)%	(11.90)%	(16.53)%	(24.25)%	(39.68)%	(85.92)%	(1.45)%	(1.82)%	(2.22)%	(2.65)%
Contributions										
Statutory - Chapter 352	$ 776,376	$ 798,471	$ 821,100	$ 844,295	$ 868,167	$ 892,816	$ 918,243	$ 944,477	$ 971,625	$ 999,710
Required - Chapter 356 (MVA)	1,334,823	1,574,272	1,929,404	2,515,767	3,679,994	7,154,869	1,027,097	1,085,041	1,147,739	1,215,705
Sufficiency / (Deficiency)	(558,447)	(775,801)	(1,108,304)	(1,671,472)	(2,811,827)	(6,262,053)	(108,853)	(140,564)	(176,114)	(215,995)
Funding Ratios										
Current Assets (MVA)	$21,584,719	$21,937,950	$22,305,418	$22,686,153	$23,078,214	$23,479,860	$23,889,770	$24,306,404	$24,727,490	$25,151,019
Actuarial Accrued Liability (AAL)	25,816,672	26,531,461	27,285,133	28,078,651	28,912,122	29,785,899	30,700,857	31,657,797	32,656,935	33,698,829
Unfunded AAL	4,231,954	4,593,511	4,979,715	5,392,499	5,833,909	6,306,039	6,811,086	7,351,393	7,929,446	8,547,810
Funding Ratio	83.6%	82.7%	81.8%	80.8%	79.8%	78.8%	77.8%	76.8%	75.7%	74.6%
Benefit Payments	$ 1,671,782	$ 1,700,090	$ 1,730,690	$ 1,764,500	$ 1,801,319	$ 1,840,739	$ 1,882,894	$ 1,928,433	$ 1,977,073	$ 2,028,950
Ratio of Assets to Benefit Payments	12.91	12.90	12.89	12.86	12.81	12.76	12.69	12.60	12.51	12.40

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 MSRS.

State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	8.73%	8.07%	7.41%	6.73%	6.01%	5.24%	4.44%	3.59%	2.69%	1.74%
Sufficiency / (Deficiency)	3.52%	4.18%	4.84%	5.52%	6.24%	7.01%	7.81%	8.66%	9.56%	10.51%
Contributions										
Statutory - Chapter 352	$ 432,747	$ 444,015	$ 458,835	$ 473,182	$ 487,747	$ 502,669	$ 517,918	$ 533,502	$ 549,498	$ 565,974
Required - Chapter 356 (MVA)	308,549	292,638	277,674	259,903	239,111	215,122	187,595	156,178	120,552	80,357
Sufficiency / (Deficiency)	124,197	151,377	181,161	213,279	248,636	287,547	330,323	377,324	428,946	485,617
Funding Ratios										
Current Assets (MVA)	$15,829,850	$16,626,805	$17,461,105	$18,335,139	$19,258,211	$20,237,270	$21,279,311	$22,392,632	$23,585,476	$24,866,993
Actuarial Accrued Liability (AAL)	16,068,758	16,502,100	16,930,394	17,349,243	17,764,925	18,179,657	18,595,152	19,013,998	19,438,105	19,869,692
Unfunded AAL	238,908	(124,706)	(530,711)	(985,896)	(1,493,286)	(2,057,613)	(2,684,159)	(3,378,634)	(4,147,371)	(4,997,301)
Funding Ratio	98.5%	100.8%	103.1%	105.7%	108.4%	111.3%	114.4%	117.8%	121.3%	125.2%
Benefit Payments	$ 1,022,849	$ 1,066,741	$ 1,115,030	$ 1,157,374	$ 1,197,506	$ 1,236,113	$ 1,272,523	$ 1,307,511	$ 1,340,994	$ 1,373,148
Ratio of Assets to Benefit Payments	15.48	15.59	15.66	15.84	16.08	16.37	16.72	17.13	17.59	18.11

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Required - Chapter 356 (MVA)	0.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sufficiency / (Deficiency)	11.51%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Contributions										
Statutory - Chapter 352	$ 582,844	$ 600,112	$ 617,800	$ 635,916	$ 654,571	$ 673,724	$ 693,363	$ 713,400	$ 733,858	$ 754,820
Required - Chapter 356 (MVA)	35,056	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	547,788	600,112	617,800	635,916	654,571	673,724	693,363	713,400	733,858	754,820
Funding Ratios										
Current Assets (MVA)	$26,247,041	$27,736,666	$29,347,608	$31,092,175	$32,982,455	$35,033,417	$37,261,381	$39,683,712	$42,318,967	$45,185,095
Actuarial Accrued Liability (AAL)	20,310,997	20,764,762	21,233,654	21,720,015	22,225,071	22,751,856	23,303,679	23,883,683	24,494,956	25,138,534
Unfunded AAL	(5,936,045)	(6,971,904)	(8,113,955)	(9,372,160)	(10,757,384)	(12,281,561)	(13,957,702)	(15,800,029)	(17,824,011)	(20,046,561)
Funding Ratio	129.2%	133.6%	138.2%	143.2%	148.4%	154.0%	159.9%	166.2%	172.8%	179.7%
Benefit Payments	$ 1,403,603	$ 1,432,648	$ 1,460,773	$ 1,489,257	$ 1,516,492	$ 1,542,433	$ 1,567,477	$ 1,591,891	$ 1,617,874	$ 1,644,387
Ratio of Assets to Benefit Payments	18.70	19.36	20.09	20.88	21.75	22.71	23.77	24.93	26.16	27.48

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Employees Retirement Fund

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 352	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
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)	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%	12.25%
Contributions										
Statutory - Chapter 352	$ 776,376	$ 798,471	$ 821,100	$ 844,295	$ 868,167	$ 892,816	$ 918,243	$ 944,477	$ 971,625	$ 999,710
Required - Chapter 356 (MVA)	-	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	776,376	798,471	821,100	844,295	868,167	892,816	918,243	944,477	971,625	999,710
Funding Ratios										
Current Assets (MVA)	$48,302,839	$51,694,526	$55,384,407	$59,397,468	$63,760,019	$68,501,058	$73,652,725	$79,249,911	$85,329,997	$91,934,138
Actuarial Accrued Liability (AAL)	25,816,672	26,531,461	27,285,133	28,078,651	28,912,122	29,785,899	30,700,857	31,657,797	32,656,935	33,698,829
Unfunded AAL	(22,486,167)	(25,163,065)	(28,099,274)	(31,318,816)	(34,847,896)	(38,715,158)	(42,951,868)	(47,592,113)	(52,673,062)	(58,235,309)
Funding Ratio	187.1%	194.8%	203.0%	211.5%	220.5%	230.0%	239.9%	250.3%	261.3%	272.8%
Benefit Payments	$ 1,671,782	$ 1,700,090	$ 1,730,690	$ 1,764,500	$ 1,801,319	$ 1,840,739	$ 1,882,894	$ 1,928,433	$ 1,977,073	$ 2,028,950
Ratio of Assets to Benefit Payments	28.89	30.41	32.00	33.66	35.40	37.21	39.12	41.10	43.16	45.31

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.