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January 31, 2025

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 Patrol 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 Patrol 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 Patrol Retirement Fund actuarial funding valuation as of July 1, 2024.

Basis for Projections

For all enclosed projections, liabilities are determined using the statutory investment return assumption of 7.0%. As required by the Minnesota Standards for Actuarial Work, the projections reflect three asset return scenarios (7.0%, 5.5% and 8.5%). Note that we believe the 8.5% 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 3.00% 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 987 members. The profile of these new members is the same as new members hired between July 1, 2018 and June 30, 2023. Average salary at hire increases at the assumed payroll growth rate.

- Average age at hire is 32.6
- Average salary at hire is $94,200
- 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 $1.0 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) for a minimum of three consecutive years or July 1, 2048 if earlier. For purposes of the enclosed projections, this State contribution is projected to be eliminated in fiscal year ending 2030 for all investment return scenarios based on the projected funding status of the State Patrol plan. The funding status of the PERA Police and Fire Plan is not reflected for purposes of this assumption.

The plan receives supplemental employer contributions of 7.0% of payroll until the plan reaches 100% funding (on a Market Value basis) for a minimum of three consecutive years. These supplemental employer contributions are projected to be eliminated in fiscal years ending 2032 and 2035 in the 8.5% and 7.0% investment return scenarios, respectively.

Comments

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

- The enclosed projections are based on recommended assumption changes as outlined in the Minnesota State Patrol Retirement Fund Four-Year Experience Study for the period July 1, 2019 through June 30, 2023.

- 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 Standards 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.

- In the 7.0% and 8.5% 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.

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.

The combined effect of the assumptions is expected to have no significant bias (i.e., not significantly optimistic or pessimistic). All actuarial assumptions and methods used in this report follow the guidance in the applicable Actuarial Standards of Practice. Additional information about the actuarial assumptions can be found in the State Patrol Retirement Fund Four-Year Experience Study for the period July 1, 2019 through June 30, 2023.

The contribution rates shown in this report have been determined using the actuarial methods disclosed in the Actuarial Basis section of the July 1, 2024 valuation report and the recommended assumption changes as outlined in the State Patrol Retirement Fund Four-Year Experience Study for the period July 1, 2019 through June 30, 2023. This valuation report includes risk metrics on pages 6-9, 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.

We have assessed that the contribution rate calculated under the 7.0% investment return scenario is a reasonable Actuarially Determined Employer Contribution (ADEC) and it is consistent with the plan accumulating adequate assets to make benefit payments when due.

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 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.

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 Patrol 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.

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

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

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

BJW/SLC:ah

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 7.00% on the actuarial 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 24 years; and
(3) The unfunded liability is expected to grow initially as a dollar amount for 2 years (based on the current 24-year amortization period and if contributions are equal to the required contribution 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.

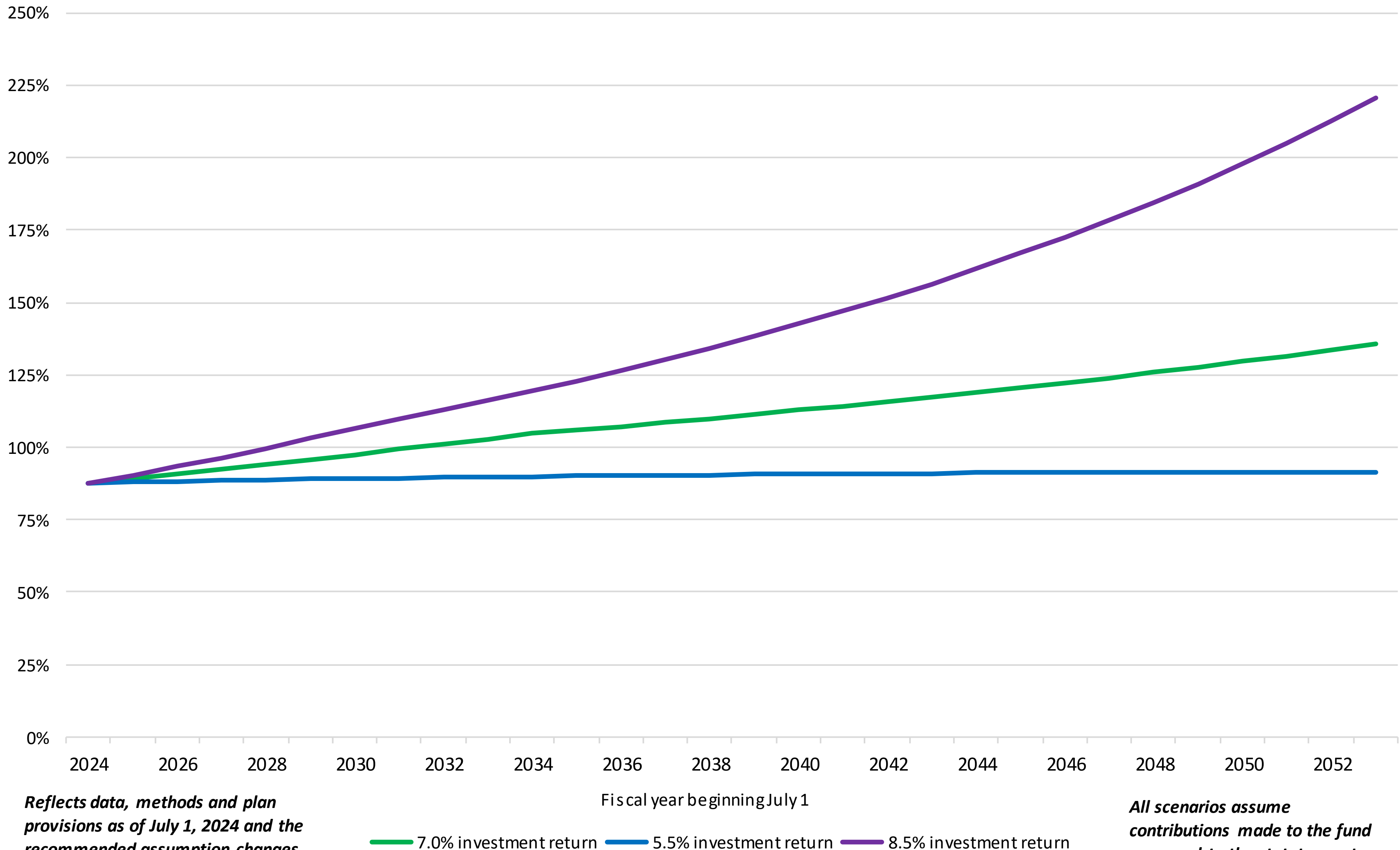
Limitations of Project Scope

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, 2025 letter to MSRS.

MSRS State Patrol Retirement Fund
Estimated Accrued Liabiltiy Funded Ratio
(Market Value of Assets Basis)

In all scenarios, the interest rate used to discount liabilities was 7.00%.



Reflects data, methods and plan provisions as of July 1, 2024 and the recommended assumption changes form the 2019-2023 experience study.

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

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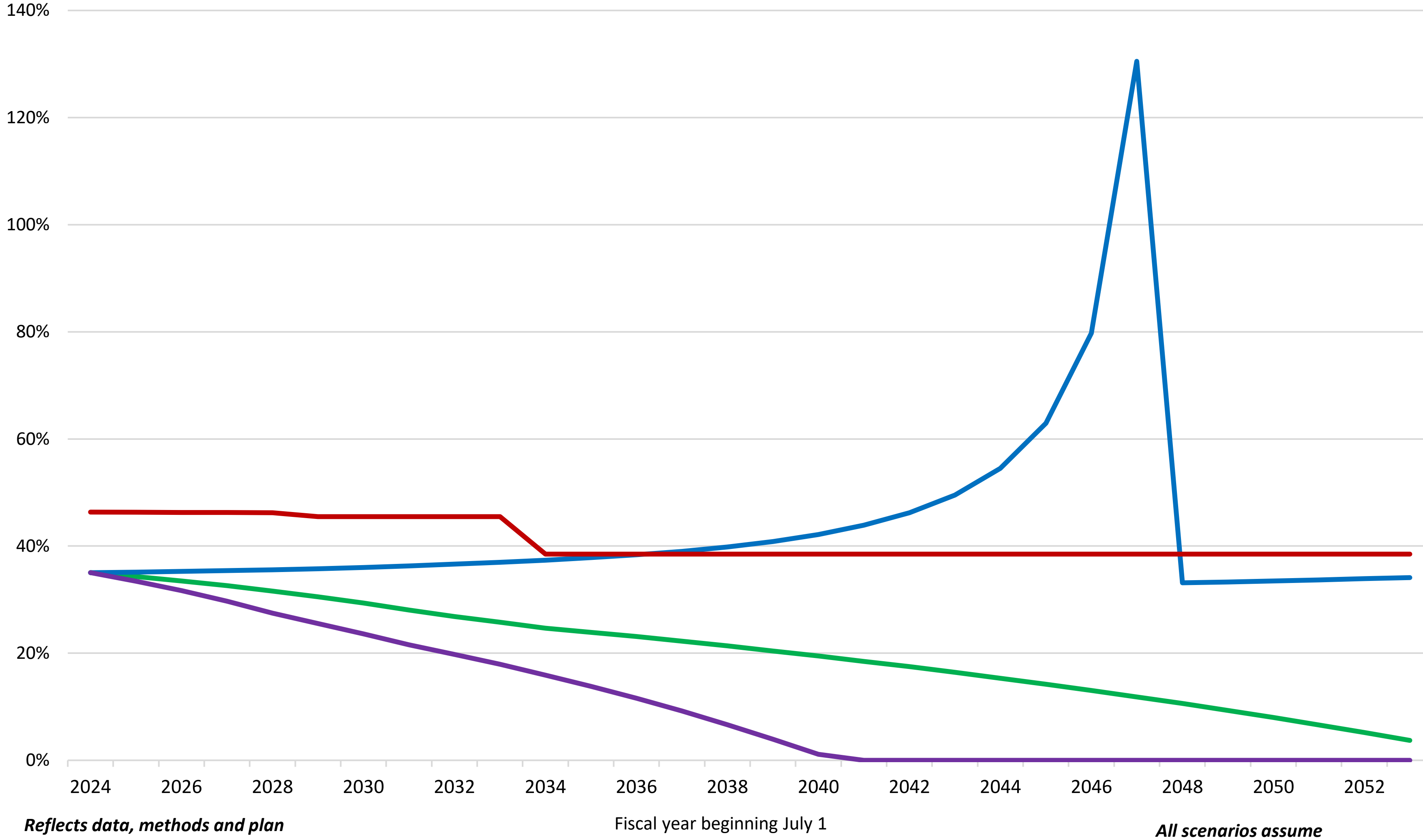
MSRS State Patrol Retirement Fund

Estimated Required Contribution Rates

(% of Pay, Market Value of Assets Basis)

In all scenarios, the interest rate used to discount liabilities was 7.00%.



7.0% investment return

8.5% investment return

5.5% investment return

Statutory Contribution Rate (7.0% Scenario)

Reflects data, methods and plan provisions as of July 1, 2024 and the recommended assumption changes from the 2019-2023 experience study.

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

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State Patrol Retirement Fund

Scenario: 7.0% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Contributions (% of Payroll)										
Statutory - Chapter 352B	46.34%	46.32%	46.29%	46.26%	46.24%	45.50%	45.50%	45.50%	45.50%	45.50%
Required - Chapter 356 (MVA)	35.04%	34.29%	33.47%	32.59%	31.61%	30.52%	29.36%	28.05%	26.86%	25.79%
Sufficiency / (Deficiency)	11.30%	12.03%	12.82%	13.67%	14.63%	14.98%	16.14%	17.45%	18.64%	19.71%
Contributions										
Statutory - Chapter 352	$ 54,998	$ 56,790	$ 58,739	$ 60,569	$ 62,547	$ 63,626	$ 65,652	$ 67,727	$ 69,864	$ 72,168
Required - Chapter 356 (MVA)	41,584	42,044	42,477	42,671	42,754	42,676	42,361	41,759	41,236	40,905
Sufficiency / (Deficiency)	13,415	14,746	16,262	17,898	19,794	20,951	23,291	25,968	28,628	31,263
Funding Ratios										
Current Assets (MVA)	$1,052,966	$1,110,421	$1,170,943	$1,234,903	$1,302,323	$1,373,482	$1,447,776	$1,526,177	$1,608,818	$1,696,234
Actuarial Accrued Liability (AAL)	1,200,463	1,244,082	1,289,069	1,335,598	1,383,692	1,433,369	1,484,886	1,538,142	1,593,048	1,649,904
Unfunded AAL	147,497	133,661	118,126	100,694	81,369	59,887	37,110	11,965	(15,771)	(46,331)
Funding Ratio	87.7%	89.3%	90.8%	92.5%	94.1%	95.8%	97.5%	99.2%	101.0%	102.8%
Benefit Payments	$ 70,416	$ 73,121	$ 75,831	$ 78,634	$ 81,550	$ 84,401	$ 87,473	$ 90,743	$ 93,844	$ 96,675
Ratio of Assets to Benefit Payments	14.95	15.19	15.44	15.70	15.97	16.27	16.55	16.82	17.14	17.55

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2025 letter to MSRS.

State Patrol Retirement Fund

Scenario: 7.0% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%
Required - Chapter 356 (MVA)	24.67%	23.91%	23.11%	22.26%	21.35%	20.42%	19.48%	18.48%	17.49%	16.43%
Sufficiency / (Deficiency)	13.83%	14.59%	15.39%	16.24%	17.15%	18.08%	19.02%	20.02%	21.01%	22.07%
Contributions										
Statutory - Chapter 352	$ 63,036	$ 65,055	$ 67,126	$ 69,276	$ 71,267	$ 73,323	$ 75,516	$ 77,552	$ 79,907	$ 82,216
Required - Chapter 356 (MVA)	40,399	40,398	40,285	40,059	39,529	38,897	38,209	37,225	36,293	35,080
Sufficiency / (Deficiency)	22,636	24,657	26,841	29,217	31,738	34,426	37,307	40,327	43,614	47,136
Funding Ratios										
Current Assets (MVA)	$1,789,212	$1,876,405	$1,968,793	$2,066,728	$2,170,598	$2,280,451	$2,396,309	$2,518,418	$2,646,534	$2,781,179
Actuarial Accrued Liability (AAL)	1,709,184	1,771,207	1,836,019	1,903,782	1,974,616	2,048,491	2,125,199	2,204,696	2,286,659	2,371,141
Unfunded AAL	(80,028)	(105,198)	(132,774)	(162,945)	(195,982)	(231,959)	(271,110)	(313,721)	(359,875)	(410,037)
Funding Ratio	104.7%	105.9%	107.2%	108.6%	109.9%	111.3%	112.8%	114.2%	115.7%	117.3%
Benefit Payments	$ 99,408	$ 102,293	$ 105,239	$ 108,265	$ 111,489	$ 115,159	$ 119,135	$ 123,612	$ 128,310	$ 132,924
Ratio of Assets to Benefit Payments	18.00	18.34	18.71	19.09	19.47	19.80	20.11	20.37	20.63	20.92

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

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State Patrol Retirement Fund

Scenario: 7.0% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%
Required - Chapter 356 (MVA)	15.33%	14.19%	13.05%	11.83%	10.62%	9.31%	7.99%	6.60%	5.19%	3.72%
Sufficiency / (Deficiency)	23.17%	24.31%	25.45%	26.67%	27.88%	29.19%	30.51%	31.90%	33.31%	34.78%
Contributions										
Statutory - Chapter 352	$ 84,590	$ 86,944	$ 89,585	$ 92,114	$ 94,968	$ 97,693	$ 100,611	$ 103,592	$ 106,796	$ 110,123
Required - Chapter 356 (MVA)	33,685	32,050	30,363	28,312	26,200	23,636	20,875	17,758	14,383	10,629
Sufficiency / (Deficiency)	50,906	54,895	59,222	63,802	68,768	74,057	79,737	85,834	92,413	99,494
Funding Ratios										
Current Assets (MVA)	$2,922,848	$3,071,707	$3,227,626	$3,391,198	$3,562,529	$3,742,335	$3,930,870	$4,128,498	$4,335,755	$4,553,363
Actuarial Accrued Liability (AAL)	2,458,449	2,548,441	2,640,749	2,735,449	2,832,443	2,931,859	3,033,677	3,137,713	3,244,026	3,352,707
Unfunded AAL	(464,399)	(523,266)	(586,878)	(655,749)	(730,085)	(810,476)	(897,193)	(990,786)	(1,091,729)	(1,200,656)
Funding Ratio	118.9%	120.5%	122.2%	124.0%	125.8%	127.6%	129.6%	131.6%	133.7%	135.8%
Benefit Payments	$ 137,919	$ 143,504	$ 149,279	$ 155,359	$ 161,594	$ 168,030	$ 174,895	$ 181,921	$ 189,120	$ 196,128
Ratio of Assets to Benefit Payments	21.19	21.40	21.62	21.83	22.05	22.27	22.48	22.69	22.93	23.22

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2025 letter to MSRS.

State Patrol Retirement Fund

Scenario: 5.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Contributions (% of Payroll)										
Statutory - Chapter 352B	46.34%	46.32%	46.29%	46.26%	46.24%	45.50%	45.50%	45.50%	45.50%	45.50%
Required - Chapter 356 (MVA)	35.04%	35.14%	35.25%	35.41%	35.56%	35.74%	36.01%	36.31%	36.65%	36.99%
Sufficiency / (Deficiency)	11.30%	11.18%	11.04%	10.85%	10.68%	9.76%	9.49%	9.19%	8.85%	8.51%
Contributions										
Statutory - Chapter 352	$ 54,998	$ 56,790	$ 58,739	$ 60,569	$ 62,547	$ 63,626	$ 65,652	$ 67,727	$ 69,864	$ 72,168
Required - Chapter 356 (MVA)	41,584	43,086	44,737	46,355	48,105	49,979	51,956	54,050	56,269	58,667
Sufficiency / (Deficiency)	13,415	13,704	14,002	14,213	14,442	13,647	13,696	13,677	13,595	13,501
Funding Ratios										
Current Assets (MVA)	$1,052,966	$1,094,745	$1,137,873	$1,182,580	$1,228,737	$1,276,458	$1,324,972	$1,375,069	$1,426,681	$1,480,130
Actuarial Accrued Liability (AAL)	1,200,463	1,244,082	1,289,069	1,335,598	1,383,692	1,433,369	1,484,886	1,538,142	1,593,048	1,649,904
Unfunded AAL	147,497	149,338	151,196	153,017	154,955	156,911	159,914	163,074	166,366	169,773
Funding Ratio	87.7%	88.0%	88.3%	88.5%	88.8%	89.1%	89.2%	89.4%	89.6%	89.7%
Benefit Payments	$ 70,416	$ 73,121	$ 75,831	$ 78,634	$ 81,550	$ 84,401	$ 87,473	$ 90,743	$ 93,844	$ 96,675
Ratio of Assets to Benefit Payments	14.95	14.97	15.01	15.04	15.07	15.12	15.15	15.15	15.20	15.31

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

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State Patrol Retirement Fund

Scenario: 5.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
Contributions (% of Payroll)										
Statutory - Chapter 352B	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%
Required - Chapter 356 (MVA)	37.38%	37.84%	38.38%	39.01%	39.81%	40.83%	42.13%	43.88%	46.20%	49.50%
Sufficiency / (Deficiency)	8.12%	7.66%	7.12%	6.49%	5.69%	4.67%	3.37%	1.62%	(0.70)%	(4.00)%
Contributions										
Statutory - Chapter 352	$ 74,497	$ 76,884	$ 79,330	$ 81,872	$ 84,225	$ 86,654	$ 89,246	$ 91,652	$ 94,435	$ 97,165
Required - Chapter 356 (MVA)	61,205	63,936	66,909	70,196	73,696	77,760	82,636	88,388	95,898	105,710
Sufficiency / (Deficiency)	13,292	12,947	12,421	11,676	10,529	8,894	6,610	3,265	(1,463)	(8,546)
Funding Ratios										
Current Assets (MVA)	$1,535,966	$1,594,443	$1,655,613	$1,719,620	$1,786,637	$1,856,432	$1,928,777	$2,003,666	$2,080,532	$2,159,643
Actuarial Accrued Liability (AAL)	1,709,184	1,771,207	1,836,019	1,903,782	1,974,616	2,048,491	2,125,199	2,204,696	2,286,659	2,371,141
Unfunded AAL	173,218	176,764	180,406	184,162	187,979	192,060	196,422	201,031	206,127	211,498
Funding Ratio	89.9%	90.0%	90.2%	90.3%	90.5%	90.6%	90.8%	90.9%	91.0%	91.1%
Benefit Payments	$ 99,408	$ 102,293	$ 105,239	$ 108,265	$ 111,489	$ 115,159	$ 119,135	$ 123,612	$ 128,310	$ 132,924
Ratio of Assets to Benefit Payments	15.45	15.59	15.73	15.88	16.03	16.12	16.19	16.21	16.21	16.25

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

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State Patrol Retirement Fund

Scenario: 5.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**
Contributions (% of Payroll)										
Statutory - Chapter 352B	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%	45.50%
Required - Chapter 356 (MVA)	54.50%	62.93%	79.75%	130.51%	33.14%	33.31%	33.49%	33.69%	33.90%	34.13%
Sufficiency / (Deficiency)	(9.00)%	(17.43)%	(34.25)%	(85.01)%	12.36%	12.19%	12.01%	11.81%	11.60%	11.37%
Contributions										
Statutory - Chapter 352	$ 99,971	$ 102,753	$ 105,873	$ 108,862	$ 112,235	$ 115,456	$ 118,904	$ 122,427	$ 126,213	$ 130,146
Required - Chapter 356 (MVA)	119,737	142,106	185,567	312,257	81,755	84,519	87,527	90,657	94,045	97,609
Sufficiency / (Deficiency)	(19,767)	(39,353)	(79,695)	(203,394)	30,479	30,937	31,378	31,770	32,169	32,536
Funding Ratios										
Current Assets (MVA)	$2,241,154	$2,324,884	$2,410,323	$2,497,717	$2,586,725	$2,677,670	$2,770,297	$2,864,488	$2,960,242	$3,057,735
Actuarial Accrued Liability (AAL)	2,458,449	2,548,441	2,640,749	2,735,449	2,832,443	2,931,859	3,033,677	3,137,713	3,244,026	3,352,707
Unfunded AAL	217,295	223,557	230,426	237,733	245,718	254,189	263,380	273,224	283,784	294,972
Funding Ratio	91.2%	91.2%	91.3%	91.3%	91.3%	91.3%	91.3%	91.3%	91.3%	91.2%
Benefit Payments	$ 137,919	$ 143,504	$ 149,279	$ 155,359	$ 161,594	$ 168,030	$ 174,895	$ 181,921	$ 189,120	$ 196,128
Ratio of Assets to Benefit Payments	16.25	16.20	16.15	16.08	16.01	15.94	15.84	15.75	15.65	15.59

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

This exhibit should only be viewed in conjunction with GRS' January 31, 2025 letter to MSRS.

State Patrol Retirement Fund
Scenario: 8.5% Investment Return for All Years
Fiscal Year Beginning July 1

$ in Thousands	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Contributions (% of Payroll)										
Statutory - Chapter 352B	46.34%	46.32%	46.29%	46.26%	46.24%	45.50%	45.50%	38.50%	38.50%	38.50%
Required - Chapter 356 (MVA)	35.04%	33.44%	31.67%	29.70%	27.48%	25.55%	23.61%	21.56%	19.79%	17.91%
Sufficiency / (Deficiency)	11.30%	12.88%	14.62%	16.56%	18.76%	19.95%	21.89%	16.94%	18.71%	20.59%
Contributions										
Statutory - Chapter 352	$ 54,998	$ 56,790	$ 58,739	$ 60,569	$ 62,547	$ 63,626	$ 65,652	$ 57,307	$ 59,115	$ 61,065
Required - Chapter 356 (MVA)	41,584	41,003	40,185	38,880	37,170	35,730	34,066	32,093	30,391	28,413
Sufficiency / (Deficiency)	13,415	15,787	18,554	21,688	25,377	27,897	31,586	25,214	28,724	32,652
Funding Ratios										
Current Assets (MVA)	$1,052,966	$1,126,098	$1,204,484	$1,288,729	$1,379,110	$1,476,185	$1,579,653	$1,690,814	$1,799,304	$1,915,656
Actuarial Accrued Liability (AAL)	1,200,463	1,244,082	1,289,069	1,335,598	1,383,692	1,433,369	1,484,886	1,538,142	1,593,048	1,649,904
Unfunded AAL	147,497	117,984	84,585	46,869	4,582	(42,816)	(94,767)	(152,672)	(206,256)	(265,752)
Funding Ratio	87.7%	90.5%	93.4%	96.5%	99.7%	103.0%	106.4%	109.9%	113.0%	116.1%
Benefit Payments	$ 70,416	$ 73,121	$ 75,831	$ 78,634	$ 81,550	$ 84,401	$ 87,473	$ 90,743	$ 93,844	$ 96,675
Ratio of Assets to Benefit Payments	14.95	15.40	15.88	16.39	16.91	17.49	18.06	18.63	19.17	19.82

Numbers may not add due to rounding.

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State Patrol Retirement Fund

Scenario: 8.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%
Required - Chapter 356 (MVA)	15.92%	13.81%	11.58%	9.22%	6.65%	3.95%	1.15%	0.00%	0.00%	0.00%
Sufficiency / (Deficiency)	22.58%	24.69%	26.92%	29.28%	31.85%	34.55%	37.35%	38.50%	38.50%	38.50%
Contributions										
Statutory - Chapter 352	$ 63,036	$ 65,055	$ 67,126	$ 69,276	$ 71,267	$ 73,323	$ 75,516	$ 77,552	$ 79,907	$ 82,216
Required - Chapter 356 (MVA)	26,066	23,334	20,184	16,585	12,312	7,530	2,246	-	-	-
Sufficiency / (Deficiency)	36,970	41,721	46,942	52,691	58,955	65,793	73,270	77,552	79,907	82,216
Funding Ratios										
Current Assets (MVA)	$2,040,967	$2,176,121	$2,321,849	$2,479,036	$2,648,658	$2,831,400	$3,027,978	$3,239,393	$3,466,220	$3,709,869
Actuarial Accrued Liability (AAL)	1,709,184	1,771,207	1,836,019	1,903,782	1,974,616	2,048,491	2,125,199	2,204,696	2,286,659	2,371,141
Unfunded AAL	(331,783)	(404,914)	(485,830)	(575,254)	(674,042)	(782,909)	(902,779)	(1,034,696)	(1,179,561)	(1,338,727)
Funding Ratio	119.4%	122.9%	126.5%	130.2%	134.1%	138.2%	142.5%	146.9%	151.6%	156.5%
Benefit Payments	$ 99,408	$ 102,293	$ 105,239	$ 108,265	$ 111,489	$ 115,159	$ 119,135	$ 123,612	$ 128,310	$ 132,924
Ratio of Assets to Benefit Payments	20.53	21.27	22.06	22.90	23.76	24.59	25.42	26.21	27.01	27.91

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.

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State Patrol Retirement Fund

Scenario: 8.5% Investment Return for All Years

Fiscal Year Beginning July 1

$ in Thousands	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%
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)	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%
Contributions										
Statutory - Chapter 352	$ 84,590	$ 86,944	$ 89,585	$ 92,114	$ 94,968	$ 97,693	$ 100,611	$ 103,592	$ 106,796	$ 110,123
Required - Chapter 356 (MVA)	-	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	84,590	86,944	89,585	92,114	94,968	97,693	100,611	103,592	106,796	110,123
Funding Ratios										
Current Assets (MVA)	$3,971,811	$4,253,270	$4,555,269	$4,879,653	$5,227,892	$5,602,188	$6,004,413	$6,436,694	$6,901,482	$7,401,591
Actuarial Accrued Liability (AAL)	2,458,449	2,548,441	2,640,749	2,735,449	2,832,443	2,931,859	3,033,677	3,137,713	3,244,026	3,352,707
Unfunded AAL	(1,513,361)	(1,704,829)	(1,914,521)	(2,144,204)	(2,395,448)	(2,670,328)	(2,970,737)	(3,298,981)	(3,657,456)	(4,048,884)
Funding Ratio	161.6%	166.9%	172.5%	178.4%	184.6%	191.1%	197.9%	205.1%	212.7%	220.8%
Benefit Payments	$ 137,919	$ 143,504	$ 149,279	$ 155,359	$ 161,594	$ 168,030	$ 174,895	$ 181,921	$ 189,120	$ 196,128
Ratio of Assets to Benefit Payments	28.80	29.64	30.52	31.41	32.35	33.34	34.33	35.38	36.49	37.74

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.0%.