

January 31, 2019

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 Erin:

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, 2018.

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 921 members. The profile of these new members is the same as new members hired between July 1, 2012 and July 1, 2017:

- Average age at hire is 30.9
- Average salary at hire is \$63,100
- Approximately 10% female, 90% 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.

The State of Minnesota provides a \$1.0 million contribution to the fund each October 1 until both the 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 MSRS State Patrol Retirement Fund becomes 90% funded, or July 1, 2048 if earlier. These state contributions are projected to be eliminated in fiscal years ending 2026, 2030, and 2049 in the 9.0%, 7.5% and 6.0% investment return scenarios, respectively.

Additional state contributions of 1.75%, 3.0% and 5.0% of payroll in fiscal years ending June 30, 2019, 2020 and 2021, respectively, and 7.0% of payroll thereafter are expected until the plan reaches 100% funding (on a Market Value basis), or July 1, 2048, if earlier. The additional state contributions are projected to be eliminated in fiscal years ending 2028, 2036, 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:

- 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 Patrol Retirement Plan actuarial funding valuation as of July 1, 2018. 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 reflected in the July 1, 2018 valuation report 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, and eventually to zero. We would typically recommend the contribution be at least equal to the normal cost of the plan.
- We typically 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.
- 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

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.

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.

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, 2018 valuation report. This valuation report includes risk metrics on page 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 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.

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 of the valuation report, except as noted. MSRS is solely responsible for communicating to GRS any changes required thereto.

In a 2018 analysis of long-term rate of investment return and inflation assumptions, GRS suggested that the current statutory investment return assumption of 7.5% is at the top of the reasonable range. Please see our draft letter dated September 17, 2018 for additional information. If capital markets decline further from the present levels, the 7.5% return assumption might not comply with actuarial standards for the July 1, 2019 valuation.



The 2018 analysis also 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 the modeling we have done, 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.

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

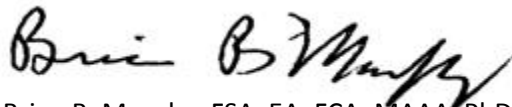
This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge and belief, the information contained in this report is accurate and fairly presents the actuarial position of the State Patrol Retirement Fund as of the 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 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, ASA, EA, FCA, MAAA



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

BJW/BBM:bd
Enclosure



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 7.50% 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 30 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.

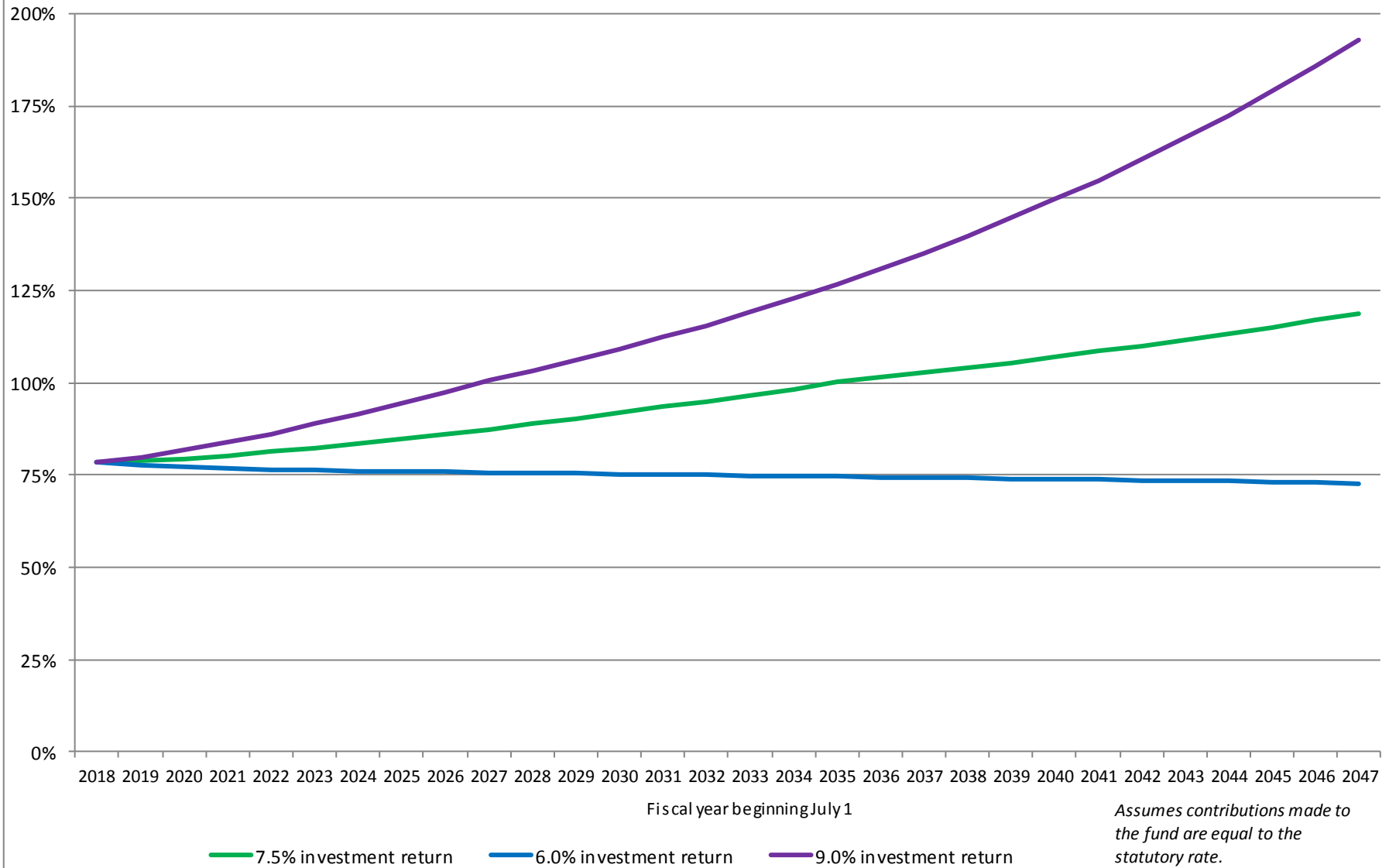
Limitations of Project Scope

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 31, 2019 letter to MSRS.

MSRS State Patrol Retirement Fund Estimated Funded Ratio

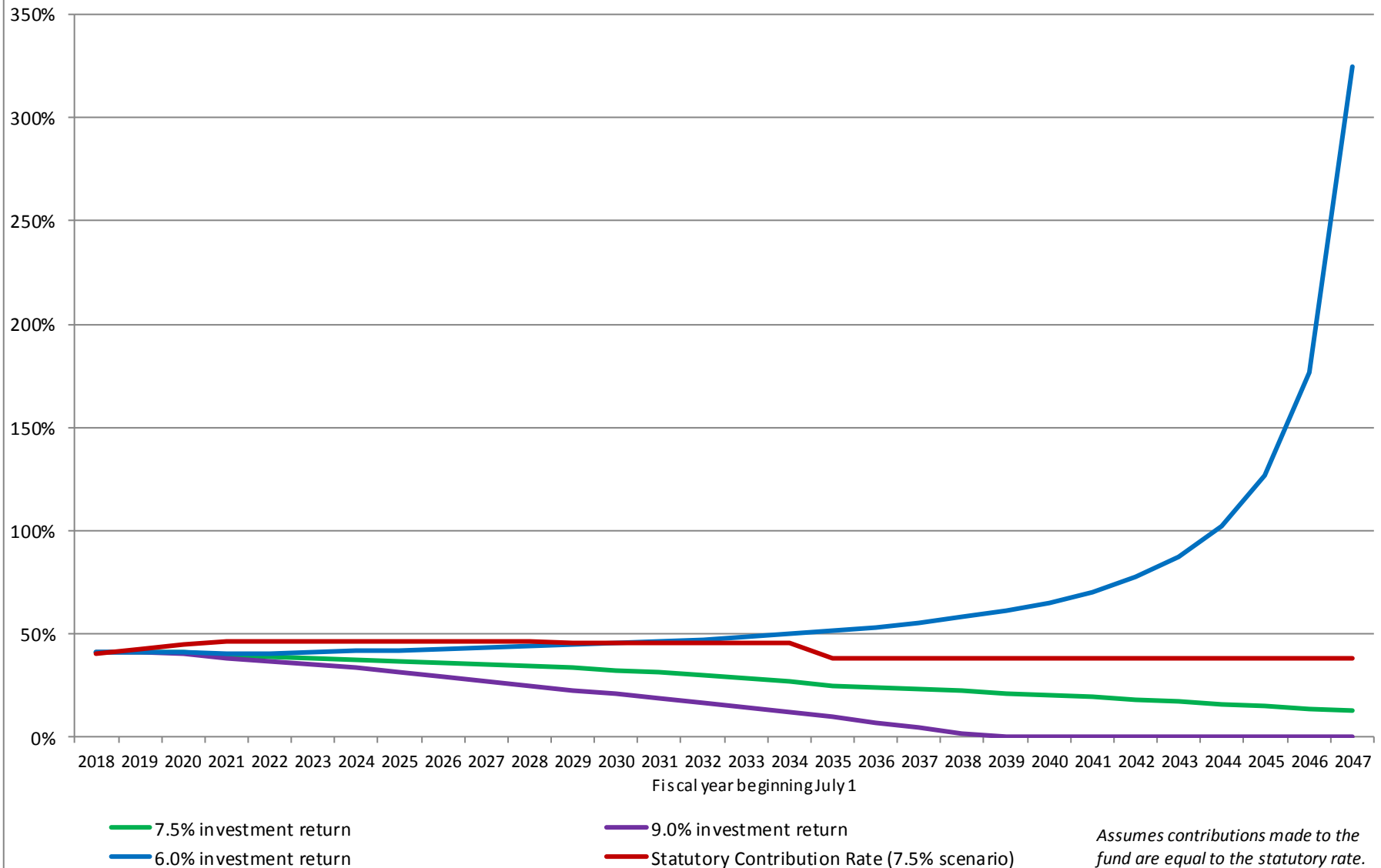
In all scenarios, the interest rate used to discount liabilities was 7.5%.



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MSRS State Patrol Retirement Fund Estimated Required Contribution Rates (% of Pay)

In all scenarios, the interest rate used to discount liabilities was 7.5%.



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31, 2019 letter to MSRS.

State Patrol Retirement Fund
Scenario: 7.5% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Contributions (% of Payroll)										
Statutory - Chapter 352B	40.3%	42.2%	44.7%	46.6%	46.6%	46.6%	46.5%	46.5%	46.5%	46.4%
Required - Chapter 356 (MVA)	40.2%	40.1%	39.8%	39.3%	38.8%	38.2%	37.5%	36.8%	36.1%	35.3%
Sufficiency / (Deficiency)	0.1%	2.2%	4.9%	7.3%	7.9%	8.4%	9.0%	9.7%	10.4%	11.2%
Contributions										
Statutory - Chapter 352B	31,371	34,050	37,481	40,760	42,226	43,738	45,196	46,812	48,497	50,048
Required - Chapter 356 (MVA)	32,112	33,144	34,166	34,459	35,064	35,837	36,435	37,056	37,632	38,001
Sufficiency / (Deficiency)	(741)	906	3,315	6,301	7,162	7,901	8,761	9,756	10,865	12,047
Funding Ratios										
Current Assets (MVA)	729,799	754,122	781,517	812,852	848,558	886,908	927,944	971,613	1,018,154	1,067,831
Actuarial Accrued Liability (AAL)	930,408	957,054	984,875	1,013,906	1,044,615	1,076,935	1,110,783	1,146,028	1,182,733	1,221,044
Unfunded AAL	200,609	202,932	203,358	201,054	196,057	190,027	182,839	174,415	164,579	153,213
Funding Ratio	78%	79%	79%	80%	81%	82%	84%	85%	86%	87%
Benefit Payments										
Ratio of Assets to Benefit Payments	60,497	61,965	63,573	64,894	66,386	68,074	69,952	71,948	73,967	76,323
	12.06	12.17	12.29	12.53	12.78	13.03	13.27	13.50	13.76	13.99

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Patrol Retirement Fund
Scenario: 7.5% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Contributions (% of Payroll)										
Statutory - Chapter 352B	46.4%	45.5%	45.5%	45.5%	45.5%	45.5%	45.5%	38.5%	38.5%	38.5%
Required - Chapter 356 (MVA)	34.4%	33.4%	32.3%	31.2%	29.9%	28.5%	26.8%	24.9%	24.1%	23.2%
Sufficiency / (Deficiency)	12.1%	12.2%	13.2%	14.3%	15.6%	17.0%	18.7%	13.6%	14.4%	15.3%
Contributions										
Statutory - Chapter 352B	51,752	52,486	54,298	56,147	58,112	60,168	62,195	54,474	56,352	58,350
Required - Chapter 356 (MVA)	38,312	38,475	38,582	38,506	38,230	37,648	36,614	35,239	35,228	35,168
Sufficiency / (Deficiency)	13,440	14,011	15,716	17,641	19,882	22,520	25,581	19,235	21,124	23,182
Funding Ratios										
Current Assets (MVA)	1,120,390	1,176,134	1,234,198	1,295,800	1,360,979	1,430,256	1,504,154	1,582,962	1,656,878	1,735,476
Actuarial Accrued Liability (AAL)	1,260,676	1,301,693	1,344,126	1,388,061	1,433,397	1,480,427	1,529,434	1,580,525	1,633,854	1,689,607
Unfunded AAL	140,286	125,559	109,928	92,261	72,418	50,171	25,280	(2,437)	(23,024)	(45,869)
Funding Ratio	89%	90%	92%	93%	95%	97%	98%	100%	101%	103%
Benefit Payments										
Ratio of Assets to Benefit Payments	14.23	14.47	14.72	14.95	15.22	15.54	15.89	16.27	16.57	16.90

Numbers may not add due to rounding.

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State Patrol Retirement Fund
Scenario: 7.5% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%
Required - Chapter 356 (MVA)	22.3%	21.4%	20.4%	19.4%	18.3%	17.2%	16.1%	14.9%	13.7%	12.5%
Sufficiency / (Deficiency)	16.2%	17.2%	18.1%	19.1%	20.2%	21.3%	22.4%	23.6%	24.8%	26.0%
Contributions										
Statutory - Chapter 352B	60,261	62,234	64,374	66,390	68,539	70,868	73,216	75,597	78,127	80,639
Required - Chapter 356 (MVA)	34,892	34,507	34,076	33,393	32,618	31,740	30,645	29,343	27,884	26,137
Sufficiency / (Deficiency)	25,369	27,727	30,298	32,997	35,921	39,128	42,571	46,254	50,243	54,502
Funding Ratios										
Current Assets (MVA)	1,819,264	1,908,397	2,002,925	2,103,304	2,209,442	2,321,514	2,440,223	2,565,858	2,698,560	2,838,736
Actuarial Accrued Liability (AAL)	1,748,060	1,809,247	1,872,982	1,939,437	2,008,396	2,079,711	2,153,733	2,230,470	2,309,760	2,391,602
Unfunded AAL	(71,204)	(99,150)	(129,943)	(163,867)	(201,046)	(241,803)	(286,490)	(335,388)	(388,800)	(447,134)
Funding Ratio	104%	105%	107%	108%	110%	112%	113%	115%	117%	119%
Benefit Payments										
Ratio of Assets to Benefit Payments	105,487	108,691	112,011	115,721	119,810	123,828	128,067	132,703	137,608	142,862
	17.25	17.56	17.88	18.18	18.44	18.75	19.05	19.34	19.61	19.87

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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State Patrol Retirement Fund
Scenario: 6.0% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Contributions (% of Payroll)										
Statutory - Chapter 352B	40.3%	42.2%	44.7%	46.6%	46.6%	46.6%	46.5%	46.5%	46.5%	46.4%
Required - Chapter 356 (MVA)	40.2%	40.9%	41.4%	41.8%	42.2%	42.6%	43.1%	43.6%	44.2%	44.8%
Sufficiency / (Deficiency)	0.1%	1.4%	3.3%	4.8%	4.4%	3.9%	3.4%	2.9%	2.3%	1.6%
Contributions										
Statutory - Chapter 352B	31,371	34,050	37,481	40,760	42,226	43,738	45,196	46,812	48,497	50,048
Required - Chapter 356 (MVA)	32,112	33,271	34,608	35,421	36,776	38,554	40,303	42,247	44,343	46,465
Sufficiency / (Deficiency)	(741)	779	2,873	5,339	5,450	5,184	4,893	4,565	4,154	3,583
Funding Ratios										
Current Assets (MVA)	729,799	743,395	759,046	777,506	799,082	821,917	845,935	870,951	897,069	924,401
Actuarial Accrued Liability (AAL)	930,408	957,054	984,875	1,013,906	1,044,615	1,076,935	1,110,783	1,146,028	1,182,733	1,221,044
Unfunded AAL	200,609	213,659	225,829	236,400	245,533	255,018	264,848	275,077	285,664	296,643
Funding Ratio	78%	78%	77%	77%	76%	76%	76%	76%	76%	76%
Benefit Payments										
Benefit Payments	60,497	61,965	63,573	64,894	66,386	68,074	69,952	71,948	73,967	76,323
Ratio of Assets to Benefit Payments	12.06	12.00	11.94	11.98	12.04	12.07	12.09	12.11	12.13	12.11

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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31, 2019 letter to MSRS.

State Patrol Retirement Fund
Scenario: 6.0% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Contributions (% of Payroll)										
Statutory - Chapter 352B	46.4%	46.4%	46.3%	46.3%	46.3%	46.3%	46.2%	46.2%	46.2%	46.2%
Required - Chapter 356 (MVA)	45.5%	46.3%	47.2%	48.2%	49.3%	50.6%	52.0%	53.7%	55.7%	57.9%
Sufficiency / (Deficiency)	0.9%	0.1%	(0.8)%	(1.9)%	(3.0)%	(4.3)%	(5.8)%	(7.5)%	(9.5)%	(11.8)%
Contributions										
Statutory - Chapter 352B	51,752	53,486	55,298	57,147	59,112	61,168	63,195	65,379	67,598	69,959
Required - Chapter 356 (MVA)	48,801	51,310	54,060	57,069	60,409	64,089	68,110	72,673	77,833	83,814
Sufficiency / (Deficiency)	2,951	2,176	1,238	78	(1,297)	(2,921)	(4,915)	(7,294)	(10,235)	(13,855)
Funding Ratios										
Current Assets (MVA)	952,535	981,607	1,011,605	1,042,593	1,074,404	1,107,338	1,141,679	1,177,452	1,214,848	1,253,985
Actuarial Accrued Liability (AAL)	1,260,676	1,301,693	1,344,126	1,388,061	1,433,397	1,480,427	1,529,434	1,580,525	1,633,854	1,689,607
Unfunded AAL	308,141	320,086	332,521	345,468	358,993	373,089	387,755	403,073	419,006	435,622
Funding Ratio	76%	75%	75%	75%	75%	75%	75%	74%	74%	74%
Benefit Payments										
Benefit Payments	78,746	81,266	83,854	86,700	89,417	92,015	94,641	97,322	100,017	102,683
Ratio of Assets to Benefit Payments	12.10	12.08	12.06	12.03	12.02	12.03	12.06	12.10	12.15	12.21

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State Patrol Retirement Fund
Scenario: 6.0% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Contributions (% of Payroll)										
Statutory - Chapter 352B	46.1%	46.1%	46.1%	46.1%	46.1%	46.0%	46.0%	46.0%	46.0%	46.0%
Required - Chapter 356 (MVA)	60.8%	64.3%	68.6%	74.3%	82.0%	92.5%	108.5%	135.2%	188.5%	349.0%
Sufficiency / (Deficiency)	(14.6)%	(18.2)%	(22.5)%	(28.3)%	(35.9)%	(46.5)%	(62.5)%	(89.2)%	(142.5)%	(303.0)%
Contributions										
Statutory - Chapter 352B	72,218	74,549	77,079	79,461	82,001	84,753	87,528	90,342	93,332	96,301
Required - Chapter 356 (MVA)	90,681	98,884	108,987	121,552	138,051	160,782	194,228	249,143	357,776	680,806
Sufficiency / (Deficiency)	(18,463)	(24,335)	(31,908)	(42,091)	(56,050)	(76,029)	(106,700)	(158,801)	(264,444)	(584,505)
Funding Ratios										
Current Assets (MVA)	1,295,143	1,338,198	1,382,923	1,429,505	1,477,502	1,526,769	1,577,672	1,630,107	1,683,796	1,738,718
Actuarial Accrued Liability (AAL)	1,748,060	1,809,247	1,872,982	1,939,437	2,008,396	2,079,711	2,153,733	2,230,470	2,309,760	2,391,602
Unfunded AAL	452,917	471,049	490,059	509,932	530,894	552,942	576,061	600,363	625,964	652,884
Funding Ratio	74%	74%	74%	74%	74%	73%	73%	73%	73%	73%
Benefit Payments										
Ratio of Assets to Benefit Payments	105,487	108,691	112,011	115,721	119,810	123,828	128,067	132,703	137,608	142,862
	12.28	12.31	12.35	12.35	12.33	12.33	12.32	12.28	12.24	12.17

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State Patrol Retirement Fund
Scenario: 9.0% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Contributions (% of Payroll)										
Statutory - Chapter 352B	40.3%	42.2%	44.7%	46.6%	46.6%	46.6%	46.5%	45.5%	45.5%	38.5%
Required - Chapter 356 (MVA)	40.2%	39.3%	38.1%	36.7%	35.1%	33.4%	31.5%	29.4%	27.2%	24.6%
Sufficiency / (Deficiency)	0.1%	3.0%	6.6%	9.9%	11.5%	13.2%	15.0%	16.1%	18.4%	13.9%
Contributions										
Statutory - Chapter 352B	31,371	34,050	37,481	40,760	42,226	43,738	45,196	45,812	47,497	41,502
Required - Chapter 356 (MVA)	32,112	33,016	33,720	33,478	33,303	33,012	32,363	31,519	30,446	28,870
Sufficiency / (Deficiency)	(741)	1,034	3,761	7,282	8,923	10,726	12,833	14,293	17,051	12,632
Funding Ratios										
Current Assets (MVA)	729,799	764,849	804,311	849,222	900,212	955,757	1,016,108	1,081,444	1,151,209	1,226,895
Actuarial Accrued Liability (AAL)	930,408	957,054	984,875	1,013,906	1,044,615	1,076,935	1,110,783	1,146,028	1,182,733	1,221,044
Unfunded AAL	200,609	192,205	180,564	164,684	144,403	121,178	94,675	64,584	31,524	(5,851)
Funding Ratio	78%	80%	82%	84%	86%	89%	91%	94%	97%	100%
Benefit Payments										
Ratio of Assets to Benefit Payments	12.06	12.34	12.65	13.09	13.56	14.04	14.53	15.03	15.56	16.08

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, 2019 letter to MSRS.

State Patrol Retirement Fund
Scenario: 9.0% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%
Required - Chapter 356 (MVA)	22.9%	21.0%	19.0%	17.0%	14.8%	12.5%	10.1%	7.5%	4.8%	2.0%
Sufficiency / (Deficiency)	15.6%	17.5%	19.5%	21.5%	23.7%	26.0%	28.4%	31.0%	33.7%	36.5%
Contributions										
Statutory - Chapter 352B	42,944	44,411	45,944	47,509	49,172	50,911	52,626	54,474	56,352	58,350
Required - Chapter 356 (MVA)	27,560	26,375	24,985	23,348	21,466	19,268	16,654	13,701	10,307	6,493
Sufficiency / (Deficiency)	15,384	18,036	20,959	24,161	27,706	31,643	35,972	40,773	46,045	51,857
Funding Ratios										
Current Assets (MVA)	1,300,657	1,380,023	1,465,423	1,557,395	1,656,297	1,762,987	1,878,370	2,003,175	2,138,330	2,284,782
Actuarial Accrued Liability (AAL)	1,260,676	1,301,693	1,344,126	1,388,061	1,433,397	1,480,427	1,529,434	1,580,525	1,633,854	1,689,607
Unfunded AAL	(39,981)	(78,330)	(121,297)	(169,334)	(222,900)	(282,560)	(348,936)	(422,650)	(504,476)	(595,175)
Funding Ratio	103%	106%	109%	112%	116%	119%	123%	127%	131%	135%
Benefit Payments										
Ratio of Assets to Benefit Payments	16.52	16.98	17.48	17.96	18.52	19.16	19.85	20.58	21.38	22.25

Numbers may not add due to rounding.

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State Patrol Retirement Fund
Scenario: 9.0% investment return for all years
Fiscal year beginning July 1

\$ in Thousands	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Contributions (% of Payroll)										
Statutory - Chapter 352B	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%
Required - Chapter 356 (MVA)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sufficiency / (Deficiency)	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%	38.5%
Contributions										
Statutory - Chapter 352B	60,261	62,234	64,374	66,390	68,539	70,868	73,216	75,597	78,127	80,639
Required - Chapter 356 (MVA)	2,055	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	58,206	62,234	64,374	66,390	68,539	70,868	73,216	75,597	78,127	80,639
Funding Ratios										
Current Assets (MVA)	2,443,705	2,615,985	2,802,470	3,004,492	3,222,914	3,458,952	3,714,452	3,990,957	4,289,974	4,613,405
Actuarial Accrued Liability (AAL)	1,748,060	1,809,247	1,872,982	1,939,437	2,008,396	2,079,711	2,153,733	2,230,470	2,309,760	2,391,602
Unfunded AAL	(695,645)	(806,738)	(929,488)	(1,065,055)	(1,214,518)	(1,379,241)	(1,560,719)	(1,760,487)	(1,980,214)	(2,221,803)
Funding Ratio	140%	145%	150%	155%	160%	166%	172%	179%	186%	193%
Benefit Payments										
Ratio of Assets to Benefit Payments	23.17	24.07	25.02	25.96	26.90	27.93	29.00	30.07	31.18	32.29

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.