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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 – Correctional 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 Correctional 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 Correctional 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 4,420 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 33.7
- Average salary at hire is $52,900
- Approximately 45% female, 55% 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 plan receives supplemental employer contributions of 4.45% of payroll until the plan reaches 100% funding (on a Market Value basis). These supplemental employer contributions are projected to be eliminated in fiscal years ending 2031 and 2038 in the 9.0% and 7.5% investment return scenarios, respectively.

Comments

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

- Statutory contributions are defined in statutes as a fixed percentage of payroll plus any statutory supplemental contributions and represent the amount that is actually contributed to the plan. Required contributions are defined in statutes and the LCPR Standard for Actuarial Work and represent the amount needed to fully fund the plan by June 30, 2048 (normal cost, expenses and a payment to amortize the unfunded liability).
- Investment experience that has occurred since the measurement date is not reflected in this report.
- The enclosed projections are based on assumptions as outlined in the Correctional 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 Correctional 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

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.

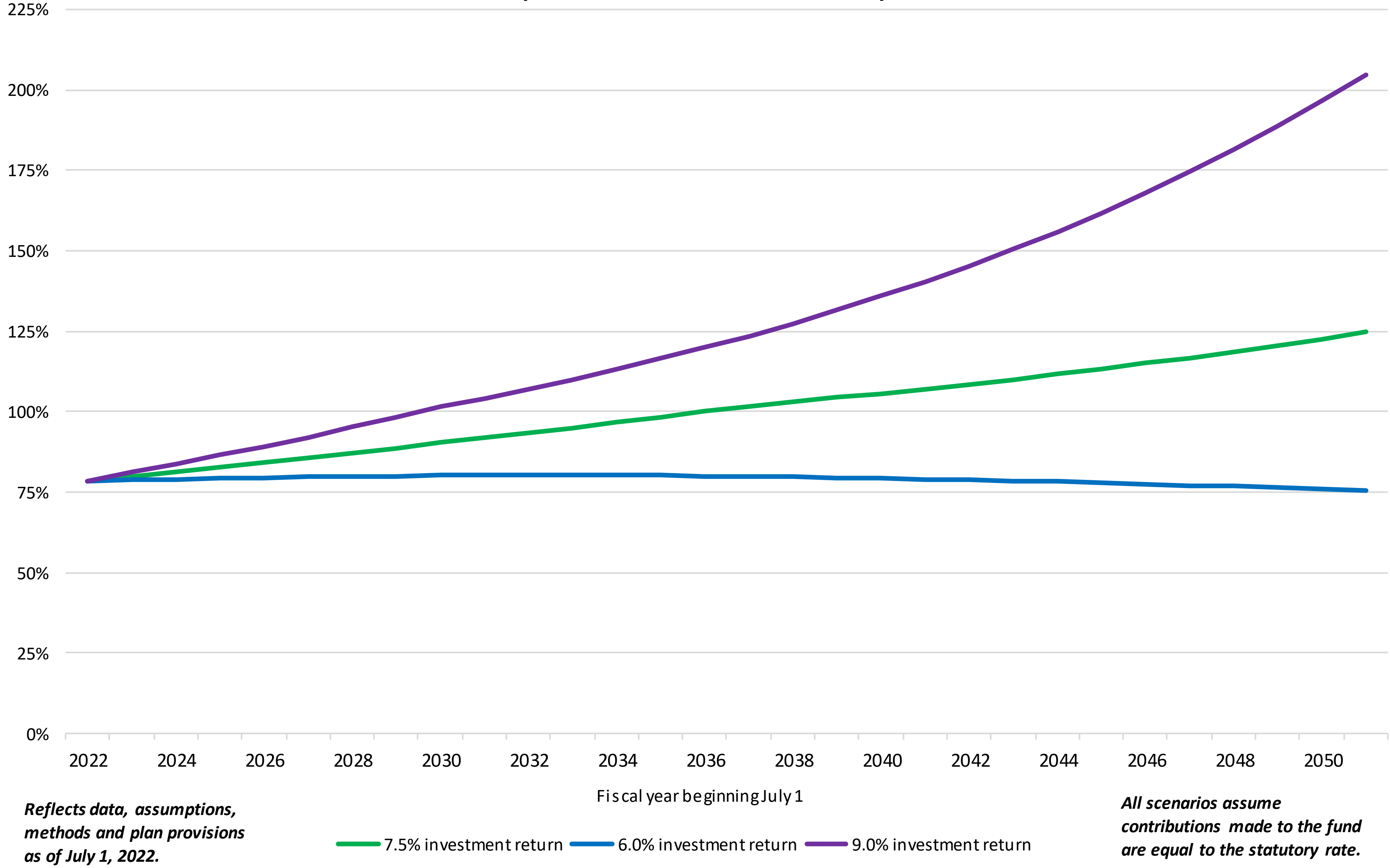
Limitations of Project Scope

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 Correctional 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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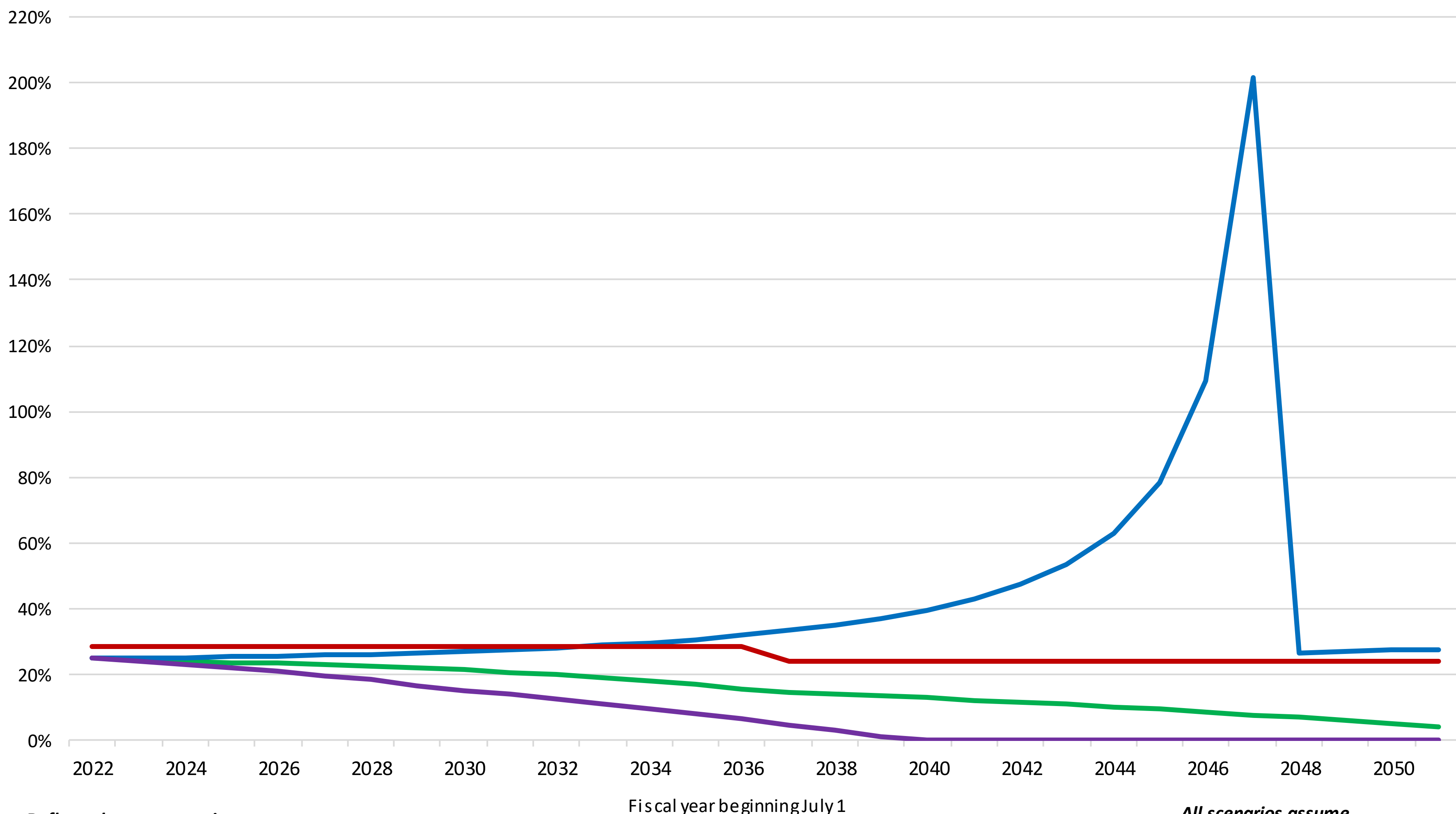
MSRS Correctional Employees Retirement Fund
Estimated Required Contribution Rates
(% of Pay, Market Value of Assets Basis)

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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Correctional 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 352.92	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%
Required - Chapter 356 (MVA)	24.81%	24.45%	24.10%	23.67%	23.25%	22.83%	22.33%	21.78%	21.18%	20.51%
Sufficiency / (Deficiency)	3.64%	4.00%	4.35%	4.78%	5.20%	5.62%	6.12%	6.67%	7.27%	7.94%
Contributions										
Statutory - Chapter 352	$ 85,484	$ 87,891	$ 90,325	$ 92,840	$ 95,320	$ 97,873	$ 100,645	$ 103,451	$ 106,316	$ 109,295
Required - Chapter 356 (MVA)	74,546	75,525	76,505	77,245	77,894	78,547	78,989	79,203	79,154	78,797
Sufficiency / (Deficiency)	10,938	12,366	13,819	15,594	17,426	19,326	21,656	24,248	27,163	30,498
Funding Ratios										
Current Assets (MVA)	$1,473,921	$1,571,327	$1,673,364	$1,780,293	$1,892,070	$2,008,713	$2,130,663	$2,258,726	$2,392,727	$2,532,487
Actuarial Accrued Liability (AAL)	1,878,449	1,966,371	2,056,767	2,149,814	2,245,164	2,342,725	2,442,825	2,545,892	2,651,512	2,759,252
Unfunded AAL	404,528	395,044	383,403	369,521	353,093	334,012	312,162	287,166	258,785	226,765
Funding Ratio	78.5%	79.9%	81.4%	82.8%	84.3%	85.7%	87.2%	88.7%	90.2%	91.8%
Benefit Payments	$ 97,216	$ 102,174	$ 107,243	$ 112,786	$ 118,631	$ 124,473	$ 130,137	$ 136,449	$ 143,418	$ 150,189
Ratio of Assets to Benefit Payments	15.16	15.38	15.60	15.78	15.95	16.14	16.37	16.55	16.68	16.86

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Correctional 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 352.92	28.45%	28.45%	28.45%	28.45%	28.45%	24.00%	24.00%	24.00%	24.00%	24.00%
Required - Chapter 356 (MVA)	19.75%	18.90%	17.92%	16.78%	15.46%	14.63%	14.07%	13.45%	12.82%	12.17%
Sufficiency / (Deficiency)	8.70%	9.55%	10.53%	11.67%	12.99%	9.37%	9.93%	10.55%	11.18%	11.83%
Contributions										
Statutory - Chapter 352	$ 112,347	$ 115,447	$ 118,663	$ 121,990	$ 125,332	$ 108,683	$ 111,689	$ 114,894	$ 118,093	$ 121,439
Required - Chapter 356 (MVA)	78,010	76,681	74,743	71,929	68,084	66,272	65,460	64,387	63,091	61,589
Sufficiency / (Deficiency)	34,337	38,767	43,920	50,061	57,247	42,412	46,229	50,508	55,002	59,850
Funding Ratios										
Current Assets (MVA)	$2,678,760	$2,831,410	$2,990,600	$3,156,608	$3,329,295	$3,508,426	$3,673,719	$3,844,709	$4,021,694	$4,205,103
Actuarial Accrued Liability (AAL)	2,869,556	2,981,960	3,096,300	3,212,475	3,329,900	3,447,991	3,566,858	3,686,824	3,807,687	3,929,562
Unfunded AAL	190,796	150,550	105,699	55,867	605	(60,435)	(106,861)	(157,885)	(214,007)	(275,542)
Funding Ratio	93.4%	95.0%	96.6%	98.3%	100.0%	101.8%	103.0%	104.3%	105.6%	107.0%
Benefit Payments	$ 157,635	$ 165,433	$ 173,550	$ 182,404	$ 191,981	$ 201,583	$ 211,007	$ 220,753	$ 230,512	$ 239,913
Ratio of Assets to Benefit Payments	16.99	17.12	17.23	17.31	17.34	17.40	17.41	17.42	17.45	17.53

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Correctional 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 352.92	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%
Required - Chapter 356 (MVA)	11.49%	10.78%	10.03%	9.25%	8.45%	7.60%	6.72%	5.80%	4.83%	3.83%
Sufficiency / (Deficiency)	12.51%	13.22%	13.97%	14.75%	15.55%	16.40%	17.28%	18.20%	19.17%	20.17%
Contributions										
Statutory - Chapter 352	$ 124,977	$ 128,651	$ 132,484	$ 136,429	$ 140,503	$ 144,745	$ 149,152	$ 153,692	$ 158,338	$ 163,100
Required - Chapter 356 (MVA)	59,849	57,799	55,387	52,602	49,447	45,863	41,776	37,113	31,854	25,996
Sufficiency / (Deficiency)	65,128	70,853	77,097	83,827	91,056	98,882	107,376	116,579	126,484	137,104
Funding Ratios										
Current Assets (MVA)	$4,395,942	$4,595,364	$4,804,405	$5,024,036	$5,254,929	$5,497,966	$5,754,504	$6,025,841	$6,312,928	$6,616,617
Actuarial Accrued Liability (AAL)	4,053,003	4,178,633	4,306,946	4,438,302	4,572,772	4,710,600	4,852,406	4,998,679	5,149,521	5,304,917
Unfunded AAL	(342,939)	(416,732)	(497,459)	(585,734)	(682,157)	(787,366)	(902,098)	(1,027,162)	(1,163,407)	(1,311,700)
Funding Ratio	108.5%	110.0%	111.6%	113.2%	114.9%	116.7%	118.6%	120.6%	122.6%	124.7%
Benefit Payments	$ 248,927	$ 257,700	$ 266,386	$ 275,303	$ 284,311	$ 293,053	$ 301,684	$ 310,600	$ 319,936	$ 329,341
Ratio of Assets to Benefit Payments	17.66	17.83	18.04	18.25	18.48	18.76	19.07	19.40	19.73	20.09

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.

Correctional 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 352.92	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%
Required - Chapter 356 (MVA)	24.81%	24.92%	25.10%	25.26%	25.50%	25.82%	26.15%	26.53%	26.99%	27.51%
Sufficiency / (Deficiency)	3.64%	3.53%	3.35%	3.19%	2.95%	2.63%	2.30%	1.92%	1.46%	0.94%
Contributions										
Statutory - Chapter 352	$ 85,484	$ 87,891	$ 90,325	$ 92,840	$ 95,320	$ 97,873	$ 100,645	$ 103,451	$ 106,316	$ 109,295
Required - Chapter 356 (MVA)	74,546	76,984	79,679	82,428	85,430	88,836	92,498	96,482	100,857	105,703
Sufficiency / (Deficiency)	10,938	10,907	10,646	10,411	9,890	9,037	8,147	6,969	5,459	3,593
Funding Ratios										
Current Assets (MVA)	$1,473,921	$1,549,313	$1,626,574	$1,705,729	$1,786,485	$1,868,595	$1,952,214	$2,037,840	$2,124,962	$2,213,052
Actuarial Accrued Liability (AAL)	1,878,449	1,966,371	2,056,767	2,149,814	2,245,164	2,342,725	2,442,825	2,545,892	2,651,512	2,759,252
Unfunded AAL	404,528	417,058	430,193	444,085	458,678	474,130	490,611	508,052	526,549	546,200
Funding Ratio	78.5%	78.8%	79.1%	79.3%	79.6%	79.8%	79.9%	80.0%	80.1%	80.2%
Benefit Payments	$ 97,216	$ 102,174	$ 107,243	$ 112,786	$ 118,631	$ 124,473	$ 130,137	$ 136,449	$ 143,418	$ 150,189
Ratio of Assets to Benefit Payments	15.16	15.16	15.17	15.12	15.06	15.01	15.00	14.93	14.82	14.74

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Correctional 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 352.92	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%
Required - Chapter 356 (MVA)	28.12%	28.83%	29.66%	30.62%	31.79%	33.17%	34.86%	36.90%	39.49%	42.82%
Sufficiency / (Deficiency)	0.33%	(0.38)%	(1.21)%	(2.17)%	(3.34)%	(4.72)%	(6.41)%	(8.45)%	(11.04)%	(14.37)%
Contributions										
Statutory - Chapter 352	$ 112,347	$ 115,447	$ 118,663	$ 121,990	$ 125,332	$ 128,835	$ 132,398	$ 136,198	$ 139,989	$ 143,956
Required - Chapter 356 (MVA)	111,053	116,998	123,728	131,311	140,041	150,224	162,250	176,632	194,295	216,661
Sufficiency / (Deficiency)	1,294	(1,551)	(5,065)	(9,320)	(14,710)	(21,389)	(29,851)	(40,434)	(54,306)	(72,705)
Funding Ratios										
Current Assets (MVA)	$2,302,488	$2,392,729	$2,483,512	$2,574,656	$2,665,541	$2,755,417	$2,844,366	$2,932,576	$3,019,910	$3,106,294
Actuarial Accrued Liability (AAL)	2,869,556	2,981,960	3,096,300	3,212,475	3,329,900	3,447,991	3,566,858	3,686,824	3,807,687	3,929,562
Unfunded AAL	567,068	589,230	612,788	637,819	664,359	692,574	722,491	754,248	787,778	823,268
Funding Ratio	80.2%	80.2%	80.2%	80.2%	80.1%	79.9%	79.7%	79.5%	79.3%	79.1%
Benefit Payments	$ 157,635	$ 165,433	$ 173,550	$ 182,404	$ 191,981	$ 201,583	$ 211,007	$ 220,753	$ 230,512	$ 239,913
Ratio of Assets to Benefit Payments	14.61	14.46	14.31	14.12	13.88	13.67	13.48	13.28	13.10	12.95

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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Correctional 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 352.92	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%
Required - Chapter 356 (MVA)	47.24%	53.43%	62.69%	78.14%	109.04%	201.70%	26.42%	26.78%	27.18%	27.61%
Sufficiency / (Deficiency)	(18.79)%	(24.98)%	(34.24)%	(49.69)%	(80.59)%	(173.25)%	2.03%	1.67%	1.27%	0.84%
Contributions										
Statutory - Chapter 352	$ 148,150	$ 152,506	$ 157,048	$ 161,725	$ 166,555	$ 171,583	$ 176,807	$ 182,189	$ 187,697	$ 193,341
Required - Chapter 356 (MVA)	246,011	286,410	346,063	444,175	638,358	1,216,471	164,214	171,526	179,296	187,621
Sufficiency / (Deficiency)	(97,861)	(133,905)	(189,015)	(282,450)	(471,803)	(1,044,888)	12,593	10,663	8,400	5,721
Funding Ratios										
Current Assets (MVA)	$3,192,220	$3,278,290	$3,364,926	$3,452,441	$3,540,787	$3,630,077	$3,720,842	$3,813,485	$3,907,986	$4,004,152
Actuarial Accrued Liability (AAL)	4,053,003	4,178,633	4,306,946	4,438,302	4,572,772	4,710,600	4,852,406	4,998,679	5,149,521	5,304,917
Unfunded AAL	860,783	900,343	942,020	985,861	1,031,985	1,080,522	1,131,564	1,185,194	1,241,535	1,300,765
Funding Ratio	78.8%	78.5%	78.1%	77.8%	77.4%	77.1%	76.7%	76.3%	75.9%	75.5%
Benefit Payments	$ 248,927	$ 257,700	$ 266,386	$ 275,303	$ 284,311	$ 293,053	$ 301,684	$ 310,600	$ 319,936	$ 329,341
Ratio of Assets to Benefit Payments	12.82	12.72	12.63	12.54	12.45	12.39	12.33	12.28	12.21	12.16

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.

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

Correctional 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 352.92	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	28.45%	24.00%	24.00%
Required - Chapter 356 (MVA)	24.81%	23.98%	23.08%	22.04%	20.90%	19.67%	18.23%	16.61%	14.97%	13.76%
Sufficiency / (Deficiency)	3.64%	4.47%	5.37%	6.41%	7.55%	8.78%	10.22%	11.84%	9.03%	10.24%
Contributions										
Statutory - Chapter 352	$ 85,484	$ 87,891	$ 90,325	$ 92,840	$ 95,320	$ 97,873	$ 100,645	$ 103,451	$ 89,687	$ 92,200
Required - Chapter 356 (MVA)	74,546	74,066	73,288	71,915	70,033	67,662	64,491	60,390	55,953	52,844
Sufficiency / (Deficiency)	10,938	13,824	17,037	20,925	25,287	30,211	36,153	43,061	33,734	39,356
Funding Ratios										
Current Assets (MVA)	$1,473,921	$1,593,341	$1,720,815	$1,856,980	$2,002,207	$2,156,960	$2,322,176	$2,499,206	$2,688,474	$2,873,077
Actuarial Accrued Liability (AAL)	1,878,449	1,966,371	2,056,767	2,149,814	2,245,164	2,342,725	2,442,825	2,545,892	2,651,512	2,759,252
Unfunded AAL	404,528	373,030	335,952	292,834	242,957	185,764	120,649	46,686	(36,963)	(113,825)
Funding Ratio	78.5%	81.0%	83.7%	86.4%	89.2%	92.1%	95.1%	98.2%	101.4%	104.1%
Benefit Payments	$ 97,216	$ 102,174	$ 107,243	$ 112,786	$ 118,631	$ 124,473	$ 130,137	$ 136,449	$ 143,418	$ 150,189
Ratio of Assets to Benefit Payments	15.16	15.59	16.05	16.46	16.88	17.33	17.84	18.32	18.75	19.13

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.

Correctional 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 352.92	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%
Required - Chapter 356 (MVA)	12.46%	11.08%	9.62%	8.05%	6.41%	4.66%	2.82%	0.85%	0.00%	0.00%
Sufficiency / (Deficiency)	11.54%	12.92%	14.38%	15.95%	17.59%	19.34%	21.18%	23.15%	24.00%	24.00%
Contributions										
Statutory - Chapter 352	$ 94,774	$ 97,390	$ 100,102	$ 102,909	$ 105,728	$ 108,683	$ 111,689	$ 114,894	$ 118,093	$ 121,439
Required - Chapter 356 (MVA)	49,198	44,953	40,117	34,536	28,221	21,110	13,108	4,051	-	-
Sufficiency / (Deficiency)	45,576	52,437	59,985	68,373	77,506	87,573	98,581	110,843	118,093	121,439
Funding Ratios										
Current Assets (MVA)	$3,069,811	$3,279,125	$3,501,826	$3,738,885	$3,990,924	$4,258,545	$4,543,268	$4,846,867	$5,170,912	$5,517,222
Actuarial Accrued Liability (AAL)	2,869,556	2,981,960	3,096,300	3,212,475	3,329,900	3,447,991	3,566,858	3,686,824	3,807,687	3,929,562
Unfunded AAL	(200,255)	(297,165)	(405,526)	(526,410)	(661,024)	(810,554)	(976,410)	(1,160,043)	(1,363,225)	(1,587,660)
Funding Ratio	107.0%	110.0%	113.1%	116.4%	119.9%	123.5%	127.4%	131.5%	135.8%	140.4%
Benefit Payments	$ 157,635	$ 165,433	$ 173,550	$ 182,404	$ 191,981	$ 201,583	$ 211,007	$ 220,753	$ 230,512	$ 239,913
Ratio of Assets to Benefit Payments	19.47	19.82	20.18	20.50	20.79	21.13	21.53	21.96	22.43	23.00

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.

Correctional 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 352.92	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%
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)	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%	24.00%
Contributions										
Statutory - Chapter 352	$ 124,977	$ 128,651	$ 132,484	$ 136,429	$ 140,503	$ 144,745	$ 149,152	$ 153,692	$ 158,338	$ 163,100
Required - Chapter 356 (MVA)	-	-	-	-	-	-	-	-	-	-
Sufficiency / (Deficiency)	124,977	128,651	132,484	136,429	140,503	144,745	149,152	153,692	158,338	163,100
Funding Ratios										
Current Assets (MVA)	$5,888,327	$6,287,062	$6,716,306	$7,179,057	$7,678,207	$8,217,071	$8,799,672	$9,430,233	$10,112,911	$10,852,065
Actuarial Accrued Liability (AAL)	4,053,003	4,178,633	4,306,946	4,438,302	4,572,772	4,710,600	4,852,406	4,998,679	5,149,521	5,304,917
Unfunded AAL	(1,835,324)	(2,108,429)	(2,409,360)	(2,740,755)	(3,105,435)	(3,506,471)	(3,947,266)	(4,431,554)	(4,963,390)	(5,547,148)
Funding Ratio	145.3%	150.5%	155.9%	161.8%	167.9%	174.4%	181.4%	188.7%	196.4%	204.6%
Benefit Payments	$ 248,927	$ 257,700	$ 266,386	$ 275,303	$ 284,311	$ 293,053	$ 301,684	$ 310,600	$ 319,936	$ 329,341
Ratio of Assets to Benefit Payments	23.65	24.40	25.21	26.08	27.01	28.04	29.17	30.36	31.61	32.95

Numbers may not add due to rounding.

The interest rate used to discount liabilities was 7.5%.