

January 31, 2013

CONFIDENTIAL

Mr. Dave Bergstrom  
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 Dave:

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 (SPRF). The estimates are based on participant data, assumptions, methods, and plan provisions as of July 1, 2012 as detailed in the State Patrol Retirement Fund Actuarial Valuation Report as of July 1, 2012.

As required by the State of Minnesota Standards for Actuarial Work, the projections reflect three asset return scenarios. The statutory investment return assumption is a 5-year select and ultimate approach with rates of 8.0% for the period July 1, 2012 to June 30, 2017 and 8.5% thereafter. The scenarios assume future investment returns of 1.5% more than the assumed rate, the assumed rate, and 1.5% less than the assumed rate.

Note that as funding ratios decline, as they are expected to in two out of three investment return scenarios, it will be increasingly difficult for the plan to attain the assumed investment return.

The estimates are based on the market value of assets with no smoothing of investment gains or losses. Payroll is assumed to increase 3.75% a year, consistent with the valuation assumption for total payroll growth. In all scenarios, the valuation interest rate used to discount liabilities was the single effective interest rate used in the July 1, 2012 valuation of 8.35%, which produces a similar liability stream as trending to a liability that reflects the expiration of the 5-year select period on June 30, 2017.

Normal cost is assumed to trend downward as a percent of payroll to a level ultimate rate that reflects the expiration of the 5-year select period on June 30, 2017.

Benefit payments are based on the assumptions and methods described in this letter, with adjustments applied to estimate the impact of future members hired after June 30, 2012 retiring during the 30-year projection period. To estimate this impact, we assumed total benefit payments would increase a minimum of 2.0% per year.

If actuarial accrued liability exceeds assets, the unfunded actuarial accrued liability is amortized through June 30, 2037 per Minnesota Statute 356.215, Subdivision 11. As directed by MSRS, the statutory amortization date is assumed to be changed to June 30, 2067 once the current period expires in 2037. 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.

Based on MSRS' direction, we have shown projection results with and without the contribution stabilizer defined in Minnesota Statute 352.045, summarized in the attached Exhibit A.

Based on the operations of the stabilizer, the projected highest annual statutory contribution rate is:

<b>Assumed Investment Return</b>	<b>Maximum Statutory Contribution</b>
6.5%/7.0%	38.00%
8.0%/8.5%	38.00%
9.5%/10.0%	35.50%

These rates are significantly higher than the current rate of 31.0% of pay and may not be sustainable. Lower contributions would result in significantly different projections.

In years of a contribution increase or decrease, employer and employee contribution rates were assumed to increase equally at 0.25% of pay each.

It is our understanding that changes in benefits and contributions are being considered to address the funding deficiency in this plan; these potential changes have not been reflected herein.

### **Postretirement Benefit Increases**

A very significant assumption affecting the projected estimates is the expectation of annual increases in the benefits being paid to retirees and beneficiaries. If the plan reaches a funding ratio of 90% (on a market value of assets basis) in the future, postretirement increases will revert to the 2.5% level.

Under the 7.0% and 8.5% ultimate rate of return scenarios, the funded status of the plan is expected to deteriorate. We assumed a 1.5% postretirement benefit increase for all years for these two scenarios. If the postretirement benefit increase was assumed to be 2.5% instead of 1.5%, the liabilities would be significantly greater than the liabilities shown in this report.

Under the 10.0% ultimate rate of return scenario, assuming all future postretirement benefit increases equal 1.5%, the funded status of the plan is expected to exceed 90% in approximately 2031 (2029 with the contribution stabilizer). However, if at that time future postretirement increases are assumed to be 2.5%, the funded ratio would be less than 90%. If the plan continued to pay postretirement increases of 1.5% per year, our projections indicate that the plan would reach a funding status of 90% (assuming future postretirement increases of 2.5%) around the year 2036 (2033 with the contribution stabilizer). Without further guidance, we cannot determine the date the

postretirement increase would change to 2.5% and have not shown values for this scenario beyond the years 2036/2033. Different results would be obtained if our projected liabilities for years prior to 2036/2033 anticipated a switch to the 2.5% COLA in the year 2036/2033.

## **Comments**

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.

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. MSRS is solely responsible for communicating to GRS any changes required thereto.

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**

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

The undersigned actuaries are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. In addition, Mr. Murphy meets the requirements of "approved actuary" under Minnesota Statutes Section 356.215, Subdivision 1, Paragraph (c).

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.

Sincerely,



Bonita J. Wurst, ASA, EA, MAAA



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

BJW/BBM:sc  
Enclosures

# Exhibit A

## State Patrol Retirement Fund Contribution Stabilizer

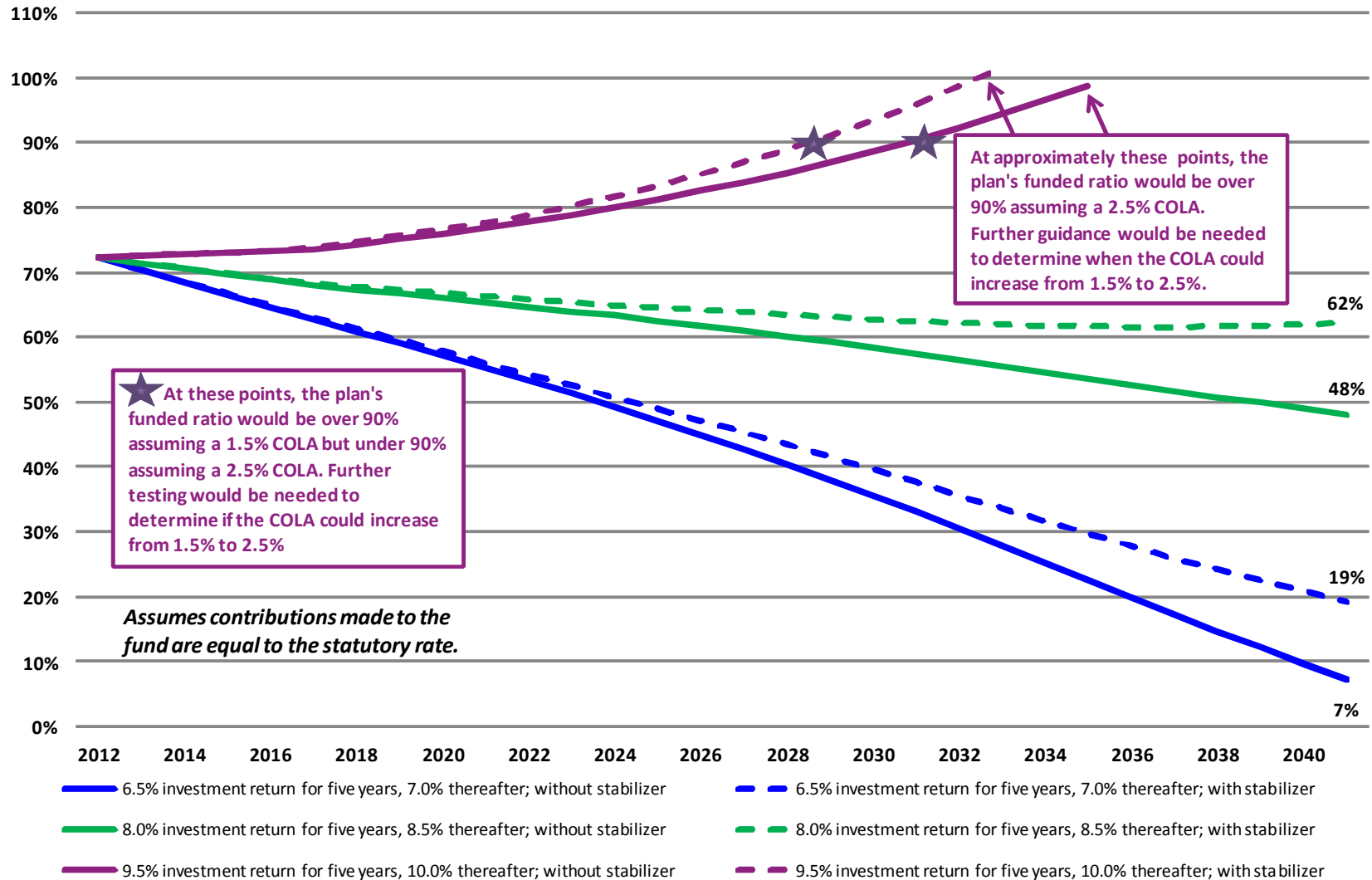
The following is a summary of Minnesota Statute 352.045:

- If a contribution sufficiency of at least 0.5% has existed for two consecutive years (after July 1, 2011), the member and employer contribution rates are decreased by at most 0.25% each to a level that is necessary to maintain a 0.25% sufficiency.
- If a contribution deficiency of at least 0.5% has existed for two consecutive years (after July 1, 2011), the member and employer contribution rates are increased by at most 0.25% each.
- A contribution rate adjustment under this section must not be made until at least two years have passed since fully implementing a previous adjustment.

This exhibit should only be viewed in conjunction with GRS' January 31, 2013 letter to MSRS.

## State Patrol Retirement Fund Projection of Funded Status

Assumes postretirement increases of 1.5% for all years

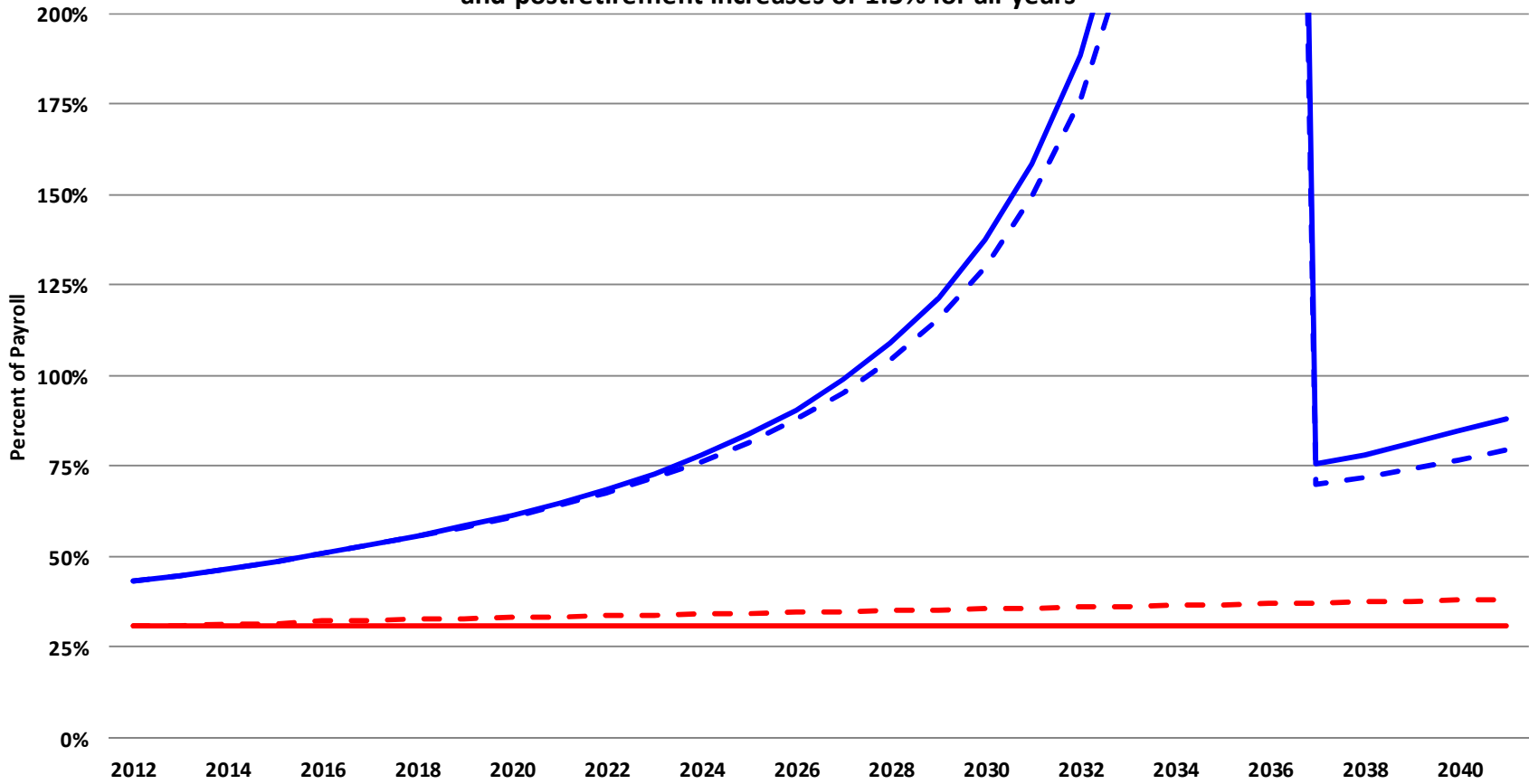


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### State Patrol Retirement Fund Estimated Contribution Rates

Assumes 6.5% investment return for five years, 7.0% thereafter and postretirement increases of 1.5% for all years

Rates briefly exceed 200% of payroll at the end of the projection period. For details, refer to attached exhibits.



— Required Contribution Rate; without stabilizer    — Statutory Contribution Rate; without stabilizer  
- - - Required Contribution Rate; with stabilizer    - - - Statutory Contribution Rate; with stabilizer

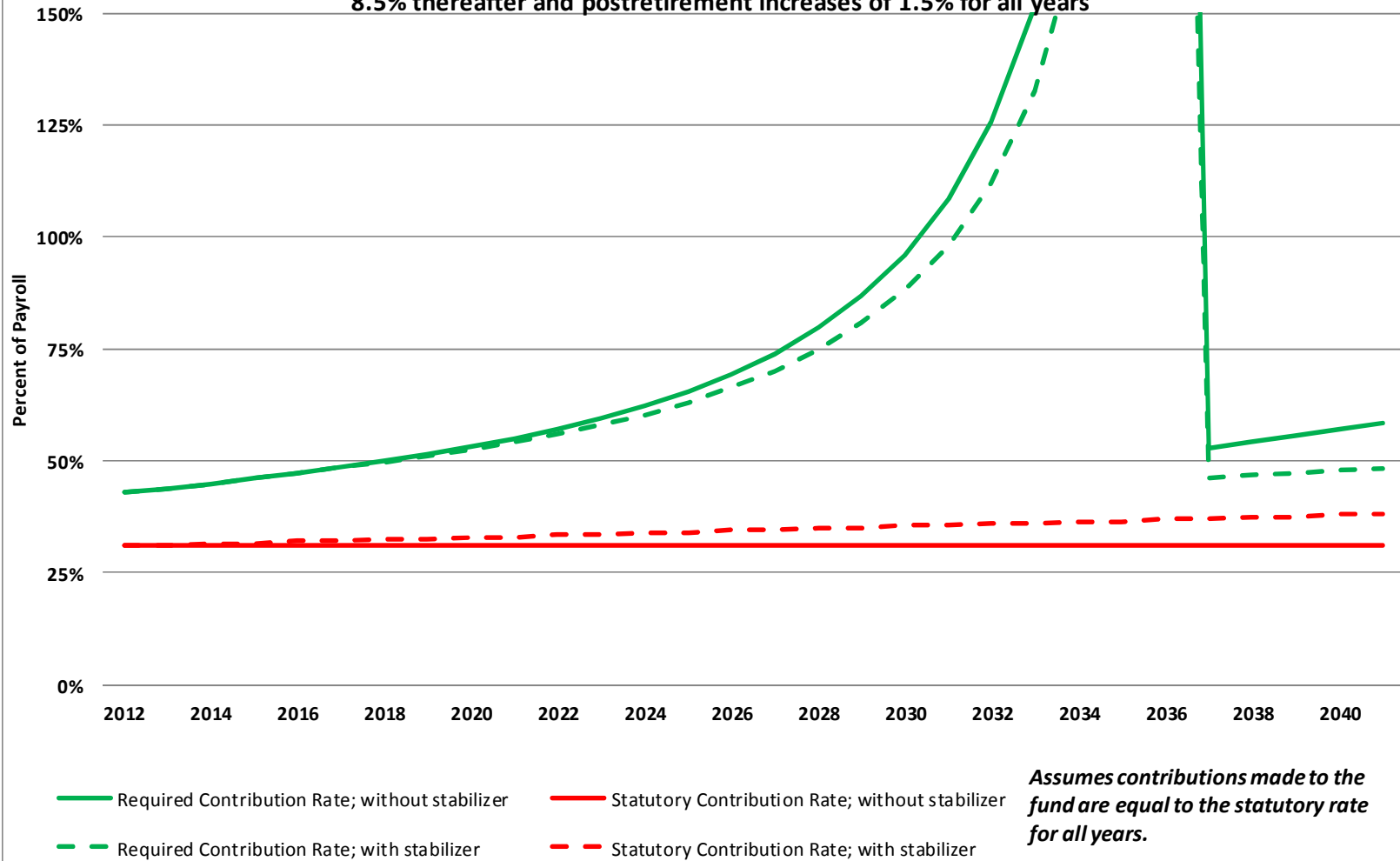
*Assumes contributions made to the fund are equal to the statutory rate for all years.*

This exhibit should only be viewed in conjunction with GRS' January 31, 2013 letter to MSRS.

## State Patrol Retirement Fund Estimated Contribution Rates

Rates briefly exceed 150% of payroll at the end of the projection period. For details, refer to attached exhibits.

Assumes investment return of 8.0% for five years,  
8.5% thereafter and postretirement increases of 1.5% for all years



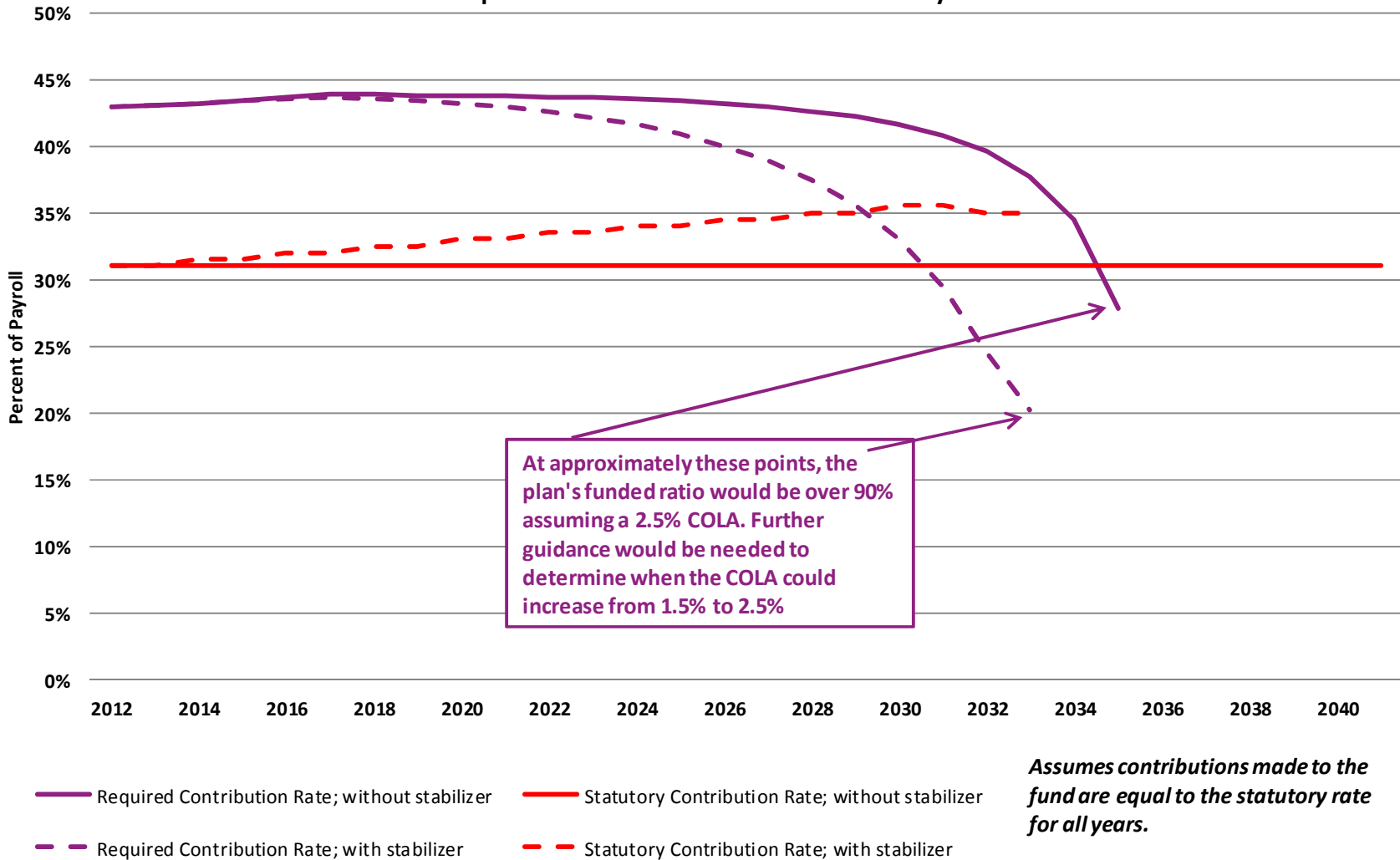


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## State Patrol Retirement Fund

### Estimated Contribution Rates

Assumes 9.5% investment return for five years, 10.0% thereafter and postretirement increases of 1.5% for all years



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**State Patrol Retirement Fund**  
**Scenario: 6.5% for Five Years, 7.0% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

<b>\$ in Thousands</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	43.0%	44.7%	46.5%	48.6%	50.8%	53.3%	55.7%	58.4%	61.4%	64.8%
Sufficiency / (Deficiency)	(12.0)%	(13.7)%	(15.5)%	(17.6)%	(19.8)%	(22.3)%	(24.7)%	(27.4)%	(30.4)%	(33.8)%
<b>Contributions</b>										
Statutory - Chapter 352B	20,644	21,418	22,221	23,054	23,919	24,816	25,746	26,712	27,713	28,753
Required - Chapter 356	28,599	30,857	33,348	36,107	39,174	42,651	46,270	50,324	54,891	60,067
Sufficiency / (Deficiency)	(7,955)	(9,439)	(11,127)	(13,053)	(15,255)	(17,835)	(20,524)	(23,612)	(27,178)	(31,314)
<b>Funding Ratios</b>										
Current Assets (MVA)	549,956	553,264	555,868	557,613	558,382	558,092	559,533	560,289	559,999	558,673
Actuarial Accrued Liability (AAL)	760,955	785,431	810,683	836,648	863,307	890,678	918,965	948,515	979,106	1,010,897
Unfunded AAL	210,999	232,167	254,815	279,035	304,925	332,586	359,432	388,226	419,107	452,224
Funding Ratio	72%	70%	69%	67%	65%	63%	61%	59%	57%	55%
<b>Benefit Payments</b>										
	51,902	53,560	55,353	57,234	59,167	60,976	62,659	64,679	66,655	68,361

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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in conjunction with GRS' January  
31, 2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 6.5% for Five Years, 7.0% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	68.6%	72.9%	77.9%	83.7%	90.5%	98.7%	108.7%	121.2%	137.3%	158.6%
Sufficiency / (Deficiency)	(37.6)%	(41.9)%	(46.9)%	(52.7)%	(59.5)%	(67.7)%	(77.7)%	(90.2)%	(106.3)%	(127.6)%
<b>Contributions</b>										
Statutory - Chapter 352B	29,831	30,949	32,110	33,314	34,563	35,860	37,204	38,599	40,047	41,549
Required - Chapter 356	65,975	72,773	80,665	89,926	100,930	114,200	130,491	150,934	177,310	212,584
Sufficiency / (Deficiency)	(36,144)	(41,824)	(48,555)	(56,612)	(66,367)	(78,340)	(93,287)	(112,335)	(137,263)	(171,035)
<b>Funding Ratios</b>										
Current Assets (MVA)	556,554	553,530	549,303	543,666	536,341	527,196	515,985	502,530	486,725	468,477
Actuarial Accrued Liability (AAL)	1,044,296	1,079,363	1,115,991	1,154,172	1,193,840	1,235,092	1,277,924	1,322,418	1,368,749	1,417,124
Unfunded AAL	487,742	525,833	566,688	610,506	657,499	707,896	761,939	819,888	882,024	948,647
Funding Ratio	53%	51%	49%	47%	45%	43%	40%	38%	36%	33%
<b>Benefit Payments</b>										
	70,163	72,231	74,459	76,903	79,406	82,069	84,815	87,559	90,286	93,130

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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**State Patrol Retirement Fund**  
**Scenario: 6.5% for Five Years, 7.0% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	188.5%	233.3%	307.8%	456.9%	904.1%	75.3%	78.2%	81.2%	84.5%	88.1%
Sufficiency / (Deficiency)	(157.5)%	(202.3)%	(276.8)%	(425.9)%	(873.1)%	(44.3)%	(47.2)%	(50.2)%	(53.5)%	(57.1)%
<b>Contributions</b>										
Statutory - Chapter 352B	43,107	44,723	46,400	48,140	49,946	51,819	53,762	55,778	57,870	60,040
Required - Chapter 356	262,093	336,514	460,757	709,559	1,456,602	125,907	135,565	146,144	157,756	170,534
Sufficiency / (Deficiency)	(218,986)	(291,791)	(414,357)	(661,419)	(1,406,656)	(74,088)	(81,803)	(90,366)	(99,886)	(110,494)
<b>Funding Ratios</b>										
Current Assets (MVA)	447,551	423,973	398,055	369,923	339,537	306,762	271,461	233,484	192,675	148,869
Actuarial Accrued Liability (AAL)	1,467,631	1,520,644	1,576,856	1,636,804	1,700,894	1,769,475	1,842,929	1,921,667	2,006,138	2,096,828
Unfunded AAL	1,020,080	1,096,671	1,178,801	1,266,881	1,361,357	1,462,713	1,571,468	1,688,183	1,813,463	1,947,959
Funding Ratio	30%	28%	25%	23%	20%	17%	15%	12%	10%	7%
<b>Benefit Payments</b>	95,823	98,093	100,143	102,146	104,189	106,273	108,398	110,566	112,777	115,033

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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**State Patrol Retirement Fund**  
**Scenario: 6.5% for Five Years, 7.0% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.5%	31.5%	32.0%	32.0%	32.5%	32.5%	33.0%	33.0%
Required - Chapter 356	43.0%	44.7%	46.5%	48.5%	50.7%	53.1%	55.5%	58.0%	60.9%	64.0%
Sufficiency / (Deficiency)	(12.0)%	(13.7)%	(15.0)%	(17.0)%	(18.7)%	(21.1)%	(23.0)%	(25.5)%	(27.9)%	(31.0)%
<b>Contributions</b>										
Statutory - Chapter 352B	20,644	21,418	22,579	23,426	24,690	25,616	26,992	28,004	29,501	30,608
Required - Chapter 356	28,599	30,857	33,348	36,080	39,116	42,526	46,065	49,990	54,405	59,360
Sufficiency / (Deficiency)	(7,955)	(9,439)	(10,769)	(12,654)	(14,426)	(16,910)	(19,073)	(21,986)	(24,904)	(28,752)
<b>Funding Ratios</b>										
Current Assets (MVA)	549,956	553,264	555,868	557,983	559,160	559,717	562,101	564,326	565,656	566,576
Actuarial Accrued Liability (AAL)	760,955	785,431	810,683	836,648	863,307	890,678	918,965	948,515	979,106	1,010,897
Unfunded AAL	210,999	232,167	254,815	278,665	304,147	330,961	356,864	384,189	413,450	444,321
Funding Ratio	72%	70%	69%	67%	65%	63%	61%	59%	58%	56%
<b>Benefit Payments</b>	51,902	53,560	55,353	57,234	59,167	60,976	62,659	64,679	66,655	68,361

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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**State Patrol Retirement Fund**  
**Scenario: 6.5% for Five Years, 7.0% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	33.5%	33.5%	34.0%	34.0%	34.5%	34.5%	35.0%	35.0%	35.5%	35.5%
Required - Chapter 356	67.6%	71.6%	76.2%	81.5%	87.7%	95.2%	104.3%	115.6%	130.0%	149.2%
Sufficiency / (Deficiency)	(34.1)%	(38.1)%	(42.2)%	(47.5)%	(53.2)%	(60.7)%	(69.3)%	(80.6)%	(94.5)%	(113.7)%
<b>Contributions</b>										
Statutory - Chapter 352B	32,237	33,445	35,217	36,538	38,466	39,908	42,005	43,580	45,860	47,580
Required - Chapter 356	65,005	71,437	78,889	87,555	97,826	110,109	125,149	143,882	167,991	200,027
Sufficiency / (Deficiency)	(32,768)	(37,992)	(43,672)	(51,017)	(59,360)	(70,201)	(83,144)	(100,302)	(122,131)	(152,447)
<b>Funding Ratios</b>										
Current Assets (MVA)	566,931	567,123	566,430	565,209	562,728	559,469	554,709	548,932	541,530	533,136
Actuarial Accrued Liability (AAL)	1,044,296	1,079,363	1,115,991	1,154,172	1,193,840	1,235,092	1,277,924	1,322,418	1,368,749	1,417,124
Unfunded AAL	477,365	512,240	549,561	588,963	631,112	675,623	723,215	773,486	827,219	883,988
Funding Ratio	54%	53%	51%	49%	47%	45%	43%	42%	40%	38%
<b>Benefit Payments</b>	70,163	72,231	74,459	76,903	79,406	82,069	84,815	87,559	90,286	93,130

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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**State Patrol Retirement Fund**  
**Scenario: 6.5% for Five Years, 7.0% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

<b>\$ in Thousands</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	36.0%	36.0%	36.5%	36.5%	37.0%	37.0%	37.5%	37.5%	38.0%	38.0%
Required - Chapter 356	176.1%	216.3%	283.1%	416.6%	817.0%	69.6%	71.8%	74.2%	76.7%	79.3%
Sufficiency / (Deficiency)	(140.1)%	(180.3)%	(246.6)%	(380.1)%	(780.0)%	(32.6)%	(34.3)%	(36.7)%	(38.7)%	(41.3)%
<b>Contributions</b>										
Statutory - Chapter 352B	50,060	51,937	54,633	56,682	59,613	61,848	65,035	67,473	70,937	73,597
Required - Chapter 356	244,888	311,987	423,802	646,983	1,316,383	116,399	124,571	133,427	143,106	153,647
Sufficiency / (Deficiency)	(194,828)	(260,050)	(369,169)	(590,301)	(1,256,770)	(54,551)	(59,536)	(65,954)	(72,169)	(80,050)
<b>Funding Ratios</b>										
Current Assets (MVA)	522,978	511,876	499,577	487,073	473,726	460,350	446,180	432,101	417,300	402,743
Actuarial Accrued Liability (AAL)	1,467,631	1,520,644	1,576,856	1,636,804	1,700,894	1,769,475	1,842,929	1,921,667	2,006,138	2,096,828
Unfunded AAL	944,653	1,008,768	1,077,279	1,149,731	1,227,168	1,309,125	1,396,749	1,489,566	1,588,838	1,694,085
Funding Ratio	36%	34%	32%	30%	28%	26%	24%	22%	21%	19%
<b>Benefit Payments</b>	95,823	98,093	100,143	102,146	104,189	106,273	108,398	110,566	112,777	115,033

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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**State Patrol Retirement Fund**  
**Scenario: 8.0% for Five Years, 8.5% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	43.0%	43.9%	44.9%	46.0%	47.3%	48.7%	50.0%	51.4%	53.1%	54.9%
Sufficiency / (Deficiency)	(12.0)%	(12.9)%	(13.9)%	(15.0)%	(16.3)%	(17.7)%	(19.0)%	(20.4)%	(22.1)%	(23.9)%
<b>Contributions</b>										
Statutory - Chapter 352B	20,644	21,418	22,221	23,054	23,919	24,816	25,746	26,712	27,713	28,753
Required - Chapter 356	28,599	30,310	32,176	34,218	36,464	38,990	41,520	44,318	47,427	50,905
Sufficiency / (Deficiency)	(7,955)	(8,892)	(9,955)	(11,164)	(12,545)	(14,174)	(15,774)	(17,606)	(19,714)	(22,152)
<b>Funding Ratios</b>										
Current Assets (MVA)	549,956	561,278	572,579	583,750	594,716	605,443	619,008	632,933	646,936	661,106
Actuarial Accrued Liability (AAL)	760,955	785,431	810,683	836,648	863,307	890,678	918,965	948,515	979,106	1,010,897
Unfunded AAL	210,999	224,153	238,104	252,898	268,591	285,235	299,957	315,582	332,170	349,791
Funding Ratio	72%	71%	71%	70%	69%	68%	67%	67%	66%	65%
<b>Benefit Payments</b>										
	51,902	53,560	55,353	57,234	59,167	60,976	62,659	64,679	66,655	68,361

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*



This exhibit should only be viewed in conjunction with GRS' January 31, 2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 8.0 % for Five Years, 8.5 % thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	57.0%	59.4%	62.2%	65.4%	69.3%	73.9%	79.7%	86.8%	96.1%	108.4%
Sufficiency / (Deficiency)	(26.0)%	(28.4)%	(31.2)%	(34.4)%	(38.3)%	(42.9)%	(48.7)%	(55.8)%	(65.1)%	(77.4)%
<b>Contributions</b>										
Statutory - Chapter 352B	29,831	30,949	32,110	33,314	34,563	35,860	37,204	38,599	40,047	41,549
Required - Chapter 356	54,824	59,275	64,379	70,297	77,246	85,534	95,600	108,108	124,097	145,300
Sufficiency / (Deficiency)	(24,993)	(28,326)	(32,269)	(36,983)	(42,683)	(49,674)	(58,396)	(69,509)	(84,050)	(103,751)
<b>Funding Ratios</b>										
Current Assets (MVA)	675,775	690,929	706,372	722,006	737,666	753,341	768,912	784,336	799,653	814,926
Actuarial Accrued Liability (AAL)	1,044,296	1,079,363	1,115,991	1,154,172	1,193,840	1,235,092	1,277,924	1,322,418	1,368,749	1,417,124
Unfunded AAL	368,521	388,434	409,619	432,166	456,174	481,751	509,012	538,082	569,096	602,198
Funding Ratio	65%	64%	63%	63%	62%	61%	60%	59%	58%	58%
<b>Benefit Payments</b>										
	70,163	72,231	74,459	76,903	79,406	82,069	84,815	87,559	90,286	93,130

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

This exhibit should only be viewed in conjunction with GRS' January 31, 2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 8.0% for Five Years, 8.5% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	125.7%	151.8%	195.2%	282.2%	543.2%	52.8%	54.1%	55.5%	56.9%	58.6%
Sufficiency / (Deficiency)	(94.7)%	(120.8)%	(164.2)%	(251.2)%	(512.2)%	(21.8)%	(23.1)%	(24.5)%	(25.9)%	(27.6)%
<b>Contributions</b>										
Statutory - Chapter 352B	43,107	44,723	46,400	48,140	49,946	51,819	53,762	55,778	57,870	60,040
Required - Chapter 356	174,836	218,942	292,169	438,169	875,205	88,244	93,765	99,763	106,293	113,422
Sufficiency / (Deficiency)	(131,729)	(174,219)	(245,769)	(390,029)	(825,259)	(36,425)	(40,003)	(43,985)	(48,423)	(53,382)
<b>Funding Ratios</b>										
Current Assets (MVA)	830,086	845,338	861,193	877,993	895,934	915,136	935,737	957,882	981,735	1,007,474
Actuarial Accrued Liability (AAL)	1,467,631	1,520,644	1,576,856	1,636,804	1,700,894	1,769,475	1,842,929	1,921,667	2,006,138	2,096,828
Unfunded AAL	637,545	675,306	715,663	758,811	804,960	854,339	907,192	963,785	1,024,403	1,089,354
Funding Ratio	57%	56%	55%	54%	53%	52%	51%	50%	49%	48%
<b>Benefit Payments</b>										
	95,823	98,093	100,143	102,146	104,189	106,273	108,398	110,566	112,777	115,033

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

This exhibit should only be viewed  
in conjunction with GRS' January  
31, 2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 8.0% for Five Years, 8.5% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.5%	31.5%	32.0%	32.0%	32.5%	32.5%	33.0%	33.0%
Required - Chapter 356	43.0%	43.9%	44.9%	46.0%	47.2%	48.6%	49.7%	51.0%	52.5%	54.1%
Sufficiency / (Deficiency)	(12.0)%	(12.9)%	(13.4)%	(14.5)%	(15.2)%	(16.6)%	(17.2)%	(18.5)%	(19.5)%	(21.1)%
<b>Contributions</b>										
Statutory - Chapter 352B	20,644	21,418	22,579	23,426	24,690	25,616	26,992	28,004	29,501	30,608
Required - Chapter 356	28,599	30,310	32,176	34,191	36,405	38,862	41,310	43,974	46,924	50,170
Sufficiency / (Deficiency)	(7,955)	(8,892)	(9,597)	(10,765)	(11,715)	(13,246)	(14,318)	(15,970)	(17,423)	(19,562)
<b>Funding Ratios</b>										
Current Assets (MVA)	549,956	561,278	572,579	584,122	595,506	607,097	621,638	637,086	652,789	669,320
Actuarial Accrued Liability (AAL)	760,955	785,431	810,683	836,648	863,307	890,678	918,965	948,515	979,106	1,010,897
Unfunded AAL	210,999	224,153	238,104	252,526	267,801	283,581	297,327	311,429	326,317	341,577
Funding Ratio	72%	71%	71%	70%	69%	68%	68%	67%	67%	66%
<b>Benefit Payments</b>										
	51,902	53,560	55,353	57,234	59,167	60,976	62,659	64,679	66,655	68,361

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

This exhibit should only be viewed in conjunction with GRS' January 31, 2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 8.0% for Five Years, 8.5% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	33.5%	33.5%	34.0%	34.0%	34.5%	34.5%	35.0%	35.0%	35.5%	35.5%
Required - Chapter 356	55.9%	58.0%	60.3%	63.1%	66.3%	70.2%	74.9%	80.7%	88.2%	98.1%
Sufficiency / (Deficiency)	(22.4)%	(24.5)%	(26.3)%	(29.1)%	(31.8)%	(35.7)%	(39.9)%	(45.7)%	(52.7)%	(62.6)%
<b>Contributions</b>										
Statutory - Chapter 352B	32,237	33,445	35,217	36,538	38,466	39,908	42,005	43,580	45,860	47,580
Required - Chapter 356	53,809	57,872	62,503	67,779	73,932	81,143	89,834	100,455	113,923	131,515
Sufficiency / (Deficiency)	(21,572)	(24,427)	(27,286)	(31,241)	(35,466)	(41,235)	(47,829)	(56,875)	(68,063)	(83,935)
<b>Funding Ratios</b>										
Current Assets (MVA)	686,622	705,205	724,464	744,875	765,840	787,977	810,713	834,695	859,485	885,904
Actuarial Accrued Liability (AAL)	1,044,296	1,079,363	1,115,991	1,154,172	1,193,840	1,235,092	1,277,924	1,322,418	1,368,749	1,417,124
Unfunded AAL	357,674	374,158	391,527	409,297	428,000	447,115	467,211	487,723	509,264	531,220
Funding Ratio	66%	65%	65%	65%	64%	64%	63%	63%	63%	63%
<b>Benefit Payments</b>										
	70,163	72,231	74,459	76,903	79,406	82,069	84,815	87,559	90,286	93,130

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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**State Patrol Retirement Fund**  
**Scenario: 8.0% for Five Years, 8.5% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	36.0%	36.0%	36.5%	36.5%	37.0%	37.0%	37.5%	37.5%	38.0%	38.0%
Required - Chapter 356	112.1%	132.9%	167.6%	236.9%	444.8%	46.3%	46.8%	47.3%	47.8%	48.4%
Sufficiency / (Deficiency)	(76.1)%	(96.9)%	(131.1)%	(200.4)%	(407.8)%	(9.3)%	(9.3)%	(9.8)%	(9.8)%	(10.4)%
<b>Contributions</b>										
Statutory - Chapter 352B	50,060	51,937	54,633	56,682	59,613	61,848	65,035	67,473	70,937	73,597
Required - Chapter 356	155,835	191,701	250,873	367,836	716,619	77,426	81,177	85,113	89,307	93,719
Sufficiency / (Deficiency)	(105,775)	(139,764)	(196,240)	(311,154)	(657,006)	(15,578)	(16,142)	(17,640)	(18,370)	(20,122)
<b>Funding Ratios</b>										
Current Assets (MVA)	913,384	942,965	974,639	1,009,664	1,047,700	1,089,881	1,135,790	1,186,692	1,242,186	1,303,686
Actuarial Accrued Liability (AAL)	1,467,631	1,520,644	1,576,856	1,636,804	1,700,894	1,769,475	1,842,929	1,921,667	2,006,138	2,096,828
Unfunded AAL	554,247	577,679	602,217	627,140	653,194	679,594	707,139	734,975	763,952	793,142
Funding Ratio	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%
<b>Benefit Payments</b>										
	95,823	98,093	100,143	102,146	104,189	106,273	108,398	110,566	112,777	115,033

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

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2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 9.5% for Five Years, 10.0% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	43.0%	43.1%	43.2%	43.4%	43.6%	43.9%	43.8%	43.8%	43.8%	43.7%
Sufficiency / (Deficiency)	(12.0)%	(12.1)%	(12.2)%	(12.4)%	(12.6)%	(12.9)%	(12.8)%	(12.8)%	(12.8)%	(12.7)%
<b>Contributions</b>										
Statutory - Chapter 352B	20,644	21,418	22,221	23,054	23,919	24,816	25,746	26,712	27,713	28,753
Required - Chapter 356	28,599	29,763	30,987	32,274	33,633	35,106	36,406	37,748	39,132	40,557
Sufficiency / (Deficiency)	(7,955)	(8,345)	(8,766)	(9,220)	(9,714)	(10,290)	(10,660)	(11,036)	(11,419)	(11,804)
<b>Funding Ratios</b>										
Current Assets (MVA)	549,956	569,291	589,531	610,651	632,672	655,659	683,054	712,391	743,548	776,789
Actuarial Accrued Liability (AAL)	760,955	785,431	810,683	836,648	863,307	890,678	918,965	948,515	979,106	1,010,897
Unfunded AAL	210,999	216,140	221,152	225,997	230,635	235,019	235,911	236,124	235,558	234,108
Funding Ratio	72%	72%	73%	73%	73%	74%	74%	75%	76%	77%
<b>Benefit Payments</b>	51,902	53,560	55,353	57,234	59,167	60,976	62,659	64,679	66,655	68,361

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

*In approximately the year 2031, the plan's funded ratio would be over 90% assuming a 1.5% COLA but under 90% assuming a 2.5% COLA. In approximately the year 2036, the plan's funded ratio would be over 90% assuming a 2.5% COLA. Further guidance would be needed to determine when the COLA could increase from 1.5% to 2.5%.*

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**State Patrol Retirement Fund**  
**Scenario: 9.5% for Five Years, 10.0% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	43.7%	43.6%	43.5%	43.4%	43.2%	42.9%	42.6%	42.2%	41.6%	40.8%
Sufficiency / (Deficiency)	(12.7)%	(12.6)%	(12.5)%	(12.4)%	(12.2)%	(11.9)%	(11.6)%	(11.2)%	(10.6)%	(9.8)%
<b>Contributions</b>										
Statutory - Chapter 352B	29,831	30,949	32,110	33,314	34,563	35,860	37,204	38,599	40,047	41,549
Required - Chapter 356	42,021	43,518	45,044	46,587	48,136	49,670	51,159	52,555	53,781	54,707
Sufficiency / (Deficiency)	(12,190)	(12,569)	(12,934)	(13,273)	(13,573)	(13,810)	(13,955)	(13,956)	(13,734)	(13,158)
<b>Funding Ratios</b>										
Current Assets (MVA)	812,645	851,318	892,852	937,411	985,112	1,036,258	1,091,072	1,149,886	1,213,154	1,281,393
Actuarial Accrued Liability (AAL)	1,044,296	1,079,363	1,115,991	1,154,172	1,193,840	1,235,092	1,277,924	1,322,418	1,368,749	1,417,124
Unfunded AAL	231,651	228,045	223,139	216,761	208,728	198,834	186,852	172,532	155,595	135,731
Funding Ratio	78%	79%	80%	81%	83%	84%	85%	87%	89%	90%
<b>Benefit Payments</b>	70,163	72,231	74,459	76,903	79,406	82,069	84,815	87,559	90,286	93,130

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

*In approximately the year 2031, the plan's funded ratio would be over 90% assuming a 1.5% COLA but under 90% assuming a 2.5% COLA. In approximately the year 2036, the plan's funded ratio would be over 90% assuming a 2.5% COLA. Further guidance would be needed to determine when the COLA could increase from 1.5% to 2.5%.*

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**State Patrol Retirement Fund**  
**Scenario: 9.5% for Five Years, 10.0% thereafter WITHOUT CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2032	2033	2034	2035	2036
<b>Contributions (% of Payroll)</b>					
Statutory - Chapter 352B	31.0%	31.0%	31.0%	31.0%	31.0%
Required - Chapter 356	39.6%	37.8%	34.5%	27.9%	20.3%
Sufficiency / (Deficiency)	(8.6)%	(6.8)%	(3.5)%	3.1%	10.7%
<b>Contributions</b>					
Statutory - Chapter 352B	43,107	44,723	46,400	48,140	49,946
Required - Chapter 356	55,094	54,456	51,656	43,261	32,773
Sufficiency / (Deficiency)	(11,987)	(9,733)	(5,256)	4,879	17,173
<b>Funding Ratios</b>					
Current Assets (MVA)	1,355,034	1,434,835	1,521,917	1,617,302	1,721,935
Actuarial Accrued Liability (AAL)	1,467,631	1,520,644	1,576,856	1,636,804	1,700,894
Unfunded AAL	112,597	85,809	54,939	19,502	(21,041)
Funding Ratio	92%	94%	97%	99%	101%
<b>Benefit Payments</b>	95,823	98,093	100,143	102,146	104,189

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

*In approximately the year 2031, the plan's funded ratio would be over 90% assuming a 1.5% COLA but under 90% assuming a 2.5% COLA. In approximately the year 2036, the plan's funded ratio would be over 90% assuming a 2.5% COLA. Further guidance would be needed to determine when the COLA could increase from 1.5% to 2.5%.*



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2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 9.5% for Five Years, 10.0% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	31.0%	31.0%	31.5%	31.5%	32.0%	32.0%	32.5%	32.5%	33.0%	33.0%
Required - Chapter 356	43.0%	43.1%	43.2%	43.4%	43.5%	43.7%	43.6%	43.4%	43.2%	42.9%
Sufficiency / (Deficiency)	(12.0)%	(12.1)%	(11.7)%	(11.9)%	(11.5)%	(11.7)%	(11.1)%	(10.9)%	(10.2)%	(9.9)%
<b>Contributions</b>										
Statutory - Chapter 352B	20,644	21,418	22,579	23,426	24,690	25,616	26,992	28,004	29,501	30,608
Required - Chapter 356	28,599	29,763	30,987	32,247	33,573	34,976	36,190	37,395	38,612	39,794
Sufficiency / (Deficiency)	(7,955)	(8,345)	(8,408)	(8,821)	(8,883)	(9,360)	(9,198)	(9,391)	(9,111)	(9,186)
<b>Funding Ratios</b>										
Current Assets (MVA)	549,956	569,291	589,531	611,026	633,472	657,344	685,748	716,663	749,603	785,327
Actuarial Accrued Liability (AAL)	760,955	785,431	810,683	836,648	863,307	890,678	918,965	948,515	979,106	1,010,897
Unfunded AAL	210,999	216,140	221,152	225,622	229,835	233,334	233,217	231,852	229,503	225,570
Funding Ratio	72%	72%	73%	73%	73%	74%	75%	76%	77%	78%
<b>Benefit Payments</b>	51,902	53,560	55,353	57,234	59,167	60,976	62,659	64,679	66,655	68,361

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

*In approximately the year 2029, the plan's funded ratio would be over 90% assuming a 1.5% COLA but under 90% assuming a 2.5% COLA. In approximately the year 2033, the plan's funded ratio would be over 90% assuming a 2.5% COLA. Further guidance would be needed to determine when the COLA could increase from 1.5% to 2.5%.*

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**State Patrol Retirement Fund**  
**Scenario: 9.5% for Five Years, 10.0% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Contributions (% of Payroll)</b>										
Statutory - Chapter 352B	33.5%	33.5%	34.0%	34.0%	34.5%	34.5%	35.0%	35.0%	35.5%	35.5%
Required - Chapter 356	42.6%	42.1%	41.6%	40.9%	40.0%	38.9%	37.4%	35.5%	33.0%	29.5%
Sufficiency / (Deficiency)	(9.1)%	(8.6)%	(7.6)%	(6.9)%	(5.5)%	(4.4)%	(2.4)%	(0.5)%	2.5%	6.0%
<b>Contributions</b>										
Statutory - Chapter 352B	32,237	33,445	35,217	36,538	38,466	39,908	42,005	43,580	45,860	47,580
Required - Chapter 356	40,960	42,045	43,061	43,913	44,594	44,952	44,925	44,234	42,650	39,538
Sufficiency / (Deficiency)	(8,723)	(8,600)	(7,844)	(7,375)	(6,128)	(5,044)	(2,920)	(654)	3,210	8,042
<b>Funding Ratios</b>										
Current Assets (MVA)	823,985	866,318	911,973	961,706	1,015,223	1,073,477	1,136,264	1,204,638	1,278,611	1,359,499
Actuarial Accrued Liability (AAL)	1,044,296	1,079,363	1,115,991	1,154,172	1,193,840	1,235,092	1,277,924	1,322,418	1,368,749	1,417,124
Unfunded AAL	220,311	213,045	204,018	192,466	178,617	161,615	141,660	117,780	90,138	57,625
Funding Ratio	79%	80%	82%	83%	85%	87%	89%	91%	93%	96%
<b>Benefit Payments</b>	70,163	72,231	74,459	76,903	79,406	82,069	84,815	87,559	90,286	93,130

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

*In approximately the year 2029, the plan's funded ratio would be over 90% assuming a 1.5% COLA but under 90% assuming a 2.5% COLA. In approximately the year 2033, the plan's funded ratio would be over 90% assuming a 2.5% COLA. Further guidance would be needed to determine when the COLA could increase from 1.5% to 2.5%.*

This exhibit should only be viewed  
in conjunction with GRS' January 31,  
2013 letter to MSRS.

**State Patrol Retirement Fund**  
**Scenario: 9.5% for Five Years, 10.0% thereafter WITH CONTRIBUTION STABILIZER**  
**Fiscal year beginning July 1**

\$ in Thousands	2032	2033
<b>Contributions (% of Payroll)</b>		
Statutory - Chapter 352B	35.0%	35.0%
Required - Chapter 356	24.5%	20.2%
Sufficiency / (Deficiency)	10.5%	14.8%
<b>Contributions</b>		
Statutory - Chapter 352B	48,669	50,494
Required - Chapter 356	34,051	29,181
Sufficiency / (Deficiency)	14,618	21,313
<b>Funding Ratios</b>		
Current Assets (MVA)	1,447,284	1,542,150
Actuarial Accrued Liability (AAL)	1,467,631	1,520,644
Unfunded AAL	20,347	(21,506)
Funding Ratio	99%	101%
<b>Benefit Payments</b>	95,823	98,093

*Assumes annual postretirement increases of 1.5% for all years.*

*Numbers may not add due to rounding.*

*In approximately the year 2029, the plan's funded ratio would be over 90% assuming a 1.5% COLA but under 90% assuming a 2.5% COLA. In approximately the year 2033, the plan's funded ratio would be over 90% assuming a 2.5% COLA. Further guidance would be needed to determine when the COLA could increase from 1.5% to 2.5%.*