State Retirement and Pension System of Maryland

June 30, 2009 Actuarial Audit

Produced by Cheiron

November 2009

Table of Contents

November 4, 2009

Board of Trustees
State Retirement and Pension System of Maryland
120 East Baltimore Street
Baltimore, MD 21202

Cheiron is pleased to present the results of our June 30, 2009 actuarial audit of the retirement plan for the State Retirement and Pension System of Maryland (the System). We direct your attention to the summary section of our report which highlights the key findings of our review of the actuarial valuation. The balance of the report provides details in support of these findings along with supplemental data, background information and discussion of the process taken in evaluation of the work performed by the System's actuary.

In performing this audit, Cheiron used actuarial assumptions and methods recommended by the actuary and adopted by the Board of Trustees (the Board) based upon the most recent review of the experience of the retirement plans in the programs administered by State Retirement and Pension System of Maryland completed in 2007. In the valuation replication we ran our results with and without assumptions and method changes adopted by the Board and applied by the System's actuary Gabriel, Roeder, Smith & Company included in their presentation of September 15, 2009. We have only shown our results without changes. We comment on the relative impact in our comparison of results. It is our understanding the Board has the final decision regarding the appropriateness of the assumptions.

The results of this audit report reflect a full replication of the System's June 30, 2009 actuarial valuation, which are dependent upon future experience conforming to these assumptions. It is certain that actual experience will not conform exactly to these assumptions. Actual amounts will differ from projected amounts to the extent actual experience differs from expected experience.

In preparing our report, we relied, without audit, on information (some oral and some written) supplied by the State Retirement Agency (SRA) and the System's actuary. This information includes, but is not limited to, plan provisions, employee census data and financial information, a detailed description of all information and provided for this audit is provided in the body of our report.

While the data was not explicitly audited, we did review the census data for reasonableness and for consistency with the prior year's data.

We would like to take this opportunity to thank the members of SRA staff and Gabriel, Roeder, Smith & Company (GRS) for their assistance in providing the data and addressing our questions during this audit process.
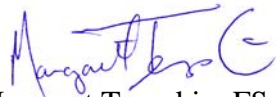
I

Board of Trustees
State Retirement and Pension System of Maryland
November 4, 2009

We hereby certify that, to the best of our knowledge, this report is complete and accurate
and has been prepared in accordance with generally recognized and accepted actuarial
principles and practices which are consistent with the Code of Professional Conduct and
applicable Actuarial Standards of Practice set out by the Actuarial Standards Board, and
that as Members of the American Academy of Actuaries, we meet the Qualification
Standards to render the opinion contained in this report.

Sincerely,
Cheiron

Kenneth A. Kent, FSA, FCA, EA, MAAA
Consulting Actuary

Margaret Tempkin, FSA, EA, MAAA
Actuary

PROCESS DESCRIPTION

An actuarial audit of an annual valuation of a retirement system provides key confirmation of results. For the Board of Trustees, these results can otherwise be viewed as a *black-box* process because of the complex computation and program systems customarily used to arrive at actuarial liabilities and costs. This audit process addresses:

- Review of the census data used determining the Systems cost. There are typical and anticipated adjustments made to the data in preparing the valuation that impact the final results, that treatment should logically be consistent and rational, and explicitly defined in the valuation reporting. By comparing summary statistics from our treatment with the GRS valuation report we can highlight differences in the underlying processed data and the likely impact on cost.
- Review of the financial data and how it is addressed under that actuarial asset methodology in determining the System cost. There are adjustments made to the financial data provided by the State to determine the actuarial value of assets. These adjustments impact the final results and future results and thus should be consistent with prior years' calculations.
- Replication of the liability and costs values by separately programming our independent valuation system for the same benefits, using the same census data, valuation cost methods and assumption as reported in the 2008 valuation. We can compare and contrast the results presented by the Systems actuary. This provides an explicit check of that *black-box* process.
- Consider the reasonableness of the body of actuarial assumptions which are in part the result of actual experience of the System measured through explicit experience analysis and in part reflection of judgment of the actuary and the Board. Our process provides additional insight into the trends, standard and emerging practice for future consideration.
- Comment on the effectiveness of the actuarial funding method, designed to provide a systematic and smooth scheme for the funding of the benefit obligations of the System.

The actual process for the audit is to run through a number of steps identical to preparing the actuarial valuation.

1. We collected the same financial and demographic census data to perform the same processes for a valuation.
2. We programmed our system to value the liabilities and costs of all benefits provided by each of the systems that make up SRPS.
3. We applied the same set of assumptions as disclosed by the Systems' actuary to best replicate results.
4. We also requested and reviewed *sample lives* runs which represent year by year, benefit by benefit analysis of a single participant which demonstrates how the assumptions are applied and the liabilities are determined through the participant's career and thereafter through retirement.

This process is conducted in accordance with generally accepted actuarial principles and methods. The balance or our report presents our findings along with consideration for the Boards attentions.

SECTION I
AUDIT SUMMARY

Cheiron performed an audit of the June 30, 2009 actuarial valuation of the State Retirement and Pension Systems of Maryland. We present below our key findings and recommendations in summarized fashion. In the sections that follow we present the details that explain and support these findings and recommendations.

Overall Findings

Our report substantiates the following results:

1. We found no material differences in the rates developed for the two largest systems and for the smaller systems we were provided sufficient documentation about methods and assumption changes since the last valuation to support acceptance of the differences between Cheiron and GRS results.

2. We note a departure from the System's established policy of considering changes in assumptions and methods following a thorough review of experience through a formal experience study. While we were informed of the changes presented to the Board for acceptance on September 15, 2009 we were informed of other assumptions and method changes that were not communicated to the Board and should be fully disclosed.

3. Neither the September 15, 2009 presentation to the Board nor the draft valuation report by GRS provides a reconciliation of the financial impact of each of the assumptions and methods changed. In this regard, we could not analyze the materiality of potential offsetting changes in the measurement of the System's costs and liabilities.

What follows is a discussion of our overall audit findings.

Using all the same actuarial assumptions and methods from the 2008 valuation reports we have verified GRS's rate development. However, while GRS's rates are not significantly different than ours, there were several changes in methods and assumptions that GRS used to develop their rates.

During our review we were informed that a number of changes to the valuation methods and assumptions were presented and adopted by the Board on September 15, 2009. In aggregate the method and assumption changes do not materially change the results provided because they have offsetting impacts. Below is from GRS's September 15th presentation on page 15.
1. *Normal Cost Method: Increase*
2. *Change in Decrement Timing: Decrease*
3. *Contribution Shortfall: Increase*
4. *Optional Benefit Forms: Decrease*
5. *COLA: Decrease*
    Total: Varies by System

SECTION I
AUDIT SUMMARY

Below we discuss each of the changes reported with comments on the implications relative to our results. We note the changes were not explicitly highlighted in the draft reports received. As a minimum it appears the impact is embedded in the calculation from the actuarial rates to the Corridor Method cost determination. It is the actuary's responsibility as part of his valuation processing to explicitly quantify the impact of all changes especially to allow for accurate reconciliation of the Corridor Method Costs not only for this year but to ensure they can be identified in the future. In determining their results GRS:

- Assumed normal costs for an individual stops when they exit active membership – this issue was identified in last years actuarial audit and is appropriate and follows generally accepted practice.

- Assumed Teachers leave the system on July 1 and that all other employment exits mid-year – mid year decrements are a common practice while at the same time the exception for teachers does best reflect hiring patterns for this class of employees.

- Assumed individuals elect optional benefit forms in accordance with recent past experience – This was address by applying a load of 0.975 for Teachers Combined Systems and 0.9775 for Employees Combined Systems to the respective active liabilities. It is unclear from the presentation material the rational for these adjustments. For these two Systems the retirement annuity payable is adjusted for any form of payment other then a life annuity. The adjustments as we understand them are actuarial equivalents. Therefore the value of an alternative form of payment other than a life annuity should have no impact on the liabilities of these Systems if the mortality assumption used in developing the actuarial equivalence factors reflects current experience.

- Recognized the estimated economic value of the COLA cap for affected groups. The explanation for their assumption of 2.75% for a 3.0% cap and 2.95% for a 5.0% cap implies a 3.0% inflation assumption. However it is our understanding the underlying inflation assumption that is the building block for the investment assumption and salary scale is 3.5%. If this adjustment is based on an underlying assumption change for inflation from 3.5% to 3.0% this is material and has implications on the long term return rate on assets as well as the salary scale.

- The fifth change is that they recognized a contribution shortfall that is expected to occur between the valuation date and the beginning of the funding period. If we understand this change from the presentation material it is in part accounting in the costs for the delay between determining the contribution rate and actual appropriation. The approach is reasonable.

Generally accepted practice for performing a valuation for the first time calls for the testing of assumptions and methods by replicating the prior years valuation before proceeding with the current valuation. We have not seen any evidence of this process having taken place in their initial presentation or in substantiating the difference between their valuation system and the

SECTION I
AUDIT SUMMARY

prior actuarial valuation. At a minimum they should disclose if they were able to reconcile with the prior valuations and if any changes made were in response to that process.

In a similar fashion there is no explicit demonstration of the difference on cost and liabilities resulting from the assumption changes disclosed in GRS's September 15, 2009 Board presentation nor the draft valuation report.

Based on discussion and correspondence with GRS we understand the following represent some additional changes implemented in their valuation processing which were not identified in their September presentation:

- **Treatment of multiple decrements** – there are various forces that impact the expected future participation of a member of the Systems including turnover, mortality, disability and retirement. These are commonly referred to by actuaries as decrements. Standard practices provide different ways actuaries apply these forces to determine the likelihood a participant will remain to collect benefits and how long they will survive to receive them. During active participation these decrements apply simultaneously. Historically for valuation purposes they have been applied as rates so for example if the rate of termination of employment at a certain age is 10% and of disability at that same age is 2% there would be an 88.0% chance the participant will be active next year $(1 – 0.10 – 0.02)$.

  An alternative approach is to apply rates as probabilities for example there is a 10% probability of termination and 2% probability of disability. In this case the probability of the participant will be active next year is 88.2% $[(1 – 0.10) \times (1 – 0.02)]$.

  The impact is not significant in the illustration but can add up over the span of an active participant's working lifetime as well as increase questions during an audit. Both methods are acceptable however GRS has applied the probabilistic approach which represents a change in the application of decrements used in past years and GRS should have documented the implications.

- **DROP valuation treatment** – in practice there are a number of ways DROP's are valued, the two most common approaches are 1. Assume participants who enter DROP will remain for an average period of time and measure the present value of the ultimate DROP account distribution or 2. Assume all DROP participants will retire at the end of the year of the valuation and hold the current DROP account as the liability. The difference in the two methods results in whether you discount costs for experience gains when DROP accounts are credited with interest at rates below the actuarial assumed return rate, or experience the gain or loss when the participant actually leaves active employment and receives their DROP account.

SECTION I
AUDIT SUMMARY

The DROP has historically been valued the first way, which recognizes the discounted cost. GRS has told us they have valued the DROP using the second method, which again represents a change in valuation method for determining the liability for these benefits.

We also believe that, based on the way they have chosen to value these benefits, they have also changed the retirement assumptions for these affected Systems. It does not appear that these assumption changes were presented to the Board for approval, nor disclosed in their draft valuation report.

- **Judges Pension employee normal cost valuation** – employees of this System are required to make employee contributions of 6.0% of pay for the first 16 years of participation and 0.0% thereafter. This provision has historically been explicitly valued this way. In the review of the sample lives we noted that the 6.0% contribution was valued beyond the 16 years. GRS indicated they chose, consistent with the normal cost method change presented to the Board to calculate the Normal Cost beyond the 16 years to the date of expected retirement and load back into the liabilities the amount of excess employee contributions produced by the valuation systems. The way in which the load was developed was not disclosed, however our results reconcile with the aggregate liabilities for this group which supports the fact the load seems to be appropriate. But the assumptions behind the development should be part of the assumptions described for the Judges System.

- **Measurement of Retirement Eligibility for members entitled to bifurcated benefits** – when a member has transferred from the "Retirement Plan" to the "Pension Plan" it is our understanding they are entitled to a benefit based on the sum of the benefits accrued under each System. However, the retirement eligibility for each System differs and more specifically retirement eligibility under the Pension Plans is at least age 62 whereas under the Retirement Plan it is age 60. Historically the assumption is these participants will defer retirement from the Retirement Plan until reaching Pension Plan eligibility. It is our understanding GRS has assumed members with bifurcated benefits will retire when first eligible under the Retirement Plan at the earlier age even though their Pension Plan benefit will not commence for at least two years after retirement.

In each of these instances the changes made fall within generally accepted practice and in the instance of competing decrements or COLA assumption the change may be preferred if in the latter example, the assumptions are based statistically on the appropriate inflation assumption. However, because the changes were not presented with the specific financial impact disclosed, it is not possible for us to confirm that they these changes do not mask some other discrepancy through offsetting impacts. To the extent these changes create larger or smaller costs and liabilities they may have implications on the way the balance of the actuarial assumptions best reflect future experience of the Systems.

SECTION I
AUDIT SUMMARY

Valuation Reconciliation

Based on review and comparison of results for each of the System we looked to see if the overall results are within generally acceptable ranges when attempting to replicate results using similar methods and assumptions. As mentioned above this was somewhat difficult because during the valuation process GRS changed assumptions and applied different methods in the calculation of costs and liabilities.

When testing against different valuation systems there is a generally acceptable tolerance of plus/minus 5.0%. With the larger Systems we would anticipate our results would be much closer.

Even with the comparisons using different methods and assumptions the results remain relatively similar and overall fall within generally acceptable tolerances.

Data Review

As discussed in Section III of our report we were unable to review the changes to the data performed by GRS the valuation. However the comparison of summary data statistics by System seems to be reasonably in line with the information provided to us. We can not determine if there are any offsetting differences that could have a material impact on the way the State-provided data may have been changed, that could produce materially different results. In Appendix C we have included the descriptions provided to us by GRS, which was used to modify the raw data provided by the System. However, we have no information that allows us to confirm these steps were taken to prepare the data for valuation.

Assumptions Review

As noted there were some assumptions that were changed by GRS. Because the State Code prescribes the assumptions as adopted by the Board, we suggest that GRS provide explicit cost analysis of the impact of all changes they have applied in the valuation report to support the Boards agreement to these changes. We were unable to quantify the impact of the changes made and cannot confirm that we are aware of all such changes, only those that came out of analysis of the sample lives provided.

Asset Valuation Method Review

The actuarial value of assets was set to 120% of the market value and we agree with these results. However, we believe that GRS should have started with the final market value from the 2008 actuarial valuation to calculate the gain/loss instead of the revised market values provided by SRA.

No other material comments on the asset valuation method on its own however the long term implications of the asset valuation method in coordination with the corridor method may need to be addressed by the Board because it serves to further extends the period of recovery of the Systems funded status as discussed below.

SECTION II
VALUATION RECONCILIATION

Funding Method and Budgeting

We recommend an analysis of the Corridor Method be conducted to address the continued divergence and understatement of the State appropriations relative to the actuarially determined cost needed to bring the Teacher's combined and Employee's combined funded status back up to historic levels in a reasonable amount of time. We also find that if the use of a method like the corridor method is still considered appropriate for the management of volatility and funding discipline, a different approach be considered that will be more transparent to changes in the funded status of these two Systems.

The following tables present comparative results between GRS and Cheiron base on the different valuation systems and our understanding of the assumptions and methods used.

State Results

Below we show a comparison of the present value of benefit (PVB), actuarial liability (AL), actuarial value of assets (AVA) and the unfunded actuarial liability (UAL) for the State Systems only.

System	Firm	PVB	AL	AVA	UAL
June 30, 2009 State Retirement and Pension System of Maryland (State Only)					
(In Millions)					
Teachers' Combined Systems	GRS	38,335	31,173	20,606	10,567
	Cheiron	38,792	31,685	20,606	11,079
	(GRS - Cheiron) $	(457)	(512)	0	(512)
	(GRS - Cheiron) %	-1%	-2%	0%	
Employees' Combined Systems	GRS	17,789	15,081	9,230	5,850
	Cheiron	17,970	15,304	9,230	6,074
	(GRS - Cheiron) $	(181)	(223)	0	(223)
	(GRS - Cheiron) %	-1%	-1%	0%	
State Police	GRS	1,905	1,710	1,120	591
	Cheiron	1,886	1,695	1,120	576
	(GRS - Cheiron) $	20	15	0	15
	(GRS - Cheiron) %	1%	1%	0%	
Judges	GRS	509	421	271	150
	Cheiron	506	421	271	150
	(GRS - Cheiron) $	3	0	0	0
	(GRS - Cheiron) %	1%	0%	0%	
LEOPS	GRS	820	684	355	330
	Cheiron	819	677	355	323
	(GRS - Cheiron) $	1	7	0	7
	(GRS - Cheiron) %	0%	1%	0%	
TOTAL - STATE	**GRS**	59,359	49,070	31,581	17,488
	Cheiron	59,972	49,782	31,581	18,201
	(GRS - Cheiron) $	(613)	(713)	0	(713)
	(GRS - Cheiron) %	-1%	-1%	0%	

SECTION II
VALUATION RECONCILIATION

Below we show the comparison of the calculated contribution rates for each State system.

June 30, 2009 State Retirement and Pension System of Maryland (State Only)				
				Difference as %
System	**Item**	**GRS**	**Cheiron**	**of Payroll**
Teachers' Combined Systems	NC%	7.22%	6.87%	0.35%
	UAL%	11.88%	12.13%	-0.25%
	Total Rate	**19.10%**	**19.00%**	**0.10%**
	Corridor Rate	**14.34%**	**14.32%**	**0.02%**
Employees' Combined Systems	NC%	6.46%	6.07%	0.39%
	UAL%	12.27%	12.25%	0.02%
	Total Rate	**18.73%**	**18.32%**	**0.41%**
	Corridor Rate	**11.69%**	**11.61%**	**0.08%**
State Police	NC%	25.51%	23.59%	1.92%
	UAL%	31.52%	29.39%	2.13%
	Total Rate	**57.03%**	**52.98%**	**4.05%**
Judges	NC%	31.30%	28.88%	2.42%
	UAL%	27.77%	27.39%	0.38%
	Total Rate	**59.07%**	**56.27%**	**2.80%**
LEOPS	NC%	18.06%	19.14%	-1.08%
	UAL%	29.61%	28.68%	0.93%
	Total Rate	**47.67%**	**47.82%**	**-0.15%**
TOTAL - STATE	NC%	7.33%	6.96%	0.37%
	UAL%	12.41%	12.54%	-0.13%
	Total Rate	**19.74%**	**19.50%**	**0.24%**
	Corridor Rate	**14.33%**	**14.25%**	**0.08%**

This table shows the implications on the relative dollar cost differences.

State Retirement and Pension System of Maryland (State Only) (In Millions)			
Amounts for Fiscal Year 2011			**Difference**
System	**GRS**	**Cheiron**	**in $millions**
Teachers' Combined Systems	$ 1,224.6	$ 1,260.7	$ (36.1)
- with corridor	$ 919.4	$ 950.2	$ (30.8)
Employees' Combined Systems	$ 619.4	$ 618.3	$ 1.1
- with corridor	$ 386.6	$ 391.9	$ (5.3)
State Police	$ 50.5	$ 47.8	$ 2.7
Judges	$ 24.6	$ 23.9	$ 0.8
LEOPS	$ 43.4	$ 44.5	$ (1.0)
TOTAL - STATE	$ 1,962.6	$ 1,995.2	$ (32.6)
- with corridor	$ 1,424.6	$ 1,458.2	$ (33.6)

SECTION II
VALUATION RECONCILIATION

Municipal Results and Combined State Results

Below we show a comparison of the present value of benefit (PVB), actuarial liability (AL), actuarial value of assets (AVA) and the unfunded actuarial liability (UAL) for the Municipal Systems and the Combined State and Municipal.

System	Firm	PVB	AL	AVA	UAL
June 30, 2009 State Retirement and Pension System of Maryland (Municipal Only) (In Millions)					
Employees' Combined Systems	GRS	4,241	3,437	2,609	828
	Cheiron	4,316	3,513	2,609	905
	(GRS - Cheiron) $	(74)	(77)	0	(77)
	(GRS - Cheiron) %	-2%	-2%	0%	
Correction-MUNI	GRS	16.2	12.3	7.4	4.9
	Cheiron	15.9	12.3	7.4	4.9
	(GRS - Cheiron) $	0.3	0.0	0.0	0.0
	(GRS - Cheiron) %	2%	0%	0%	
LEOPS-MUNI	GRS	299	211	87	124
	Cheiron	300	212	87	125
	(GRS - Cheiron) $	(1)	(1)	0	(1)
	(GRS - Cheiron) %	0%	0%	0%	
TOTAL- Municipal	**GRS**	4,557	3,660	2,703	956
	Cheiron	4,631	3,737	2,703	1,034
	(GRS - Cheiron) $	(75)	(78)	0	(78)
	(GRS - Cheiron) %	-2%	-2%	0%	
June 30, 2009 State Retirement and Pension System of Maryland (Combined State and Municipal)					
TOTAL- (State and Municipal)	**GRS**	$ 63,916	$ 52,729	$ 34,285	$ 18,445
	Cheiron	$ 64,604	$ 53,520	$ 34,285	$ 19,235
	(GRS - Cheiron) $	(688)	(790)	0	(790)
	(GRS - Cheiron) %	-1%	-1%	0%	

8

SECTION II
VALUATION RECONCILIATION

Below we show the comparison of the calculated contribution rates for each Municipal system and the Combined State and Municipal.

June 30, 2009 State Retirement and Pension System of Maryland (Municipal Only)				
				Difference as %
System	Item	GRS	Cheiron	of Payroll
Employees' Combined Systems	NC%	5.41%	5.01%	0.40%
	UAL%	1.89%	2.17%	-0.28%
	Total Rate	7.30%	7.18%	0.12%
Correction-MUNI	NC%	9.29%	8.29%	1.00%
	UAL%	0.40%	0.36%	0.04%
	Total Rate	9.69%	8.65%	1.04%
LEOPS-MUNI	NC%	17.44%	16.35%	1.09%
	UAL%	15.30%	15.16%	0.14%
	Total Rate	32.74%	31.51%	1.23%
TOTAL- Municipal	NC%	6.00%	5.55%	0.44%
	UAL%	2.52%	2.77%	-0.25%
	Total Rate	8.52%	8.33%	0.19%

June 30, 2009 State Retirement and Pension System of Maryland (Combined State and Municipal)				
				Difference as %
System	Item	GRS	Cheiron	of Payroll
TOTAL- (State and Municipal)	NC%	7.19%	6.81%	0.38%
	UAL%	11.41%	11.53%	-0.11%
	Total Rate	18.61%	18.34%	0.27%
	Corridor Rate	13.80%	13.69%	0.11%

This table shows the implications on the relative dollar cost differences.

State Retirement and Pension System of Maryland (Municipal Only) (In Millions)			
Amounts for Fiscal Year 2011			Difference
System	GRS	Cheiron	in $millions
Employees' Combined Systems	$ 84.4	$ 87.4	$ (3.0)
Correction-MUNI	$ 0.4	$ 0.4	$ 0.0
LEOPS-MUNI	$ 17.6	$ 17.5	$ 0.1
TOTAL- Municipal	$ 102.4	$ 105.4	$ (2.9)

State Retirement and Pension System of Maryland (Combined State and Municipal) (In Millions)			
Amounts for Fiscal Year 2011			Difference
System	GRS	Cheiron	in $millions
TOTAL- (State and Municipal)	$ 2,065.1	$ 2,100.6	$ (35.5)
- with corridor	$ 1,527.0	$ 1,563.6	$ (36.5)

CHEIRON

SECTION III
DATA REVIEW

As part of the valuation process the actuary takes the *raw data* from the System and performs reasonability tests. These tests look for missing or inconsistent data elements and result in subsequent questions and data file adjustments. In addition there are often certain data elements that require adjustment before the valuation is run. For example to accurately reflect the total service of a participant of the State Police System the actuary needs to add Prior Service Months, Membership Service months, Old Military Months, New Military Months, and Buyback Months. The result of these changes either in correcting the file or adding fields together results in what is often referred to as the *processed or scrubbed data file* which represents the input information for valuation processing.

We have asked for this file from GRS to determine what changes were made to the file and audit if the fields that need to be manipulated are done so correctly. GRS has represented that a *scrubbed data file* is not available as the input changes and field manipulation are done internally. We therefore can not report on this process and can only confirm if the appropriate changes are being made relative to our ability to replicate their results using the same data file from the System.

GRS did provide us with the parameters and assumptions used to fill in missing data in their automated process. This type of information should be disclosed in the valuation report. Appendix C contains the information they provided to us.

The following tables provide a summary comparing the demographic statistics between our valuation and GRS's. We have highlighted the statistics that are questionable. Also of note is the count of Vested Former participants being different from the two valuation processes.

SECTION III
DATA REVIEW

June 30, 2009 State Retirement and Pension System of Maryland (State Active Members Only)					
System	**Firm**	**Count**	**Average Age**	**Average Service**	**Total Salary**
Teachers' Retirement System	GRS	3,554	59.7	34.1	306,096,545
	Cheiron	3,553	59.7	34.1	316,727,454
	(GRS - Cheiron)	1	(0.0)	(0.0)	-3%
Teachers' Pension System	GRS	102,553	44.3	11.2	5,888,637,495
	Cheiron	102,548	44.3	11.3	6,094,404,309
	(GRS - Cheiron)	5	0.1	(0.1)	-3%
Teachers' Combined Systems	GRS	106,107	44.8	11.9	6,194,734,040
	Cheiron	106,101	44.8	12.0	6,411,131,763
	(GRS - Cheiron)	6	0.1	(0.1)	-3%
Employees' Retirement System	GRS	9,633	43.3	12.9	464,545,090
	Cheiron	9,632	43.3	12.9	473,581,927
	(GRS - Cheiron)	1	-	-	-2%
Employees' Pension System	GRS	54,223	47.6	13.2	2,730,825,405
	Cheiron	54,265	47.6	13.0	2,787,504,101
	(GRS - Cheiron)	(42)	-	0.2	-2%
Employees' Combined Systems	GRS	63,856	46.9	13.2	3,195,370,495
	Cheiron	63,897	46.9	13.0	3,261,086,028
	(GRS - Cheiron)	(41)	(0.0)	0.2	-2%
State Police	GRS	1,408	35.1	10.7	85,585,708
	Cheiron	1,407	35.1	10.7	87,213,362
	(GRS - Cheiron)	1	0.0	0.0	-2%
Judges	GRS	297	57.3	9.4	40,266,330
	Cheiron	296	57.3	10.7	40,959,596
	(GRS - Cheiron)	1	0.0	(1.2)	-2%
LEOPS	GRS	1,516	41.3	11.1	88,043,377
	Cheiron	1,517	41.3	9.6	89,844,509
	(GRS - Cheiron)	(1)	-	1.5	-2%
TOTAL - STATE	**GRS**	**173,184**	**45.5**	**12.4**	**9,603,999,950**
	Cheiron	**173,218**	**45.5**	**12.3**	**9,890,235,258**
	(GRS - Cheiron)	**(34)**	**0.0**	**0.0**	**-3%**

SECTION III
DATA REVIEW

June 30, 2009 State Retirement and Pension System of Maryland (Municipal Active Members Only)					
System	**Firm**	**Count**	**Average Age**	**Average Service**	**Total Salary**
Employees' Retirement System	GRS	329	58.6	33.4	19,326,113
	Cheiron	329	58.6	32.8	20,002,528
	(GRS - Cheiron)	-	(0.0)	0.6	-3%
Employees' Pension System	GRS	25,195	48.1	10.9	1,034,839,500
	Cheiron	25,148	48.0	10.6	1,068,815,038
	(GRS - Cheiron)	47	0.1	0.3	-3%
Employees' Combined Systems	GRS	25,524	48.2	11.2	1,054,165,613
	Cheiron	25,477	48.1	10.9	1,088,817,566
	(GRS - Cheiron)	47	0.1	0.3	-3%
LEOPS-MUNI	GRS	929	38.5	10.3	52,027,915
	Cheiron	928	38.5	9.8	53,786,544
	(GRS - Cheiron)	1	0.0	0.5	-3%
Correction-MUNI	GRS	68	44.2	12.2	4,047,633
	Cheiron	68	44.2	12.2	4,128,586
	(GRS - Cheiron)	-	-	(0.0)	-2%
TOTAL- Municipal	**GRS**	**26,521**	**47.9**	**11.2**	**1,110,241,161**
	Cheiron	**26,473**	**47.8**	**10.8**	**1,146,732,696**
	(GRS - Cheiron)	**48**	**0.1**	**0.3**	**-3%**

June 30, 2009 State Retirement and Pension System of Maryland (State and Municipal Active Members)					
System	**Firm**	**Count**	**Average Age**	**Average Service**	**Total Salary**
TOTAL (State and Municipal)	**GRS**	**199,705**	**52.9**	**14.1**	**10,714,241,111**
	Cheiron	**199,691**	**52.8**	**14.0**	**11,036,967,954**
	(GRS - Cheiron)	**14**	**0.1**	**0.1**	**-3%**

SECTION III
DATA REVIEW

June 30, 2009 State Retirement and Pension System of Maryland (State Inactive Members Only)					
System	**Firm**	**Retirees and Disableds**	**Survivors**	**Vested Former**	**Total Counts**
Teachers' Retirement System	GRS	28,367	2,231	996	31,594
	Cheiron	28,368	2,231	993	31,592
	(GRS - Cheiron)	(1)	-	3	2
Teachers' Pension System	GRS	24,432	726	21,999	47,157
	Cheiron	24,431	726	21,953	47,110
	(GRS - Cheiron)	1	-	46	47
Teachers' Combined Systems	GRS	52,799	2,957	22,995	78,751
	Cheiron	52,799	2,957	22,946	78,702
	(GRS - Cheiron)	-	-	49	49
Employees' Retirement System	GRS	16,739	2,713	982	20,434
	Cheiron	16,754	2,716	978	20,448
	(GRS - Cheiron)	(15)	(3)	4	(14)
Employees' Pension System	GRS	22,959	1,316	21,132	45,407
	Cheiron	22,943	1,313	21,090	45,346
	(GRS - Cheiron)	16	3	42	61
Employees' Combined Systems	GRS	39,698	4,029	22,114	65,841
	Cheiron	39,697	4,029	22,068	65,794
	(GRS - Cheiron)	1	-	46	47
State Police	GRS	1,996	230	68	2,294
	Cheiron	1,996	230	67	2,293
	(GRS - Cheiron)	-	-	1	1
Judges	GRS	242	106	6	354
	Cheiron	242	106	6	354
	(GRS - Cheiron)	-	-	-	-
LEOPS	GRS	898	44	143	1,085
	Cheiron	898	44	142	1,084
	(GRS - Cheiron)	-	-	1	1
TOTAL - STATE	**GRS**	**95,633**	**7,366**	**45,326**	**148,325**
	Cheiron	**95,632**	**7,366**	**45,229**	**148,227**
	(GRS - Cheiron)	**1**	**-**	**97**	**98**

SECTION III
DATA REVIEW

June 30, 2009 State Retirement and Pension System of Maryland (Municipal Inactive Members Only)					
System	Firm	Retirees and Disableds	Survivors	Vested Former	Total Counts
Employees' Retirement System	GRS	3,650	676	83	4,409
	Cheiron	3,650	676	85	4,411
	(GRS - Cheiron)	-	-	(2)	(2)
Employees' Pension System	GRS	8,093	464	6,411	14,968
	Cheiron	8,093	464	6,412	14,969
	(GRS - Cheiron)	-	-	(1)	(1)
Employees' Combined Systems	GRS	11,743	1,140	6,494	19,377
	Cheiron	11,743	1,140	6,497	19,380
	(GRS - Cheiron)	-	-	(3)	(3)
LEOPS-MUNI	GRS	123	2	46	171
	Cheiron	123	2	46	171
	(GRS - Cheiron)	-	-	-	-
Correction-MUNI	GRS	0	0	0	0
	Cheiron	0	0	0	0
	(GRS - Cheiron)	-	-	-	-
TOTAL- Municipal	GRS	11,866	1,142	6,540	19,548
	Cheiron	11,866	1,142	6,543	19,551
	(GRS - Cheiron)	-	-	(3)	(3)

June 30, 2009 State Retirement and Pension System of Maryland (State and Municipal Inactive Members)					
System	Firm	Retirees and Disableds	Survivors	Vested Former	Total Counts
TOTAL (State and Municipal)	GRS	107,499	8,508	51,866	167,873
	Cheiron	107,498	8,508	51,772	167,778
	(GRS - Cheiron)	1	-	94	95

Another area that would be explained through the comparison of processed data is some part time employees get their full salary and partial service, while others get partial salary and full service. The salary needs to be adjusted for these employees when terminated. We can not determine if GRS adjusted the salary for these part timers. SRA provides budgeted salary, so when a member terminates, the salary used in determining the terminated vested benefit must be reduced by the part time percent to appropriately value the benefit due. Our contention is that GRS may be overstating liabilities based on the fact that full year service equivalents are granted for this group. This would eventually produce a gain when the terminated vested participants eventually retire.

SECTION IV
ASSUMPTIONS REVIEW

The overall assumption set seems to be reasonable however we can not tell if GRS has changed the underlying inflation rate in the application of their COLA assumptions and with the other assumption and method changes made during the valuation process, only future experience with support the rationale behind the changes.

During the valuation reconciliation process the assumptions that were made by GRS were outside the general process followed in the past by the Board. Historically demographic assumptions have been addressed through a systematic review of experience and changes have been presented with estimates of the financial impact. Even with the changes proposed in the September 15, 2009 presentation the impact was not presented as part of GRS's consideration. For the large systems these changes may not have had a material impact, demonstrated by the comparison of our results based on all assumptions and method applied last year without change and those of GRS.

The non-disclosure of these changes may be the reason we were not able to reconcile with a number of the smaller systems indicating the changes may have a more material impact an initially represented to the Board. However after discussing these changes and applying GRS's changes we could reconcile results of the smaller systems.

SECTION IV
ASSUMPTIONS REVIEW

Investment Return Rate

The current assumption of 7.75% is below the national average among large public sector plans. However we have seen a trend for Systems to consider reduction of their investment return rate given the recent market meltdown and concern that future long term return rates may not be the same for a similar diversified portfolio as they once were.

Investment Return Assumption
NASRA's Public Fund Survey
Valuation Dates on or After 6/30/2007
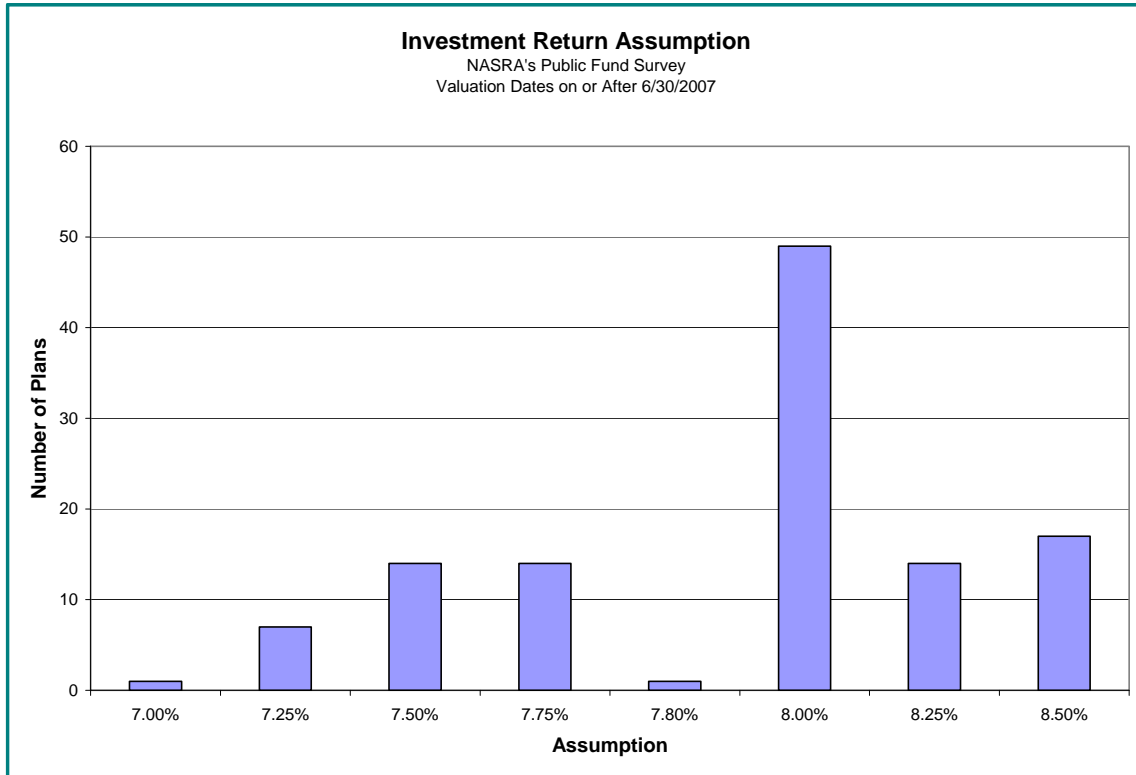
There are a number of areas that are influencing this trend including:

- Globalization and the impact of other countries with higher expected growth rate than in the United States impacting our recovery process
- Recent pressure for consideration of financial economic views of the measurement of liabilities (coined as market value of liabilities) and influence such positions, which have already changed the private sector retirement system funding requirements and may have sway in the future disclosures under Government Accounting Standards

Mortality Assumption

There is relatively little additional experience since the last experience study to identify changes in the trends of mortality experience. However there is one area not discussed in the experience analysis that the Board could give consideration to for the next experience study, which is the use of *mortality projection scales*.

SECTION IV
ASSUMPTIONS REVIEW

The mortality tables adopted by the Board in 2007 are based on national experience and modified to fit the recent experience of the System. In the development of these tables there are also mortality improvement trend rates published, referred to as projection scales. They basically recognize small annually improvements in life expectancies which reflect the trends seen among all aspects of the population.

Because most public employer retirement systems require periodic experience studies like the System it is anticipated that changes in mortality experience will be regularly measured and captured in revisions to the mortality assumptions. However as the System matures and a greater part of the total liabilities reflects non-active participants, the Systems risk of participants living longer can be a source of regular experience losses if not anticipated in the mortality assumption. While this can be handled with the periodic adjustments to the tables, new tables can produce significant increases in liabilities when adopted. For future consideration we suggest looking at mortality assumptions that include projection scales.

Salary Scale

There are opposing forces on future salary growth rates which make it difficult to predict where to anticipate the long term trend rate. With the current recession anticipated lower salary growth is likely anticipated and may already be built into the State's expectations. At the same time there is concern over expected future hyperinflation which could create upward pressure on payroll. Given the uncertainty, continued reliance on the changes adopted in 2007 seems appropriate.

Inflation

Underlying all the demographic assumptions is one of underlying inflation. It is the building block for the long term investment return which is made up of the "real return rate" plus inflation. It is also the underlying building block for the salary scale. This rate last year was 3.5%. We have not seen where GRS has stated this assumption but it is a concern that they may have change the inflation rate based on the adjusted assumptions they have recommended for the COLA assumptions.

If they are recommending a change in this assumption, then there are considerations that need to be made, relative to the current salary scale and long term investment assumption.

Other Demographic Assumptions

To a lesser degree, than the mortality assumption, the other demographic assumptions impact the overall liabilities of the System. In the period from the last experience study the current economic recession can have significant short term implications on areas of withdrawal where State employees may be less likely to retire or voluntarily terminate employment because of the high degree of uncertainty in the labor market. At the same time, with State budget constraints, hiring and overall employment with the State may be more strictly managed.

The trend implications of the recession may take a number of years to realize. The job of identifying temporary versus more permanent trends becomes a balancing act and needs to be

considered seriously during the next experience studies. With that, the current set of other demographic assumptions still may be the best estimates until the next experience analysis is performed.

SECTION V
ASSET VALUATION METHOD REVIEW

The market value of assets represents a "snap-shot" value as of the last day of the fiscal year that provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. Because these fluctuations would cause volatility in employer contributions, an actuarial value of assets is developed.

The actuarial value of assets typically represents an asset value based on averaging or smoothing year-to-year market value returns for purposes of reducing the resulting volatility on contributions.

The actuarial value is calculated by adjusting the market value to remove 80% of the prior year's investment gain or loss, 60% of the gain or loss from two years ago and 40% of the gain or loss from three years ago. The gain or loss is measured by comparing actual returns on a market value basis to those expected vs. the 7.75 % assumption. The actuarial value of assets is further constrained by 80% or 120% of the market value of assets. Based on our review this method is being applied accurately.

The only exception is that an adjustment was made to last year's year-end market value of assets. To accurately capture the gain/loss for the asset valuation method, GRS should have started with the market value of assets used in last years valuation and included the adjustment as part of the experience this year.

We also think in connection with the Corridor Method there should be consideration of the use of both methods as allowing the resulting valuation from straying too far from actual funded status and need to increase State appropriations. Some systems that use of a corridor method have gone to using a market value of assets because it makes the method more transparent.

SECTION VI
FUNDING METHOD AND BUDGETING (CORRIDOR APPROACH)

For defining the States Contributions to the Teachers Combined and the Employees Combined the State appropriations are based on using a Corridor Method. Under this funding approach, the State appropriation was fixed at the June 30, 2000 valuation rate for as long as the actuarial funded status of these Systems remains in a corridor of 90% funded to 110% funded (funded defined as the ratio of actuarial asset value divided by the actuarial accrued liability). Once the ratio falls outside of this corridor, the appropriated rate has been annually adjusted towards the underlying actuarially calculated rate.

The use of a corridor for funding is not uncommon among public employer retirement systems. It can be particularly effect with well funded systems in managing cost volatility and funding discipline particularly where there is a relatively low actuarially determined cost which was the case for this System and many others around the end of the 1990's. The method is anticipated to call for funding that straddles above and below the actuarially determine funding However while the implications of the method have been tested against alternative future investment returns, they can cause too slow a response in addressing the additional funding following a dramatic declines in funded status like those brought about as a result of the current market downturn.

Another concern is the continued use of the Corridor Method with an asset smoothing method which potentially defers recognition of the actual funded status over too long a period.

Funding Method

In 2007 the System moved from an aggregate Entry Age Normal Cost Funding method to individual Entry Age Normal Cost Funding method. The distinctive difference in these two approaches is to explicitly calculate the expected annual cost of a benefit spreading the value of the benefit over the entire career of new participants and then spreading this value as a level percent of pay over that career. It is anticipated that with the larger Systems and with the uniform Systems the average career length will be relatively consistent over time, thus producing consistent normal costs for budgeting and appropriation predictability.

It is possible, especially with the smaller systems, for the average total expected career to vary over time which would cause the normal cost as a percent of pay to drift from year to year. However given the short period this method (which is one of the most common funding methods among public employer retirement systems [NASRS's Public Plan Survey]) has been utilized there is no evidence of any trends that would provide any reason this method may not be the most appropriate method for the system. In other words the arguments for changing to this method and not some of the other methods available for consideration still hold.

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

In our audit process we applied these assumptions which are the same as those applied in the June 30 2008 valuation without modification for methods or assumptions applied this year by GRS.

A. Actuarial Assumptions

	1. Valuation Interest Rate	2. Rate of Increase in Cost of Living	3. Rates of Salary Increase (% at selected years of service)			3. Rates of Salary Increase (% at selected ages with 9+ years of service)					
			0	3	9	25	30	35	40	45	50
Teachers' Retirement	7.75%	3.0%	7.25	7.25	7.25	7.50	7.25	6.75	5.50	4.75	4.25
Teachers' Pension	7.75%	3.0%	7.25	7.25	7.25	7.50	7.25	6.75	5.50	4.75	4.25
Employees' Retirement											
Regular	7.75%	3.0%	5.50	5.50	4.50	5.00	5.00	4.50	4.25	4.00	3.75
Correctional	7.75%	3.0%	8.25	5.75	4.50	5.75	5.75	4.75	4.75	4.75	4.75
Legislative	7.75%	3.5%	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Employees' Pension	7.75%	3.0%*	5.50	5.50	4.50	5.00	5.00	4.50	4.25	4.00	3.75
State Police Retirement	7.75%	3.0%	12.00	7.50	4.00	4.50	4.00	3.75	3.50	3.50	3.50
Judges Pension	7.75%	3.5%	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
LEOPS	7.75%	3.0%**	8.00	6.50	4.50	5.00	5.00	4.75	4.75	4.25	3.50
Local Fire & Police											
Retirement	7.75%	3.0%**	8.00	6.50	4.50	5.00	5.00	4.75	4.75	4.25	3.50
Pension	7.75%	3.0%**	8.00	6.50	4.50	5.00	5.00	4.75	4.75	4.25	3.50

* A 3% simple rate is applicable for municipal members of these Systems, who do not elect to be covered under the improved plan.
** A 3% simple rate is applicable for former EPS members.

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

4. Annual Rates of Withdrawal (number of withdrawals per 1,000 members)										
(at selected years of service)			**(at selected ages for those with 9+ years)**							
0	**3**	**9**	**25**	**30**	**35**	**40**	**45**	**50**	**55**
Teachers' Retirement										
Male	150	110	40	40	40	40	20	10	10	10
Female	140	100	50	50	50	50	30	25	10	10
Teachers' Pension										
Male	150	110	40	40	40	40	20	10	10	10
Female	140	100	50	50	50	50	30	25	10	10
Employees' Retirement										
Regular										
Male	200	90	50	50	40	40	30	25	25	20
Female	200	80	45	45	30	30	25	25	20	15
Correctional										
Male	180	120	40	40	40	40	40	30	30	25
Female	170	110	100	50	50	50	50	50	50	25
Legislative	*	*	*	*	*	*	*	*	*	*
Employees' Pension										
Male	200	90	50	50	40	40	30	25	25	20
Female	200	80	45	45	30	30	25	25	20	15
State Police Retirement										
Male	95	40	25	10	10	10	10	10	10	10
Female	110	70	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Judges Pension	0	0	0	0	0	0	0	0	0	0
LEOPS										
Male	120	80	20	15	15	15	15	15	15	15
Female	160	110	30	30	30	30	30	30	30	30
Local Fire & Police										
Male	120	80	20	15	15	15	15	15	15	15
Female	160	110	30	30	30	30	30	30	30	30

* 200 withdrawals per 1,000 members are assumed after 8 years of service and each fourth year thereafter.

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	5. Annual Rates of Mortality at Selected Ages (number of deaths per 10,000 members)							
	45	**50**	**55**	**60**	**65**	**70**	**75**	**80**
Teachers' Retirement & Pension								
Healthy Members (RP-2000 Combined Healthy Table with age set back 4 years)								
Male	11	16	24	42	77	144	245	422
Female	8	12	19	31	58	110	186	307
Disabled Members								
Male (50% of RP-2000 Disabled Retiree Table plus 50% of RP-2000 Combined Healthy Table set back 2 years)	119	141	139	223	283	374	518	749
Female (RP-2000 Disabled Retiree Table)	75	98	145	197	253	332	458	635
Employees' Retirement & Pension Regular								
Healthy Members (RP-2000 Combined Healthy Table with ages set back 2 years for females)								
Male	15	21	36	67	127	222	378	644
Female	9	14	22	39	76	134	230	376
Disabled Members								
Male (RP-2000 Disabled Retiree Table set back 4 years)	226	238	303	367	435	522	658	870
Female (RP-2000 Disabled Retiree Table)	75	115	165	218	280	376	522	723
Employees' Retirement Correctional & Legislative								
Healthy Members (RP-2000 Combined Healthy Table with ages set back 2 years for females)								
Male	15	21	36	67	127	222	378	644
Female	9	14	22	39	76	134	230	376
Disabled Members								
Male (RP-2000 Disabled Retiree Table set back 4 years)	226	238	303	367	435	522	658	870
Female (RP-2000 Disabled Retiree Table)	75	115	165	218	280	376	522	723

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	5. Annual Rates of Mortality at Selected Ages (number of deaths per 10,000 members, cont.)							
	45	**50**	**55**	**60**	**65**	**70**	**75**	**80**
State Police Retirement								
Healthy Members (RP-2000 Combined Healthy Table set back two years for males)								
Male	17	25	31	54	101	180	305	522
Female	15	23	29	52	98	168	282	460
Disabled Members (RP-2000 Disabled Retiree Table)								
Male	226	290	354	420	502	626	821	1,094
Female	75	115	165	218	280	376	522	723
Judges' Pension								
Healthy Members (RP-2000 Combined Healthy Table with ages set back 4 years)								
Male	11	16	24	42	77	144	245	422
Female	8	12	19	31	58	110	186	301
Disabled Members								
Male (50% of RP-2000 Disabled Retiree Table plus 50% of RP-2000 Combined Healthy Table set back 2 years)	119	141	179	223	283	374	518	749
Female (RP-2000 Disabled Retiree Table)	75	98	145	197	253	332	458	635
LEOPS								
Healthy Members (RP-2000 Combined Healthy Table set back two years for males)								
Male	17	25	31	54	101	180	305	522
Female	15	23	29	52	98	168	282	460
Disabled Members (RP-2000 Disabled Retiree Table)								
Male	226	290	354	420	502	626	821	1,094
Female	75	115	165	218	280	376	522	723
Local Fire & Police Systems								
Healthy Members (RP-2000 Combined Healthy Table set back two years for males)								
Male	17	25	31	54	101	180	305	522
Female	15	23	29	52	98	168	282	460
Disabled Members (RP-2000 Disabled Retiree Table)								
Male	226	290	354	420	502	626	821	1,094
Female	75	115	165	218	280	376	522	723

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	6. Annual Rates of Disablement at Selected Ages (number becoming disabled per 10,000 members)						
	25	**30**	**35**	**40**	**45**	**50**	**55**
Teachers' Retirement*							
Male	1	1	1	2	4	7	9
Female	1	1	3	7	12	17	30
Teachers' Pension*							
Male	3	3	3	10	20	31	41
Female	3	3	6	13	22	32	54
Employees' Retirement							
Ordinary Disability							
Regular							
Male	4	4	7	13	17	20	27
Female	4	4	7	12	18	25	35
Correctional							
Male	30	36	45	57	71	101	131
Female	46	46	46	51	59	77	117
Legislative	0	0	0	0	0	0	0
Accidental Disability							
Regular							
Male	1	1	1	2	2	1	1
Female	1	1	1	2	2	2	2
Correctional							
Male	5	6	8	10	13	18	23
Female	8	8	8	9	10	14	21
Legislative	0	0	0	0	0	0	0
Employees' Pension							
Ordinary Disability							
Male	12	12	21	40	51	61	81
Female	9	9	15	27	41	58	81
Accidental Disability							
Male	3	3	4	6	5	4	4
Female	2	2	3	4	4	4	4
State Police Retirement							
Ordinary Disability							
Male	78	100	126	166	223	319	410
Female	243	260	263	306	372	489	746
Accidental Disability							
Male	52	55	68	79	87	122	159
Female	162	145	142	144	145	187	289

* It is assumed that 1% of disability retirement is due to accidents in the performance of duty.

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	6. Annual Rates of Disablement at Selected Ages (number becoming disabled per 10,000 members, cont.)						
	25	**30**	**35**	**40**	**45**	**50**	**55**
Judges' Pension							
Male	3	3	3	10	21	31	41
Female	3	3	6	13	22	32	55
LEOPS							
Ordinary Disability							
Male	29	37	46	61	81	116	149
Female	47	50	51	59	72	95	145
Accidental Disability							
Male	19	20	25	29	32	44	58
Female	31	28	27	28	28	36	56
Local Fire & Police Systems							
Ordinary Disability							
Male	29	37	46	61	81	116	149
Female	47	50	51	59	72	95	145
Accidental Disability							
Male	19	20	25	29	32	44	58
Female	31	28	27	28	28	36	56

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	7. Annual Rates of Retirement at Selected Ages (number retiring per 1,000 members)					
	45	50	55	60	65	70
Teachers' Retirement						
Early						
First Year Eligible						
Male	30	30	40	N/A	N/A	N/A
Female	10	20	65	N/A	N/A	N/A
Subsequent Years						
Male	10	15	30	N/A	N/A	N/A
Female	10	15	25	N/A	N/A	N/A
Normal						
First Year Eligible						
Male	250	250	250	250	250	250
Female	250	250	250	250	250	1,000
Subsequent Years						
Male	150	150	150	180	200	200
Female	150	150	150	200	300	200
Teachers' Pension						
Early						
First Year Eligible						
Male	0	0	20	60	N/A	N/A
Female	0	0	45	80	N/A	N/A
Subsequent Years						
Male	0	0	0	45	N/A	N/A
Female	0	0	0	50	N/A	N/A
Normal						
First Year Eligible						
Male	150	150	150	200	200	200
Female	130	130	130	240	70	70
Subsequent Years						
Male	100	100	100	170	220	160
Female	100	100	100	130	200	150
Employees' Retirement						
Early						
First Year Eligible						
Male	25	25	80	N/A	N/A	N/A
Female	20	20	90	N/A	N/A	N/A
Subsequent Years						
Male	20	20	60	N/A	N/A	N/A
Female	20	20	20	N/A	N/A	N/A
Normal						
First Year Eligible						
Male	170	170	170	170	170	170
Female	210	210	210	210	210	210
Subsequent Years						
Male	50	110	110	110	200	200
Female	120	120	150	150	300	220

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	7. Annual Rates of Retirement at Selected Ages (number retiring per 1,000 members, cont.)					
	45	50	55	60	65	70
Employees' Retirement, cont.						
Correctional						
Early	N/A	N/A	N/A	N/A	N/A	N/A
Normal						
First Year Eligible	240	240	240	300	990	1,000
Subsequent Years	120	120	120	120	210	1,000
Legislative						
Early	N/A	N/A	N/A	N/A	N/A	N/A
Normal	0	0	0	1,000	1,000	1,000
Employees' Pension						
Early						
First Year Eligible						
Male	0	0	30	80	N/A	N/A
Female	0	0	35	80	N/A	N/A
Subsequent Years						
Male	0	0	70	45	N/A	N/A
Female	0	0	100	55	N/A	N/A
Normal						
First Year Eligible						
Male	140	140	140	140	50	50
Female	160	160	170	260	60	60
Subsequent Years						
Male	70	70	70	110	200	150
Female	100	100	100	160	230	160
State Police Retirement*						
Normal						
First Year Eligible	300	300	300	1,000	1,000	1,000
Subsequent Years	300	300	600	1,000	1,000	1,000
Judges' Pension						
Normal						
First Year Eligible						
Male	0	0	0	100	100	100
Female	0	0	0	300	300	1,000
Subsequent Years						
Male	0	0	0	100	100	300
Female	0	0	0	200	200	1,000
LEOPS*						
Normal						
First Year Eligible	530	230	230	230	1,000	1,000
Subsequent Years	150	150	200	300	1,000	1,000
Local Fire & Police Retirement						
Normal						
First Year Eligible	530	230	230	230	1,000	1,000
Subsequent Years	150	150	200	300	1,000	1,000

* 50% of members eligible to do so are expected to elect DROP.

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

8. Social Security Covered Compensation

   Teachers' Retirement   Not applicable

   Teachers' Pension   Future covered compensation levels, used to estimate member contributions and retirement allowances, were calculated using a 3.5% per annum compounded increase in the 2008 Social Security Maximum Wage Base.

   Employees' Retirement   Not applicable

   Employees' Pension   Future covered compensation levels, used to estimate member contributions and retirement allowances, were calculated using a 3.5% per annum compounded increase in the 2008 Social Security Maximum Wage Base.

   State Police Retirement   Not applicable

   Judges' Pension   Not applicable

   LEOPS   Future covered compensation levels, used to estimate member contributions and retirement allowances, were calculated using a 3.5% per annum compounded increase in the 2008 Social Security Maximum Wage Base.

   Local F&P Retirement   Not applicable

   Local F&P Pension   Future covered compensation levels, used to estimate member contributions and retirement allowances, were calculated using a 3.5% per annum compounded increase in the 2008 Social Security Maximum Wage Base.

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

9. Retirement Age for Inactive Vested Participants

Teachers' Retirement	Age 60
Teachers' Pension	Age 62
Employees' Retirement	Age 60
Correctional Officers'	Age 55
Employees' Pension	Age 62
State Police Retirement	Age 50
Judges' Pension	Age 60
LEOPS	Age 50
Local F&P Retirement	Age 60
Local F&P Pension	Age 62

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

	10. Probability of Leaving Contributions in the Plan Upon Withdrawal (number leaving their contributions per 1,000 members)				
	20	**25**	**30**	**35**	**40**
Teachers' Retirement and Pension					
Male	750	915	903	884	1,000
Female	667	913	930	935	1,000
Employees' Retirement and Pension					
Male	875	768	706	682	1,000
Female	944	869	872	846	1,000
Corrections and Legislative	1,000	1,000	1,000	1,000	1,000
State Police Retirement	1,000	1,000	1,000	1,000	1,000
Judges' Pension	500	500	1,000	1,000	1,000
LEOPS	1,000	1,000	1,000	1,000	1,000
Local Fire & Police	1,000	1,000	1,000	1,000	1,000

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions, cont.

11. Miscellaneous Assumptions Which are Common to All Plans

a.	Unknown Data for Participants:	Same as those exhibited by Members with similar known characteristics. If not specified, Members are assumed to be male.
b.	Percent Married:	75%
c.	Age of Spouse:	Females are 4 years younger than males.
d.	Unused Sick Leave:	Each member is assumed to have an additional 5 months of service at retirement attributable to unused sick leave.
e.	Aggregate Payroll Growth:	3.50% per annum

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Asset Valuation Method

Teachers' Retirement & Pension	All six Systems use a method based on the principle that the difference between actual and expected investment returns should be subject to partial recognition to smooth out fluctuations in the total return achieved by the fund from year to year. Under this method, the actuarial value of the assets reflects annually one-fifth of the market value gains for the five prior years. The resulting value is restricted to be not less than 80% of market value nor greater than 120% of market value. As of June 30, 2007, the calculation of market gains included the difference between market and actuarial assets as of June 30, 2006.
Employees' Retirement & Pension	
State Police	
Judges	
LEOPS	
Local F&P Retirement & Pension	

For the Employees' Retirement & Pension System and for LEOPS, assets must be allocated between State and Municipal Corporation members. Beginning July 1, 1984, this allocation is based upon actual cash flows and shared investment results.

2. Funding Method

Teachers' Retirement & Pension	All six Systems use the individual entry age normal method to determine costs. Under this funding method, a total contribution rate is determined which consists of two elements, the normal cost rate and the unfunded actuarial liability (UAL) rate.
Employees' Retirement & Pension	
State Police	
Judges	The Individual Entry Age Normal cost rate is determined as the value, as of age at entry into the plan, of the member's projected future benefits, and divided by the value, also as of the member's entry age, of his expected future salary.
LEOPS	
Local F&P Retirement & Pension	

APPENDIX A
ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

2. Funding Method, cont.

Teachers' Retirement & Pension	In addition to contributions required to meet the System's normal cost, contributions will be required to fund the System's unfunded actuarial liability. Actuarial liability is defined as the present value of future benefits less the present value of future normal costs. The unfunded actuarial liability is the total of the actuarial liability for all members less the actuarial value of the System's assets.
Employees' Retirement & Pension	
State Police	
Judges	
LEOPS	
Local F&P Retirement & Pension	If the System's unfunded actuarial liability is increased by plan changes or actuarial losses or decreased by actuarial gains, these amounts will be included as part of the unfunded actuarial liability and funded over a 25-year amortization period.

Actuarial contributions for the Teachers and Employees Systems are based on a corridor method as described elsewhere.

APPENDIX B
GLOSSARY OF TERMS

1. Actuarial Accrued Liability

The Actuarial Accrued Liability is the difference between the present value of all future system benefits and the present value of total future normal costs. This is also referred to by some actuaries as the "accrued liability" or "actuarial liability".

2. Actuarial Assumptions

Estimates of future experience with respect to rates of mortality, disability, turnover, retirement rate or rates of investment income and salary increases. Actuarial assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

3. Accrued Service

Service credited under the System which was rendered before the date of the actuarial valuation.

4. Actuarial Equivalent

A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate actuarial assumptions.

5. Actuarial Funding Method

A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of a retirement system benefit between future normal cost and actuarial accrued liability. Sometimes referred to as the "actuarial funding method".

6. Actuarial Gain (Loss)

The difference between actual experience and actuarial assumption anticipated experience during the period between two actuarial valuation dates.

7. Actuarial Present Value

The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payment.

8. Amortization

Paying off an interest-discounted amount with periodic payments of interest and principal—as opposed to paying off with a lump sum payment.

APPENDIX B
GLOSSARY OF TERMS

9. Annual Required Contribution (ARC) under GASB 25

The Governmental Accounting Standards Board (GASB) Statement No. 25 defines the Plan Sponsor's "Annual Required Contribution" (ARC) that must be disclosed annually.

10. Normal Cost

The actuarial present value of retirement system benefits allocated to the current year by the actuarial funding method.

11. Set back/Set forward

Set back is a period of years that a standard published table (i.e. mortality) is referenced backwards in age. For instance, if the set back period is 2 years and the participant's age is currently 40, then the table value for age 38 is used from the standard published table. It is the opposite for set forward. A system would use set backs or set forwards to compensate for mortality experience in their work force.

12. Unfunded Actuarial Liability (UAL)

The difference between actuarial liability and valuation assets. Sometimes referred to as "unfunded actuarial accrued liability".

Most retirement systems have unfunded actuarial liabilities. They typically arise each time new benefits are added and each time experience losses are realized.

APPENDIX C
SUPPLEMENTAL EXHIBITS

1. **Missing data Assumptions –** Following is a listing of the assumptions provided to us on the treatment of missing data elements in the valuation to allow us to reconcile results in lieu of a valuation data file. Such assumptions should be contained in the body of the valuation report.

- Actives
  - Budgeted salaries for part-time members of the Teachers Pension system, Employees Pension System, and LEOPS Pension System were used to develop liabilities for the individual members. Budgeted salary is equal to the part-time percentage times the full-time salary equivalent for these members (position 141 to 147). An additional liability was added to the aggregate results for Teachers and Employees Pension Systems to reflect that the past service benefits would be calculated based on the full-time salary equivalent for these members. This will be shown as a separate line item in the liability detail.
  - Members with sex code of 9 (unknown) were assumed to be male.
  - Members older than age 85 were assumed to be 85.
  - GRS made adjustments to the date of birth and service for certain members based on data questions in the Excel file "Data_Listings_20090813.xls" which were sent previously.
  - Service for members of University Park was multiplied by 70%.
  - Members with a date of birth of 1/1/1998 were assumed to have the following entry age:
    - o Corrections = 31
    - o Employees Pension = 35
    - o Employees Retirement = 25
    - o Judges = 48
    - o Legislative = 45
    - o LEOPS = 29
    - o State Police = 24
    - o Teachers Pension = 33
    - o Teachers Retirement = 26

- Vested Deferreds and Inactives
  - The salaries for members with a part-time percentage of less than 50 percent and greater than 0 percent and a salary amount greater than $100,000 were adjusted to the salary provided times the part-time percentage.
  - Average Final Compensation for systems and plans other than Judges and Legislative was calculated as the salary amount in bytes 141 to 147 times the following factor:

    $(1/1.045 + 1/1.045^2 + 1/1.045^3) / 3$. No factor was applied for Judges and Legislative.

APPENDIX C
SUPPLEMENTAL EXHIBITS

- The salaries for members with a salary less than $1,000 were assumed to be as follows:
  - o Employees Pension - $37,075
  - o State Police - $47,187
  - o Teachers Pension - $46,598
  - o Teachers Retirement - $23,964
- Members with a sex code of 9 (unknown) were assumed to be male.
- Members with a date of birth of 1/1/1998 were assumed to be age 50 (date of birth of 6/30/1959).

- Retirees and Beneficiaries
  - The beneficiaries with a blank date of birth were assumed to have a four year age difference from the retiree. A female beneficiary was assumed to be four years younger than the retiree date of birth, and a male beneficiary was assumed to be four years older than the retiree date of birth.
  - The beneficiary sex code (position 156) was used. If the beneficiary sex code is blank, the retiree sex code was used. For example, if the retiree sex code is F and the beneficiary sex code is blank, the beneficiary is assumed to be female.