

# Arizona State Retirement System

**Audit of June 30, 2023 Actuarial Valuations**

June 6, 2024



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June 6, 2024

Board of Trustees  
Arizona State Retirement System  
3300 North Central Avenue, 14th Floor  
Phoenix, Arizona 85012

**Re: Audit of the Arizona State Retirement System and the ASRS Long Term Disability Program**

Dear Members of the Board:

We are pleased to present the results of this audit of the June 30, 2023 Actuarial Valuations for the Arizona State Retirement System (ASRS) Plan and Long Term Disability (LTD) Program. The purpose of this audit is to verify the calculations completed by Gabriel, Roeder, Smith & Company (GRS) and to offer comments on the methodology and the results of their actuarial valuations.

This review was conducted by Brad Ramirez, a Fellow of the Society of Actuaries, Member of the American Academy of Actuaries, and an Enrolled Actuary under ERISA, Todd Tauzer, a Fellow of the Society of Actuaries and Member of the American Academy of Actuaries, and Eva Yum, a Fellow of the Society of Actuaries, Member of the American Academy of Actuaries, and an Enrolled Actuary under ERISA. This review was conducted in accordance with the standards of practice prescribed by the Actuarial Standards Board.

We are members of the American Academy of Actuaries, and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

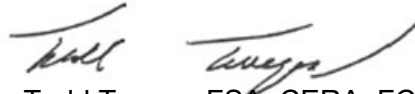
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The assistance of ASRS and GRS is gratefully acknowledged. We appreciate the opportunity to be of service to ASRS's Board of Trustees, and we are available to answer any questions you may have on this report.

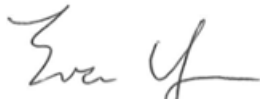
Sincerely,



Brad Ramirez, FSA, MAAA, EA  
Vice President and Consulting Actuary



Todd Tauzer, FSA, CERA, FCA, MAAA  
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Vice President and Actuary

OH/jl

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# Executive Summary

This report has been prepared by Segal to present an audit of the June 30, 2023 Actuarial Valuations for the ASRS Plan and LTD Program performed by GRS for ASRS.

This audit report includes an independent reproduction of the detailed valuation results that appear in the June 30, 2023 valuation reports, prepared by GRS and dated December 7, 2023. This audit was based on actuarial reports, employee data and supplemental information provided by both ASRS and GRS.

We have performed this audit to provide assurance to the Board of Trustees that the actuarial calculations are reasonable and that the actuarial process was conducted according to generally accepted actuarial principles and practices. **Our audit confirms that the results of the actuarial calculations as of June 30, 2023 are reasonable, and that those calculations are based on generally accepted actuarial principles and practices.** Our proceeding report will summarize key findings and recommendations, and then detail our approach and findings.

A comparison of Segal's and GRS' valuation results are shown in the following tables:

## 401(a) and 401(h)

Line Description	GRS	Segal	Ratio of Segal/GRS
Present Value of Benefits	\$80,861 M	\$80,718 M	99.8%
Actuarial Accrued Liability	\$68,642 M	\$68,766 M	100.2%
Total Normal Cost Rate	14.46%	14.24%	98.5%
Total contribution rate (employer and member)	24.24%	24.12%	99.5%
Funded Ratio	73.1%	73.0%	99.9%

## LTD

Line Description	GRS	Segal	Ratio of Segal/GRS
Present Value of Benefits	\$418 M	\$412 M	98.6%
Actuarial Accrued Liability	\$207 M	\$194 M	93.5%
Total Normal Cost Rate	0.25%	0.26%	104.0%
Total contribution rate (employer and member)	0.30%	0.30%	100.0%
Funded Ratio	94.0%	100.5%	106.9%

Our findings are summarized as follows:

- Our first focus was on matching the core numbers on which the plans' ultimate costs depend: the Present Value of Future Benefits (PVFB). The results of this analysis are shown below. We also focused on (1) the implementation of the actuarial assumptions as determined by the

2021 Actuarial Experience Study, (2) the valuation of members with different plan provisions, and (3) the determination of contribution rates.

- Segal's total PVFB for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 99.8% of GRS's PVFB.
- Segal's total Actuarial Accrued Liability (AAL) for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 100.2% of GRS's AAL.
- Segal's employer and member contribution rate for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 99.5% of GRS's rate, resulting in a contribution rate that is 0.12% of pay less than GRS's rate.
- Segal's PVFB for the LTD program as of June 30, 2023 is 98.6% of GRS' PVFB.
- Our comparison of the demographics of the 2023 data provided by ASRS with the valuation data used by GRS for the June 30, 2023 actuarial valuations indicates that GRS made some changes to the original data before the valuation was performed. These changes were based on discussions that GRS has with ASRS staff each year to ensure that all data elements are properly applied when measuring the liabilities. We have included a few comments in *Results of the Audit* under Step 1 regarding the data process.
- We reviewed the actuarial assumptions used in the valuation and believe that the assumptions are reasonable for use in the actuarial valuation and in compliance with the Actuarial Standards of Practice (ASOPs). This review is discussed in further detail in *Results of the Audit* under Step 5.
- For the investment rate of return assumption, GRS recommended a decrease from 7.50% to 7.00% in the 2021 experience study. As an independent check, we applied Segal's model to review the 7.00% investment return assumption. Under this model, the 7.00% investment return assumption is reasonable and complies with the relevant ASOP.
- GRS includes an explicit assumption for future Permanent Benefit Increases (PBIs) of 0.3% per year for eligible retirees and beneficiaries. This assumption was developed in the 2016 experience study and maintained in the 2021 experience study. Additionally, because a PBI has not been paid since this assumption was put in place, GRS recommended including approximately \$243 million in accumulated gains in the funded status for previously assumed PBIs. We concur with GRS' approach in reflecting the potential liability from the PBI and recommend that this assumption be monitored closely.
- The Unfunded Actuarial Accrued Liability (UAAL) is funded as a level percentage of payroll using a "layered" approach, with each year's changes amortized over a closed period. The amortization period for the 401(a) portion of the benefits was 30 years for valuations prior to June 30, 2019 and 25 years for the layers established from June 30, 2019 to June 30, 2021. Effective with the June 30, 2022 valuation, the amortization period is 20 years for new UAAL layers. We concur that the 20-year amortization period for new sources of UAAL is reasonable. We note that there is still some effect of "negative amortization" in some of the layers established prior to June 30, 2019 but this effect will disappear when the remaining amortization period becomes less than 23 years.
  - The 20-year "layered" amortization as a level percentage of payroll is model practice under the Actuarial Funding Policies and Practices for Public Pension Plan as published by the Conference of Consulting Actuaries Public Plans Community (CCA). It also falls within the recommended range established by the Government Finance Officers Association (GFOA) and generally prevents negative amortization from those layers.

- We recommend that the UAAL amortization policy, particularly the UAAL amortization period, be clarified in the valuation for UAAL experience that is related to Plan provision changes.
- Because the 401(h) plan is currently in surplus and the LTD program is at around 94% funded, we recommend that an amortization policy for surplus be reviewed. In particular, currently the 401(h) plan is 132% funded and the amortization credit reduces normal cost in the calculation of the required contribution. While the LTD plan is currently 94% funded, it is possible that when it reaches 100% funding in the next few years, the amortization schedule would result in a positive UAAL amortization even though the total UAAL is negative.
- The asset smoothing method used applies a 10-year smoothing for all investment gains/losses on a market value basis (as compared to the assumed return), with each annual gain or loss recognized over a 10-year period at the rate of 10% per year. However, offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. There is a 30% corridor around the Market Value of Assets (MVA), so there is a restriction of 30% that the Actuarial Value of Assets (AVA) may vary from the MVA.
  - This methodology will generally result in the AVA staying relatively close to the MVA, even for a period of sustained actuarial gains or losses.
  - In addition, based on our experience, the immediate recognition of offsetting investment gains and losses is not a common practice for public sector retirement systems. However, systems that use this method have found it effective at mitigating investment volatility in setting contribution rates.
- The ASRS Board made the policy decision in 2021 to phase-in the impact of new actuarial assumptions for the 401(a) portion of the Plan adopted for the June 30, 2021 valuation over a three-year period by establishing three UAAL amortization layers and commencing amortization over three years. The phase-in of the contribution rate impact of assumptions is a common practice for public sector retirement systems. We believe that phasing in the impact of the assumption changes is preferable to phasing in assumption changes themselves. We concur with this approach but recommend that the reasonable actuarially determined contribution without the phase-in be disclosed in the valuation report during the phase-in period. This would allow stakeholders to better understand the effect of the phase-in and is consistent with the updated version of ASOP 4.
- We also reviewed the GRS actuarial valuation reports in detail. We have confirmed that the GRS report contains required disclosures including those necessary to comply with the ASOPs.
- Most of our comments on the content of the valuation reports were minor. We believe that the plan provisions described in the actuarial valuation report are overall consistent with governing law and employee handbooks. A list of suggested changes to the valuation report for GRS to consider can be found in *Results of the Audit* under Step 5.
- There were minor inconsistencies with the calculation of the pre-retirement death refund and LTD administrative fees. These would not have a significant effect on the valuation results.
- We included suggestions for additional disclosures on assumptions/procedures for the valuation report in *Results of the Audit* under Step 5.

# Purpose and Scope of the Actuarial Audit

## Purpose of the audit

Segal has performed an actuarial audit of the ASRS Plan and the ASRS LTD Program as of June 30, 2023 to provide assurance to the ASRS's Board of Trustees that the actuarial calculations are reasonable and that the actuarial process was conducted according to generally accepted actuarial principles and practices.

## Scope of the audit

The scope of the audit, as described in the proposal letter for actuarial audit services, includes the following:

- Comparison of the plan provisions described in the actuarial valuation reports to governing law and employee handbooks for consistency
- Review of the actuarial assumptions to determine the reasonableness of assumptions and compliance with the Actuarial Standards of Practice
- Review of the actuarial funding policy to assess whether it is reasonable and appropriate
- Review of the actuarial valuation reports and suggestion of recommendations for improvement, if applicable
- Comparison of the census data used by the actuary for the valuations to the census data provided by the System to assess whether the files are consistent
- A complete reconstruction of the valuation data file from the census data provided by the System
- Review of detailed sample test life output (supplied by the System's actuary) to determine if the calculations are accurate and reasonable
- Review of any unique aspects of the valuation process, as requested by the System
- A parallel valuation in which all of the plan liabilities are independently calculated

# Results of the Audit

Several steps are involved in conducting an actuarial audit of a retirement benefits program. Outlined below are the primary steps we took to comply with the scope of the audit services. Following each step is a description of our observations.

## Step 1: Data

Compare the June 30, 2023 data provided by ASRS to the valuation data used by GRS for the June 30, 2023 actuarial valuations.

## Results

Exhibit A provides a comparison of the number of participants, their average ages, average salaries (active members), average service (active members) and average benefit (pensioners). This exhibit indicates that GRS had to make some adjustments, estimations or corrections to the data received from ASRS. In general, the data received by GRS was not entirely “valuation ready.” Changes made to the data were based on discussions that GRS has with ASRS staff each year to ensure that all data elements are properly applied when measuring the liabilities. Overall, the final data used by GRS is reasonable and valid for use in the June 30, 2023 valuation. The final data was consistent with the counts shown in the valuation report. Our comments below would not have a significant effect on the valuation results, but should be considered by GRS in the 2024 valuation.

## Observations

1. GRS indicated that there were no specific data questions related to the June 30, 2023 actuarial valuation. Our understanding is that there was discussion between GRS and ASRS staff to ensure that all data elements are properly applied. GRS have also checked the data for internal and year-to-year consistency but did not audit the data. This is an appropriate approach. We observed that there are some records with missing information. We generally agree that for a plan the size of ASRS, the relatively small number of records with missing information can be handled by making assumptions about the missing data. We recommend that GRS continues to monitor and report the data with missing information and/or consistency issues.
2. GRS provided us a document which detailed the methodology that they use to calculate a “smoothed salary”, which is then projected to calculate the valuation payroll. For the majority of members, GRS averages the “annualized earnings” from the last two years and projects it forward with ½ year of the applicable salary scale.
  - a. We were able to replicate this process and match the smoothed salary for the majority of members. GRS first annualized the “Gross Salary” before applying the salary smoothing procedure. They annualize for all active members whose service is greater than 0 and less than 1.
  - b. We observed that there are about 527 actives whose Smoothed Earnings at 6/30/2023 is \$10,149, based on the salary smoothing procedure Scenario 4 (i.e. assume salary is \$10,000 with half a year increase of 3.0%). Most have no Fiscal Year 2023 annualized

earnings but have Fiscal Year 2022 annualized earnings. We suggest that GRS could consider utilizing the Fiscal Year 2022 annualized earnings in the Smoothed Salary procedure for this scenario.

- c. We recommend that the "smoothed salary" procedure be disclosed in the valuation report.
3. For the 12,488 inactive members with missing dates of birth, GRS assumes they were all born on June 30, 1967 (age 56). The average age in the raw data is 48.0 vs. 48.4 in the 2023 GRS valuation report. We recommend GRS to review the basis for this assumption and disclose this assumption in the valuation report.
4. ASRS does not include final average salary (FAS) for current inactive members. GRS calculates FAS for all inactive members using the YTD Gross salary fields. If available, ASRS could consider providing FAS or benefit amount for inactive members. If that information is not available, GRS should review and confirm the annualized salary that is used for benefit calculations and store the annualized salary for purposes of benefit calculations.
5. GRS calculated 401(h) liability in 2018 for the retiree records with a health flag but had no benefit amounts reported. This approach is changed from 2018 and 401(h) liability is no longer calculated for such members in 2023. Based on our understanding, ASRS and GRS had reviewed the data and resolved the valuation procedure for such records.
6. Scrubbed data from GRS did not include some data fields that are used to calculate liabilities. Going forward, these data fields should be included in the scrubbed data:
  - a. Optional Premium Benefit Flag - 401(h) optional form is determined based on this flag together with the 401(a) optional form.
  - b. Years Since Termination or date of termination for current inactive vesteds - the percentage taking the immediate refund and taking a deferred benefit is based on years since termination.

## Step 2: Valuation program

Develop a valuation program based on the relevant provisions of the Arizona Revised Statutes as summarized in the Summary Plan Descriptions, using the actuarial methods and assumptions outlined in the most recent valuation report, and further defined by GRS.

### Observations

1. We modified our valuation software so that it closely mimics the middle of the plan year timing of decrements (i.e., when members are expected to terminate, die, or go on to service or disability retirement from ASRS) used by GRS.
2. Our valuation program reflects all of the current actuarial assumptions that were adopted as part of the 2021 experience study.
3. Our valuation program reflects the distinctions in plan provisions that apply to members hired on or after July 1, 2011.

## Step 3: Test lives

Run the valuation program with specific individuals (test lives) who illustrate particular benefit provisions and compare results to GRS's results.

### Results

Exhibit B provides a comparison of Segal's and GRS test life results for the present value of future benefits for 401(a), 401(h) and LTD.

- **Present Value of Future Benefits:** This liability represents the current value of the member's projected benefits, recognizing the time value of money (i.e., the investment return assumption), the salary increase assumption and the probabilities of retirement, death, disability and turnover. This value is the cornerstone for the entire valuation as it represents the amount expected to be needed to provide all future expected benefit payouts for current members, based on the valuation assumptions.

The ratios of Segal's results to GRS's results, on a total present value of future benefits basis, range from 95% to 105% for the active test lives and 96% to 103% for the inactive and retired test lives.

We believe our results for these testlives are within an acceptable range of GRS's results to provide assurance that the significant plan liabilities are properly valued.

### Observations

1. Segal's valuation program can be adjusted to reflect the timing of when active members decrement (i.e., retirement, termination, etc.) at the beginning of each plan year (July 1) or the middle of each plan year (January 1). The GRS valuation applies decrements occurring in the middle of the year (January 1). As part of this audit for the System, we have adjusted our timing of the decrements to allow for the middle of the year timing to match the decrement timing assumed by GRS. Either methodology is acceptable, and an actuary can establish their own approach for the assumed timing of decrements.
2. Some differences in the results are expected due to differences between Segal and GRS' valuation systems. Differences could include such things as the rounding used in the calculations of ages or the assumed timing for salary increases or benefit payments. Various methodologies are acceptable, with each actuarial firm establishing its own approach. Given the differences in the valuation systems, we would not expect to match GRS' results exactly.
3. The actuarial assumptions adopted by the Board of Trustees in conjunction with the 2021 experience study were used to value the test lives.
4. The pre-retirement death refund is defined to be equal to the member's combined (member and employer) contribution balance accumulated with interest at a rate determined by the board. We confirmed with GRS that the accumulated contribution balance is being accumulated with 7.50% interest instead of the 7.0% investment return assumption. GRS noted that they will incorporate this update into the valuation going forward. This change would not have a significant effect on the valuation results.
5. For current LTD members, GRS applied a LTD administrative fee of \$312 per annum (or \$26 per month). As per page 14 of the valuation report, we expect the LTD administrative

fee to be \$432 per annum (or \$36 per month). GRS noted that the LTD administrative fee was updated from \$26/month to \$36/month a couple of years ago and while that update was included in the calculation of future LTD members, it was not updated in the calculation of current LTD members. GRS noted that they will incorporate this update into the valuation going forward. This change would not have a significant effect on the valuation results.

## Step 4: Full valuation

Run the valuation program with all participant data, compile results, and compare to GRS's results.

### Validation results

Exhibit C provides a comparison by Plan of Segal's validation results and GRS' results, including (i) the present value of future benefits, (ii) actuarial accrued liability (AAL), (iii) the unfunded actuarial accrued liability (UAAL), (iv) the total (employer plus member) normal cost rate, (v) the member contribution rates and (v) the employer contribution rates.

- Arizona State Retirement System – Funding 401(a) Plan
  - In total, the present value of future benefits determined by Segal is 99.8% of the amount determined by GRS.
- Arizona State Retirement System – Funding 401(h) Plan
  - In total, the present value of future benefits determined by Segal is 99.7% of the amount determined by GRS.
- Arizona State Retirement System – Long Term Disability Program
  - In total, the present value of future benefits determined by Segal is 98.6% of the amount determined by GRS.
- The funding method adopted by ASRS, the Entry Age Actuarial Cost Method, separates the present value of future benefits for active members into two components, the actuarial accrued liability and the present value of future normal costs. Simply stated, the Entry Age Actuarial Cost Method determines a level cost as a percentage of pay for each year of service, called the Normal Cost. The actuarial accrued liability is the accumulated value of past Normal Costs (less any expected benefits, and assuming all actuarial assumptions were exactly realized), while the Present Value of Future Normal Costs (PVFNC) represents the current value of future Normal Costs required to fully fund the member's projected benefits before the member is expected to retire.
  - The method used to separate the present value of projected benefits into its two components can differ somewhat between valuation systems, even though the underlying funding method used in the systems is the same.
- The PVFNC is allocated between member contributions and employer contributions. The Segal and GRS valuation systems have slight differences and we would expect minor discrepancies in this allocation.
- The accrued liability also depends in part on the valuation system's methodology for separating the present value of projected benefits into its two components – the actuarial accrued liability (AAL) and the PVFNC. In total, the AAL determined by Segal for the combined 401(a) and 401(h) portions of the ASRS Plan is 100.2% of the amount determined

by GRS. The unfunded actuarial accrued liability (UAAL) is simply the difference between the accrued liability and the actuarial value of assets. Therefore, differences in the accrued liabilities due to the variations in the valuation systems also impact the unfunded accrued liabilities.

- Segal's total (employer plus member) Normal Cost contribution rate for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 98.5% of GRS's total Normal Cost rate.
- Segal's UAAL contribution rate for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 101.0% of GRS's rate.
- Segal's member contribution rate for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 99.5% of GRS's rate.
- Segal's employer contribution rate for the combined 401(a) and 401(h) portions of the ASRS Plan as of June 30, 2023 is 99.5% of GRS's rate.

## Observations

In determining the UAAL contribution rate, GRS uses a methodology that first projects the outstanding balances of the various UAAL layers to the next valuation date (i.e. one year in the future). Based on those projected outstanding balances and the remaining amortization periods as of that same date, GRS determines the UAAL amortization payments for each layer. The total of these amortization payments is then converted to a percent of the expected payroll for the year that begins on the next valuation date. It is our understanding that the purpose of this methodology is to adjust for the one-year delay between the valuation date and the date that the contribution rates are implemented. We believe that the methodology they are applying is reasonable for this purpose.

## Step 5: Valuation results

Evaluate the valuation results and methodology as presented in the GRS actuarial valuation report.

## Observations

We reviewed the actuarial assumptions used in the valuation and believe that the assumptions are reasonable for use in the actuarial valuation and in compliance with the Actuarial Standards of Practice. The focus of our comments regarding the actuarial assumptions is to comment on those items which, in our opinion, could be subject to improvement, so as to contribute to the improvement of the experience study process.

## Assumptions

- Investment Return Assumption
  - For the investment rate of return assumption, GRS recommended reducing the assumption from 7.50% to 7.00%, net of investment related expenses in the 2021 experience study.
  - In their review of the investment return assumption, GRS used capital market assumptions from NEPC (the system's investment consultant), a survey of several investment consulting

firms maintained by GRS and industry surveys. GRS also used the target asset allocation from 2021.

- As an independent check, Segal has applied the model from Segal’s investment advisory division based on arithmetic returns to review the 7.00% investment return assumption. While, our model does not generally produce an absolute investment return recommendation, it is very useful for comparing the level of risk inherent in the investment return assumptions adopted by a given retirement system at different points in time or with other retirement systems that have previously been analyzed using that model. Our model is based on the target asset allocation that was adopted in 2022 and is slightly different than the allocation used by GRS in their 2021 experience study. Under this model, the 7.00% investment return assumption is reasonable and complies with the Actuarial Standards of Practice (ASOP) in our opinion.

Also, we believe that the level of risk implicit in the 7.00% investment return assumption, along with a 2.30% price inflation assumption, is comparable when compared to recommendations we have made to other retirement systems.

- Mortality Assumption

- The non-disabled retiree mortality assumptions used by GRS are based on a mortality table constructed using actual ASRS experience. The 2017 State Retirees of Arizona mortality table was developed on a benefit-weighted basis since benefit amounts are a significant predictor of life expectancy. Future mortality improvement is projected on a generational basis using the ultimate mortality improvement rates found in the MP projection scales. While we do not have the underlying data that was used to construct the table, we concur with GRS’ description of the development of the mortality assumption and believe it is reasonable.

- The Retirement Plans Experience Committee (RPEC) of the Society of Actuaries published the Pub-2010 Public Retirement Plans Mortality tables (Pub-2010) in 2019 based on public sector pension plan experience in the United States. Within the Pub-2010 family of mortality tables, there are separate tables by job categories of General, Safety and Teachers.

- Based on the experience study, the 2017 State Retiree of Arizona table is shown to closely match actual ASRS experience. Alternatively, GRS could consider whether to use the Pub-2010 mortality tables along with setting the mortality tables based on job class for members in the ASRS and make adjustment based on ASRS experience.

- GRS applies the ultimate rates of the MP-2020 mortality improvement scale, citing the objective of reflecting the most recent data available while maintaining stability of results from year to year. We understand that the RPEC had provided mortality improvement models (for certain user input parameter projection) but had not issued new mortality improvement scale after MP-2021. We recommend GRS continue to monitor any new developments of mortality improvement scales and consider using the latest MP projection scale without adjustment unless there is sufficient plan experience to justify an alternative assumption.

- The disabled retiree and active member mortality assumptions used by GRS are based on the Pub-2010 mortality tables. We concur with using the Pub-2010 mortality tables, for this population is smaller and constructing its own mortality table would be difficult .

- Other Assumptions

- GRS assumes that 50% of future retirees will elect to receive the post-retirement health insurance premium supplement and that 50% of those retirees will elect the dependent

premium supplement. They also implicitly assume that all members over age 65 will have Medicare Part A and B. There was no data shown in the experience study to justify the use of these assumptions.

- We recommend that GRS include at least a summary of recent data in the next experience study to justify their assumptions.
- When calculating the valuation payroll, GRS generally first projects the member’s average salary over the last two years with one-half of a year’s worth of the applicable salary scale (based on the member’s years of service), and then projects that amount again with a full year’s worth of the applicable salary scale.
  - We recommend that GRS consider providing disclosure regarding this process in the assumptions section along with a justification for why 1.5 years of salary scale is applied.
  - We recommend that GRS disclose salary adjustments in the valuation report.
- GRS uses three distinct estimations to calculate the unreduced benefit amounts, which correlate with members with a certain and life form of benefit with either a 5, 10 or 15 year certain period. There was no mention of how these estimates were made (in the experience study or in the valuation). GRS should consider disclosing this in the assumptions section and reviewing these assumptions in the next experience study.
- GRS uses three distinct “pop-up” factors, which correlate with members with an optional joint and survivor form of benefit of either 50%, 66.67% or 100%. There was no mention of how these estimates were made (in the experience study or in the valuation). GRS should consider disclosing this in the assumptions section and reviewing these assumptions in the next experience study.
- GRS applies a three-year certain period when valuing single life annuities for current and future retirees. This assumption reflects anticipated potential payments for refunds of unused member contributions. These could potentially be paid if a retired member dies before their accumulated benefit payments exceed their member contributions.
  - GRS should review whether or not a three-year certain period is a long enough period since the ASRS member contribution accounts are relatively large and the implied certain period could be much higher for many members.

## Funding Policy

- Funding Policy
  - We reviewed the actuarial funding policy to assess whether it is reasonable and appropriate. The focus of our comments regarding the funding policy is to comment on those items which, in our opinion, are subject to improvement. Our comments are as follows.
- The Unfunded Actuarial Accrued Liability (UAAL) is funded as a level percentage of payroll using a “layered” approach, with each year’s changes amortized over a closed period. The amortization period for the 401(a) portion of the benefits was 30 years for valuations prior to June 30, 2019 and 25 years for the layers established from June 30, 2019 to June 30, 2021. Effective with the June 30, 2022 valuation, the amortization period is 20 years for new UAAL layers. We concur with that the 20 year amortization period for new sources of UAAL is reasonable. We note that there is still some effect of “negative amortization” in some of the layers established prior to June 30, 2019 but this effect will disappear when the remaining amortization period becomes less than 23 years.

- The 20-year “layered” amortization as a level percentage of payroll is the model practice under the Actuarial Funding Policies and Practices for Public Pension Plan as published by the Conference of Consulting Actuaries Public Plans Community (CCA). It also falls within the recommended range established by the Government Finance Officers Association (GFOA).
- We recommend that the UAAL amortization policy, particularly the UAAL amortization period, be clarified in the valuation for UAAL experience that is related to Plan provision changes.
- Because the 401(h) plan is currently in surplus and the LTD program is at around 94% funded, we recommend that an amortization policy for surplus be reviewed. In particular, currently the 401(h) plan is 132% funded and the amortization credit reduces normal cost in the calculation of the required contribution. While the LTD plan is currently 94% funded, it is possible that when it reaches 100% funding in the next few years, the amortization schedule would result in a positive UAAL amortization even though the total UAAL is negative.
- Asset Smoothing Method
  - The asset smoothing method used applies a 10-year smoothing for all investment gains/losses on a market value basis (as compared to the assumed return), with each annual gain or loss recognized over a 10-year period at the rate of 10% per year. However, offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. There is a 30% corridor around the Market Value of Assets (MVA), so there is a restriction of 30% that the Actuarial Value of Assets (AVA) may vary from the MVA.
  - An essential part of the public sector budgeting process is that material budget items, including pension contributions, should have a level cost pattern from year to year to the extent possible. Segal recognizes the importance of this requirement and assists clients in establishing reasonable methodologies for recognizing investment gains and losses and limiting the potential volatility that may result in increased contributions due to investment results.
  - The actuary’s guide for determining the reasonableness of an asset smoothing method is ASOP No. 44. Two key principles arise from ASOP No. 44. First, an acceptable asset smoothing approach must create asset values that fall within a reasonable range around market value, and second, that gains and losses are recognized in a reasonable period of time. In lieu of satisfying both of these principles, a smoothing method could satisfy the requirements if, in the actuary’s professional judgment, the range around market value is sufficiently narrow or the differences are recognized in a sufficiently short period.
    - We believe that, within the meaning of ASOP No. 44, 10 years may not be a sufficiently short period for the AVA to return to the MVA. This means the AVA must remain within a reasonable range of the MVA. The asset smoothing method also includes the use of a 30% corridor around the MVA in the event there is a sustained period of either gains or losses. This would limit the AVA to be within 70% and 130% of the MVA. We believe that the combination of the corridor and the smoothing period would comply with the ASOP in regards to producing a sufficiently narrow range around the MVA.
- Phase-in of Impact of Changes in Actuarial Assumptions from 2021 Experience Study
  - The ASRS Board made the policy decision in 2021 to phase-in the impact of new actuarial assumptions for the 401(a) portion of the Plan adopted for the June 30, 2021 valuation over

a three-year period by establishing three UAAL amortization layers and commencing amortization over three years. The phase-in of the contribution rate impact of assumptions is a common practice for public sector retirement systems. We believe that phasing in the impact of the assumption changes is preferable to phasing in assumption changes themselves. We concur with this approach but recommend that the reasonable actuarially determined contribution without the phase-in be disclosed in the valuation report during the phase-in period. This would allow stakeholders to better understand the effect of the phase-in.

## Actuarial Communications

- Other Comments
  - We reviewed the actuarial valuation reports in detail. We have confirmed that the GRS report contains required disclosures including those necessary to comply with Actuarial Standards of Practice (ASOP). In particular, the June 30, 2023 GRS valuation report generally contains information that are required to be disclosed starting with the June 30, 2023 actuarial valuation in regards to ASOP No. 4 requirements.
  - We recommend that the Smoothed Salary procedure be disclosed in the valuation report.
  - We recommend that the assumption for missing date of birth for inactive members be disclosed in the valuation report.
  - In December 2021, the Actuarial Standards Board (ASB) adopted a revision to Actuarial Standard of Practice (ASOP) No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions. The revised ASOP No. 4 requires the calculation and disclosure of a liability referred to by the ASOP as the “Low-Default-Risk Obligation Measure” (LDRM), and also a discussion of the effects of this measure on plan funding. GRS has included a detailed discussion of the LDRM in the valuation report. We believe that this satisfies the requirements of ASOP No. 4.

# Exhibit A: Analysis of participant data ASRS

## Active Members

Line Description	Count	Average Age <sup>1</sup>	Average Service	Average Salary <sup>2</sup>
ASRS data <sup>3</sup>	215,467	45.7	9.2	\$56,593
GRS data	215,299	45.3	9.2	\$60,063
<b>Ratio ASRS/GRS</b>	<b>100%</b>	<b>101%</b>	<b>100%</b>	<b>94%</b>

## Retired Members

Line Description	Count <sup>4</sup>	Average Age <sup>1</sup>	Average Monthly Allowance
ASRS data <sup>3</sup>	176,443	72.7	\$1,793
GRS data	168,760	72.5	\$1,776
<b>Ratio ASRS/GRS</b>	<b>105%</b>	<b>100%</b>	<b>101%</b>

## Inactive Members

Line Description	Count <sup>5</sup>	Average Age <sup>1</sup>
ASRS data <sup>3</sup>	275,537	48.0
GRS data	261,016	48.4
<b>Ratio ASRS/GRS</b>	<b>106%</b>	<b>99%</b>

<sup>1</sup> The average age shown for the ASRS data is before any adjustment for members with missing dates of birth, whereas the average age shown for the GRS data includes an assumption for these members.

<sup>2</sup> The average salary shown for the GRS data represents the projected valuation payroll. GRS generally calculates this salary by first developing a smoothed salary, and then projecting that salary forward. The average salary shown for ASRS represents the average non-zero unaltered salary from the data files. We confirmed that it is close to the unaltered salary of \$56,682 in GRS data. GRS provided us the steps that they take in this calculation, and we believe they are generally reasonable. Please see our further comments in Step 1.

<sup>3</sup> The counts shown for the ASRS data includes all members on the raw data files. The difference between the ASRS data and the GRS data represents the data clean up that GRS must perform (such as removing members who withdrew contributions, died during the year, or those that may have been reported on multiple files).

<sup>4</sup> Retiree counts with "Retirement Code" equalled "P" and Member Status equalled "A" would be 168,760.

<sup>5</sup> Inactive counts with "Retirement Code" equalled "P" and Drop code equalled "Inact" or with Drop code and Drop Date after 7/1/2023 would be 262,627. In addition, the ASRS data counts for inactive membership also include approximately 2,300 members who are currently enrolled in the LTD Program, which are removed by GRS and valued separately.

# Exhibit B: Test life comparison

## Active Members 401(a)

Line Description	Active #1 GRS	Active #1 Segal	Active #2 GRS	Active #2 Segal	Active #3 GRS	Active #3 Segal
PVB – retirement	\$257,597	\$255,005	\$113,720	\$114,001	\$228,280	\$227,053
PVB – termination	25,330	24,883	17,888	18,026	0	0
PVB – death	3,456	3,463	3,418	3,429	2,680	2,684
PVB – disability	7,542	7,495	3,057	4,085	4,816	4,687
Total PVB	\$293,926	\$290,846	\$138,082	\$139,541	\$235,775	\$234,424
<b>Ratio Segal/GRS Total PVB</b>		<b>99.0%</b>		<b>101.1%</b>		<b>99.4%</b>

Line Description	Active #4 GRS	Active #4 Segal	Active #5 GRS	Active #5 Segal	Active #6 GRS	Active #6 Segal
PVB – retirement	\$71,952	\$69,936	\$178,879	\$187,340	\$78,601	\$78,482
PVB – termination	6,182	4,602	0	0	0	0
PVB – death	1,777	1,781	8,460	8,467	1,267	1,270
PVB – disability	2,286	2,312	835	820	847	726
Total PVB	\$82,197	\$78,631	\$188,174	\$196,627	\$80,715	\$80,478
<b>Ratio Segal/GRS Total PVB</b>		<b>95.7%</b>		<b>104.5%</b>		<b>99.7%</b>

## Active Members 401(h)

Line Description	Active #1 GRS	Active #1 Segal	Active #2 GRS	Active #2 Segal	Active #3 GRS	Active #3 Segal
Total PVB	\$4,749	\$4,747	\$1,942	\$1,980	\$7,074	\$7,074
<b>Ratio Segal/GRS Total PVB</b>		<b>100.0%</b>		<b>102.0%</b>		<b>100.0%</b>

Line Description	Active #4 GRS	Active #4 Segal	Active #5 GRS	Active #5 Segal	Active #6 GRS	Active #6 Segal
Total PVB	\$4,792	\$4,773	\$5,882	\$5,847	\$5,548	\$5,263
<b>Ratio Segal/GRS Total PVB</b>		<b>99.6%</b>		<b>99.4%</b>		<b>94.9%</b>

## Active Members Long Term Disability Program

Line Description	Active #1 GRS	Active #1 Segal	Active #2 GRS	Active #2 Segal	Active #3 GRS	Active #3 Segal
Total PVB	\$2,053	\$2,077	\$1,367	\$1,400	\$1,377	\$1,398
<b>Ratio Segal/GRS Total PVB</b>		<b>101.2%</b>		<b>102.4%</b>		<b>101.5%</b>

## Retired Members 401(a) and 401(h)

Line Description	Retiree #1 GRS	Retiree #1 Segal	Retiree #2 GRS	Retiree #2 Segal	Retiree #3 GRS	Retiree #3 Segal
Benefit (w/ assumed PBI)	\$28,843	\$28,843	\$12,074	\$12,074	\$1,908	\$1,908
PVB – 401(a)	284,605	284,605	134,682	134,724	22,047	22,053
PVB – 401(h)	4,145	4,145	0	0	9,826	10,610
Total PVB	\$288,750	\$288,750	\$134,682	\$134,724	\$31,873	\$32,663
<b>Ratio Segal/GRS Total PVB</b>		<b>100.0%</b>		<b>100.0%</b>		<b>102.5%<sup>1</sup></b>

Line Description	Beneficiary #1 GRS	Beneficiary #1 Segal	Previously Disabled #1 GRS	Previously Disabled #1 Segal
Benefit (w/ assumed PBI)	\$19,149	\$19,149	\$9,257	\$9,257
PVB – 401(a)	123,376	123,376	79,984	79,984
PVB – 401(h)	0	0	17,281	17,281
Total PVB	\$123,376	\$123,376	\$97,265	\$97,265
<b>Ratio Segal/GRS Total PVB</b>		<b>100.0%</b>		<b>100.0%</b>

<sup>1</sup> For retirees with Optional Premium Benefit Flag (OPB Flag), we assumed 60% Joint and Survivor annuity for 401(h) if their 401(a) optional form is any Joint and Survivor annuity. We recommend if data is available, to provide the 401(h) optional form for the valuation.

## Retired Members Long Term Disability Program

Line Description	LTD #1 GRS	LTD #1 GRS	LTD #2 Segal	LTD #2 Segal
LTD gross benefit	\$20,348	\$20,348	\$23,313	\$23,313
401(a) deferred benefit	17,117	17,117	12,668	12,668
PVB – LTD	48,261	49,019	79,788	79,388
PVB – 401(a)	122,246	119,772	55,024	55,037
PVB – 401(h)	13,238	13,238	8,046	8,046
Total PVB	\$183,744	\$182,029	\$142,857	\$142,471
<b>Ratio Segal/GRS Total PVB</b>		<b>99.1%</b>		<b>99.7%</b>

## Inactive Members

Line Description	Inactive #1 GRS	Inactive #1 Segal	Inactive #2 GRS	Inactive #2 Segal	Inactive #3 GRS	Inactive #3 Segal
PVB – 401(a)	\$119,081	\$114,536	\$496,258	\$496,258	\$1,553	\$1,553
PVB – 401(h)	3,567	3,567	10,111	10,111	0	0
Total PVB	\$122,649	\$118,104	\$506,369	\$506,369	\$1,553	\$1,553
<b>Ratio Segal/GRS Total PVB</b>		<b>96.3%</b>		<b>100.0%</b>		<b>100.0%</b>

# Exhibit C: Comparison of Results

## Present Value of Future Benefits (PVB)

*(\$ shown in thousands)*

Line Description	401(a) GRS	401(a) Segal	401(h) GRS	401(h) Segal	Total GRS	Total Segal
Active retirement	\$35,525,635	\$35,441,935	\$812,514	\$800,647	\$36,338,149	\$36,242,583
Active disability deferred retirement	674,874	666,442	23,190	22,815	698,064	689,257
Active death	595,808	595,079	0	0	595,808	595,079
Active withdrawal	2,034,876	2,053,618	37,715	37,877	2,072,591	2,091,495
Total active PVB	38,831,194	38,757,074	873,418	861,340	39,704,612	39,618,414
Inactive PVB	2,770,494	2,708,256	140,691	140,280	2,911,185	2,848,536
Retiree PVB	37,401,466	37,400,307	843,824	850,553	38,245,290	38,250,860
Total PVB	79,003,154	78,865,637	1,857,933	1,852,173	80,861,087	80,717,810
<b>Ratio Segal/GRS Total PVB</b>		<b>99.8%</b>		<b>99.7%</b>		<b>99.8%</b>

Line Description	LTD GRS	LTD Segal
Active PVB	\$262,811	\$266,833
Current LTD PVB	154,811	144,850
Total PVB	417,621	411,683
<b>Ratio Segal/GRS Total PVB</b>		<b>98.6%</b>

## Unfunded Actuarial Accrued Liability (UAAL)

(\$ shown in thousands)

Line Description	401(a) GRS	401(a) Segal	401(h) GRS	401(h) Segal	Total GRS	Total Segal
Actuarial accrued liability	\$67,098,972	\$67,215,956	\$1,542,654	\$1,550,022	\$68,641,627	\$68,765,977
Actuarial value of assets	48,146,652	48,146,652	2,040,079	2,040,079	50,186,732	50,186,732
UAAL	18,952,320	19,069,303	(497,425)	(490,058)	18,454,895	18,579,246
Funded ratio	71.8%	71.6%	132.2%	131.6%	73.1%	73.0%
<b>Ratio Segal/GRS</b>						
Actuarial accrued liability		100.2%		100.5%		100.2%
Actuarial value of assets		100.0%		100.0%		100.0%
UAAL		100.6%		98.5%		100.7%

Line Description	LTD GRS	LTD Segal
Actuarial accrued liability	\$207,152	\$193,722
Actuarial value of assets	194,716	194,716
UAAL	12,436	(994)
Funded ratio	94.0%	100.5%
<b>Ratio Segal/GRS</b>		
Actuarial accrued liability		93.5%
Actuarial value of assets		100.0%
UAAL		(8.0%)

## Contribution Rates

Line Description	401(a) GRS	401(a) Segal	401(h) GRS	401(h) Segal	Total GRS	Total Segal
Total normal cost rate	14.03%	13.83%	0.43%	0.41%	14.46%	14.24%
UAAL contribution rate	10.14%	10.23%	-0.36%	-0.35%	9.78%	9.88%
Total contribution rate (employer and member)	24.17%	24.06%	0.07%	0.06%	24.24%	24.12%
Member rate	12.12%	12.06%	0.00%	0.00%	12.12%	12.06%
Employer rate	12.05%	12.00%	0.07%	0.06%	12.12%	12.06%
<b>Ratio Segal/GRS</b>						
Total normal cost rate		<b>98.6%</b>		<b>95.3%</b>		<b>98.5%</b>
UAAL contribution rate		<b>100.9%</b>		<b>97.2%</b>		<b>101.0%</b>
Total contribution rate		<b>99.5%</b>		<b>85.7%</b>		<b>99.5%</b>
Member rate		<b>99.5%</b>		<b>N/A</b>		<b>99.5%</b>
Employer rate		<b>99.6%</b>		<b>85.7%</b>		<b>99.5%</b>

Line Description	LTD GRS	LTD Segal
Total normal cost rate	0.25%	0.26%
UAAL contribution rate	0.04%	0.03%
Total contribution rate (employer and member)	0.30%	0.30%
Member rate	0.15%	0.15%
Employer rate	0.15%	0.15%
<b>Ratio Segal/GRS</b>		
Total normal cost rate		<b>104.0%</b>
UAAL contribution rate		<b>75.0%</b>
Total contribution rate		<b>100.0%</b>
Member rate		<b>100.0%</b>
Employer rate		<b>100.0%</b>

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