

School Employees Retirement System of Ohio

Proposal to Perform an Independent Actuarial Audit

**Produced by Cheiron, Inc.
June 6, 2024**

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June 6, 2024

Ms. Bethany Rhodes, Director/General Counsel
Ohio Retirement Study Council
30 East Broad Street, 2nd Floor
Columbus, Ohio 43215
Bethany.Rhodes@orsc.org

Re: Request for Proposal for Actuarial Audit

Dear Ms. Rhodes,

Cheiron is pleased to present this proposal for actuarial audit services to the Ohio Retirement Study Council (ORSC).

We are an employee-owned actuarial consulting firm with a reputation for creativity, technological proficiency, and integrity.

Public Sector Experience

Our founding partners have advised public plans since the 1990s, and 30 of our 73 credentialed actuaries have more than 20 years of public experience.

Cheiron has 150 public sector clients—92 pension and 58 health & welfare—and our consultants advise plans of comparable size and complexity to your System. We have worked with many of the nation's largest public pension plans, including the retirement systems under the State of New Jersey Division of Pensions and Benefits, the Pennsylvania Municipal Retirement System, the California Public Employees' Retirement System, California State Teachers' Retirement System, the State of Delaware, the Maine Public Employees Retirement System, the Maryland State Retirement and Pension System, the New York State Teachers Retirement System, the State Teachers Retirement System of Ohio, and the University of California Retirement Plan.

Credentials

Our commitment to providing the highest quality of work begins with encouraging our actuaries to become Fellows of the Society of Actuaries (FSAs), the highest actuarial credential. To advance to the FSA designation from other credentials requires hundreds of extra hours of study, additional examinations, and a specialty track. More than 60% of all our credentialed actuaries are FSAs.

Our proposed team more than meets your requirements. Our co-lead pension actuaries Janet Cranna and Graham Schmidt are Fellows of the Society of Actuaries (FSA), Enrolled Actuaries (EA) under ERISA, and Members of the American Academy of Actuaries (MAAA). Mike Moehle, the assigned audit specialist, is also an FSA, EA, and MAAA. Our co-lead health actuaries, Kathy Weaver and Danny Rhodes, are both FSAs and MAAAs.

Sophisticated Tools

Cheiron's founders were among the first in the nation to develop interactive pension modeling tools more than three decades ago. Our proprietary projection tool *P-Scan* excels in forecasting future financial metrics such as costs, liabilities, assets, and funding ratios. This model's strength lies in its adaptability and ease of use, allowing for comprehensive analysis of numerous variables, including benefit changes, rate of return, discount rates, and contribution levels, among others.

Creativity

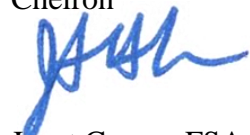
Because of our reputation for creativity, some of the most troubled pension plans in the country have sought our help over the years, including the San Diego City Employees' Retirement System, the City of Detroit, the City of Philadelphia Board of Pensions and Retirement, the five large Illinois public employee retirement systems, and the Maine Public Employees Retirement System.

Professional Leadership

Our consultants are active in professional organizations such as the American Academy of Actuaries, the Conference of Consulting Actuaries, and the Society of Actuaries. They also serve on the Pension Committee of the Actuarial Standards Board, the rulemaking body for the actuarial profession and the California Actuarial Advisory Panel. Our consultants also speak at conferences of industry organizations such as the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employees Retirement Systems (NCPERS), the National Council on Teacher Retirement (NCTR), the California Association of Public Retirement Systems, (CALAPRS), and the International Foundation of Employee Benefit Plans (IFEBP).

We are confident that we can do an outstanding job in performing this audit for ORSC and thank you for considering Cheiron. We look forward to answering your questions.

Sincerely,
Cheiron



Janet Cranna FSA, EA, MAAA, FCA
Principal Consulting Actuary



Graham Schmidt, FSA, EA, MAAA, FCA
Principal Consulting Actuary

June 6, 2024

AUDIT PROPOSAL

4.1 PROPOSAL SUMMARY

Each proposal shall provide a narrative summary of the proposal being submitted. This summary should identify all of the services and work products that are being offered in the proposal and should demonstrate the firm's understanding of the project.

We understand that the Ohio Retirement Study Council (ORSC) is requesting a proposal to perform an actuarial audit for independent verification and analysis of the assumptions, procedures, and methods used and reported on by the consulting actuary of SERS for:

- SERS Annual Basic Benefits Valuation as of June 30, 2023
- The five-year experience review for the period ending June 30, 2020, and
- SERS Retiree Health Care Valuation as of June 30, 2023, including GASB Statement 74 disclosures.

We will perform parallel valuations of pension benefits as of June 30, 2023, and of retiree health care benefits as of June 30, 2023. We will make recommendations as needed of assumption adjustments to more accurately reflect present and future assets, liabilities and costs of SERS, assess whether SERS appropriately and consistently determines retiree contributions to health care, and whether the implementation of SERS's health care policies differ from those determinations. We will also review the approach, conclusions, and communications of the experience review. We will provide monthly updates to the ORSC and prepare an audit report containing a description of the work performed, an executive summary of our findings and recommendations, and the basis for our recommendations. We will also present our results to the ORSC and the SERS Board.

In addition to the summary, please provide all of the following general information:

- **The firm's primary contact for ORSC staff use and, if different, for SERS staff use during the audit, including the contact's address, telephone and e-mail address;**
 - **Janet Cranna FSA, EA, MAAA, FCA**, Principal Consulting Actuary, the proposed co-lead actuary for this engagement, is a primary contact for ORSC.

Contact:

8300 Greensboro Drive, Suite 800

McLean, VA 22102

jcranna@cheiron.us / 877-243-4766 Ext. 1145

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- **Graham Schmidt, FSA, EA, MAAA, FCA**, Principal Consulting Actuary, the other proposed co-lead for this engagement, is also a primary contact for ORSC.

Contact:

3685 Mount Diablo Blvd., Suite 250

Lafayette, CA 94549

gschmidt@cheiron.us / 877-243-4766 Ext. 1137

- **General ownership structure of the organization, including subsidiary and affiliated companies, and joint venture relationships;**

Cheiron is an independent employee-owned actuarial consulting firm incorporated as a C-corporation in Delaware in September 2002. The firm has no parent company, subsidiaries, affiliates, or joint ventures.

- **Information regarding any material change in the firm's structure or ownership within the last eighteen months, or any material change in ownership, staff, or structure currently under review or being contemplated by the firm;**

Cheiron has not changed the firm's structure or ownership in the past 18 months, nor is it contemplating any changes.

- **If available, a third-party assessment or report concerning client satisfaction and measures of the firm's strengths and weaknesses;**

We monitor satisfaction with our services through regular communication with our clients. We establish relationships with people at various levels of our clients' organizations, and continually seek feedback. We address even the smallest of concerns before they have a chance to become big issues.

We also participate in formal reviews of our services initiated and performed by our clients. We have included as Appendix A an example of a review for a client of one of our proposed co-leads Graham Schmidt.

- **Any material litigation which has been threatened against the firm or to which the firm is currently a party;**

The firm is not a party to any litigation currently, nor have we been threatened with any litigation.

- **A list and brief description of litigation brought against the firm by existing or former clients over the last five years; and**

The firm has not been sued by existing or former clients in the past five years.

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- **A list of any professional relationships involving the ORSC, the five Ohio public retirement systems, the State of Ohio, or its political subdivisions for the past five years, together with a statement explaining why such relationships do not constitute a conflict of interest relative to performing the proposed review. In the event that the firm has had any professional relationships involving the ORSC, the five Ohio public retirement systems, the State of Ohio, or its political subdivisions for the past five years, the firm shall provide a statement explaining why such relationships do not constitute a conflict of interest relative to performing the proposed review, or, if necessary, an explanation of the actions that will be taken to ensure an independent review.**

Cheiron Inc. currently provides actuarial consulting services to the State Teachers Retirement System of Ohio (STRS). Cheiron has served in this capacity since May 29, 2018. We do not believe this represents any conflict of interest regarding our ability to do the requested work for ORSC because none of the proposed team members are currently assigned to work on Ohio STRS account. We also confirmed with STRS that they have no concerns with our providing these services to SERS.

4.2 CAPABILITIES AND EXPERIENCE

Each proposal shall describe the firm’s capabilities and recent experience (at least during the last five years) in performing actuarial valuations, audits, or studies of public employee retirement systems. The response should include information on the types and sizes of public employee retirement systems for which past work has been performed, including whether the systems were defined benefit or defined contribution plans, the types and number of participating employers, number of participants, and other relevant indicators of plan type, size, and comparability to SERS. You should include other information you believe may be relevant in demonstrating your capabilities in performing the actuarial audit, including other professional experience and data processing capabilities.

Cheiron is a professional actuarial services firm that provides actuarial valuations, experience investigations, actuarial audits, and pension and other postemployment benefits (OPEB) consulting services to national and regional public pension and OPEB systems. On the following pages we provide detailed information to the extent available about the types and sizes of public plans for which we have performed actuarial valuation and audit services.

**School Employees Retirement System of Ohio
RFP for Independent Actuarial Audit**

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Actuarial Audit Services

In the last five years, we have performed actuarial audits similar to that required in this request for proposal for the following systems:

Client	Type of Plan and Number of Employers	Participants	Assets	Audit Performed
<ul style="list-style-type: none"> California State Teachers' Retirement System (CalSTRS) 	Cost-sharing employer plan; defined benefit and defined contribution	933,410	\$208,700,000,000	Full replication of 2019 actuarial valuation of DB program, full replication 2018 experience study, Full replication of the CB Benefit and DBS valuations as of June 30, 2019; Full replication of the MPP actuarial valuation as of June 30, 2019
<ul style="list-style-type: none"> Contra Costa County Employees' Retirement Association 	Cost-sharing, defined benefit plan	23,000	\$8,150,000,000	Full replication of 12/31/2018 valuation and experience study
<ul style="list-style-type: none"> Educational Employees' Supplementary Retirement System of Fairfax County 	Single employer plan, defined benefit plan	38,329	\$2,279,741,119	2018; limited scope
<ul style="list-style-type: none"> Illinois Office of the Auditor General 	Cost-sharing and single-employer plans, defined benefit	945,000	\$108,000,000,000	2012-ongoing; limited scope audits of the Illinois Teachers, Retirement System, State Employees Retirement System of Illinois, State Universities Retirement System of Illinois, Judges' Retirement System of Illinois, General Assembly Retirement System of Illinois, Public School Teachers Pension and Retirement Fund of Chicago
<ul style="list-style-type: none"> Kern County Employees' Retirement Association 	Cost-sharing, defined benefit plan	20,600	\$4,219,235,000	2021; full replication of 6/30/2019 valuation and review of actuarial assumptions and methods
<ul style="list-style-type: none"> Los Angeles City Employees Retirement System 	Single-employer, defined benefit plan	53,515	\$17,707,909,933	2019; full replication audit of 6/30/2019 retirement and health plan valuations and 2014-2017 experience study

**School Employees Retirement System of Ohio
RFP for Independent Actuarial Audit**

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Client	Type of Plan and Number of Employers	Participants	Assets	Audit Performed
<ul style="list-style-type: none"> Maryland-National Capital Park & Planning Commission Employees' Retirement System 	Single-employer, defined benefit plan	4,202	\$964,901,537	2018; full replication of actuarial valuation, full replication of option factors, review of actuarial assumption and methods and GASB 67/68 disclosure
<ul style="list-style-type: none"> Mendocino County Employees' Retirement Association 	Cost-sharing defined benefit; 3 employers	2,737	\$484,000,000	2022-2023; full replication
<ul style="list-style-type: none"> Mississippi Public Employees' Retirement Systems 	cost-sharing, single-employer, and agent, defined benefit plans	345,000	\$35,863,000,000	Full replication audit of June 30, 2021 actuarial valuations (4 systems), review of June 30, 2020 experience study, and review of GASB 67/68 disclosure
<ul style="list-style-type: none"> Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS) 	Cost-sharing, defined benefit plan	18,300	\$2,200,000,000	Full replication audit of June 30, 2018 actuarial valuation and review of the June 30, 2017 experience study
<ul style="list-style-type: none"> Municipal Employees' Retirement System of Michigan (MERS) 	Agent multiple-employer, defined benefit plan	83,600	\$9,000,000,000	Full replication audit of December 31, 2018 actuarial valuation and review of December 31, 2018 experience study
<ul style="list-style-type: none"> New Mexico Public Employees' Retirement Association 	Cost-sharing, defined benefit plan	106,000	\$15,200,000,000	2020; sample life audit of actuarial valuation; review of experience study; validation of Asset/Liability modeling
<ul style="list-style-type: none"> New York State Teachers' Retirement System 	Cost-sharing, defined benefit plan	431,000	\$118,000,000,000	Study of actuarial opinions related to a Governor's proposal regarding a long-term stable contribution program (2013); detailed examination of NYSTRS based on requirements of Insurance Law and the Retirement and Social Security Law (2017); full replication of June 30, 2018 NYSTRS Valuation Report; audit of the NYSTRS Recommended Actuarial Assumptions 2021 Report

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Client	Type of Plan and Number of Employers	Participants	Assets	Audit Performed
• Orange County Employees' Retirement System	Cost-sharing, defined benefit plan	50,633	\$20,700,000,000	Full replication audit of 12/31/2017 and 12/31/2021 actuarial valuations and review of actuarial assumptions and methods
• Pennsylvania Public School Employees; Retirement System	Defined benefit, single employer plan	657,000	\$58,687,000,000	2022; full replication of June 30, 2020 actuarial valuation, and review of actuarial assumptions and GASB 67/68 disclosure
• Sacramento County Employees' Retirement System	Cost-sharing, defined benefit plan	37,700	\$7,700,000,000	Full replication audit of 6/30/2016 and 6/30/2021 actuarial valuations and review of actuarial assumptions and methods
• San Bernardino County Employees' Retirement Association	Cost-sharing defined benefit plan; 21 employers	38,836	\$9,200,000,000	Full replication of 6/30/2018 valuation, GASB 67 valuation and review of actuarial assumptions and methods
• San Diego County Employees' Retirement Association	Cost-sharing, defined benefit plan	42,800	\$12,288,915,000	Full replication of the 6/30/2018 valuation and 2015-2018 Experience Study
• San Mateo County Employees' Retirement Association	Cost-sharing, defined benefit plan	12,736	\$4,723,110,000	Full replication of the June 30, 2020 valuation and review of actuarial methods and assumptions
• Texas County and District Retirement System	Cost-sharing, defined benefit plan	57,997	\$40,924,100,000	Full replication of June 30, 2020 valuation for 20 Districts
• University of California Retirement System	Single-employer, defined benefit plan	280,297	\$48,700,000,000	Full replication audit of July 1, 2016 Retirement and OPEB Valuations and Independent Audit of July 2, 2014 to June 30, 2018 Experience Study

**School Employees Retirement System of Ohio
RFP for Independent Actuarial Audit**

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Actuarial Valuation Services

This is a list of Cheiron’s public sector defined benefit clients for whom we provide ongoing pension actuarial valuation services and actuarial consulting services.

Client	Type of Plan and Number of Employers	Participants	Assets	Date of Hire
• Alameda-Contra Costa Transit District Employees Retirement Plan	Single employer	4,592	\$776,785,000	1/1/2013
• Amalgamated Transit Union Local 900 Pension Plan	Single employer	158	\$6,995,366	1/1/2007
• Arlington County Retirement System	Single employer	8,715	\$29,761,000,000	4/3/2003
• Austin Fire Fighters Relief and Retirement Fund	Single employer	2,213	\$1,115,832,870	12/1/2022
• Cincinnati Retirement System Pension	Single employer	8,638	\$1,763,884,000	8/8/2018
• City and County of San Francisco Employees Retirement System	Cost-sharing; 4 Employers	70,994	\$22,410,000,000	7/1/2008
• City of Alexandria Pension Plans	Single Employer	4,344	\$551,742,465	11/30/2010
• City of Allentown Pension Plans	Single employer	944	\$284,395,284	7/12/2010
• City of Baltimore Fire and Police Employees	Single employer	9,969	\$3,054,071,598	3/30/2012
• City of Kansas City, Missouri Employees Retirement System	Single employer	7,036	\$1,160,655,852	1/1/2007
• City of Kansas City, Missouri Firefighters Pension System	Single employer	2,029	\$6,023,383,893	1/1/2007
• City of Norfolk Employees Retirement System	Single employer	8,627	\$1,244,910,000	6/1/2005
• City of Philadelphia Municipal Retirement System	Single employer	64,148	\$6,939,833,896	8/7/2007
• City of San Jose Federated City Employees Retirement System	Single employer	10,693	\$2,889,956,000	8/12/2010
• City of San Jose Police and Fire Department Retirement Plan	Single employer	5,850	\$3,479,134,000	5/5/2011
• City of Wilmington Pension System	Single employer	2,744	\$206,576,675	12/28/2011
• DART Contributory Pension Plan	Single employer	1,095	\$63,933,076	5/7/2007
• Delaware Public Employees Retirement System	Cost-sharing	72,767	\$9,696,899,100	6/1/2006
• Denver Employees Retirement Plan	Single employer	28,384	\$2,486,313,817	12/11/2018
• Employees Retirement System of the City of Baltimore	Single employer	18,292	\$1,740,450,176	5/5/2005

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Client	Type of Plan and Number of Employers	Participants	Assets	Date of Hire
• Employees Retirement System of the City of St. Louis	Cost-sharing	12,487	\$797,777,721	10/1/2010
• Fairfax County Retirement Systems	Single employer	32,797	\$7,399,044,443	7/1/2003
• Firefighters Retirement Plan of the City of St. Louis	Single employer	682	\$43,948,104	6/25/2014
• Golden Gate Transit-Amalgamated Retirement Plan	Single employer	617	\$87,079,579	4/1/2013
• Hampton Employees Retirement System	Single employer	1,116	\$61,861,497	8/27/2009
• Jackson County Revised Pension Plan	Single employer	3,848	\$340,868,633	5/1/2016
• Knoxville Utilities Board Pension Plan	Single employer	1,056	\$234,507,227	11/15/2011
• Maine Public Employees Retirement System	Cost-sharing and Agent	155,822	\$15,075,604,606	3/1/2005
• Marin County Employees Retirement Association	Cost-sharing; 9 Employers	7,487	\$3,144,663,241	1/1/2013
• Maryland National Park and Planning Commission	Single employer	4,945	\$1,127,163,977	3/7/2019
• Merced County Employees Retirement Association	Cost-sharing	6,124	\$1,135,081,385	1/1/2013
• Metropolitan Relief Association Death Benefit Plan	Single employer	817	\$14,972,083	1/6/2015
• Metropolitan Washington Council of Governments	Single employer	203	\$70,448,751	4/1/2003
• Modesto Irrigation District	Single employer	1,037	\$451,510	4/1/2019
• Newport News Employees Retirement Fund	Single employer	11,871	\$993,211,071	6/3/2010
• Oakland Police and Fire Retirement System	Single employer	653	\$416,130	9/18/2013
• Pasadena Fire Fighters Association Benefit Trust	Single employer	261	\$7,905,746	1/1/2013
• Pennsylvania Municipal Retirement System	Agent, ~1000 employers	19,104	\$3,019,421,000	10/1/2006
• Police & Fire Retirement System of Wichita, Kansas	Single employer	2,236	\$805,749,251	7/15/2019
• Port Authority of Allegheny County Retirement and Disability Allowance Plan for Employees Represented by Local 85 of the Amalgamated Transit Union	Single employer	5,430	\$759,398,625	1/1/2007
• Retirement Plan for Pace West Division Employees	Single employer	507	\$26,172,443	1/1/2007
• Sacramento Regional Transit District	Single employer	2,241	\$298,355,348	1/1/2013
• San Diego City Employees Retirement System	Agent; 3	23,930	\$10,598,771,205	6/14/2006

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Client	Type of Plan and Number of			
	Employers	Participants	Assets	Date of Hire
	employers			
• San Diego Transit Corporation Pension Plan	Single employer	1551	\$183,997,343	1/1/2013
• San Joaquin County Employees Retirement System	Cost-sharing	14,523	\$3,244,361,827	1/1/2013
• Santa Barbara County Employees Retirement System	Cost-sharing	11,487	\$4,132,090,000	1/1/2013
• Santa Clara Valley Transportation Authority ATU Pension Plan	Single employer	3,226	\$632,627,301	1/1/2013
• Stanislaus County Employees Retirement Association	Cost-sharing	9,793	\$2,182,200,000	1/1/2013
• State of New Jersey Division of Pensions and Benefits	Single and cost-sharing plans, 1,672 employers	720,410	\$70,372,562,728	8/1/2018
• State Teachers Retirement System of Ohio	Cost-sharing	525,540	\$85,001,128,147	5/23/2018
• Sussex County Employee Pension Plan	Single employer	810	\$82,759,578	2/1/2016
• The Police Retirement System of St. Louis	Single employer	2,936	\$871,099,654	6/1/2012
• Tri-County Metropolitan Transportation District of Oregon	Single employer	3,857	\$693,134,687	2/28/2018
• Tulare County Employees Retirement Association	Cost-sharing	9,805	\$1,587,476,000	5/6/2015
• U.S. Court of Appeals for Veterans Claims	Single employer	20	\$53,562,311	4/1/2003
• United States Army Nonappropriated Fund Employee Retirement Plan	Single employer	61,012	\$2,326,400,000	8/1/2003
• Washington Metropolitan Area Transit Authority Retirement Plan	Single employer	1,638	\$347,330,827	7/1/2009
• Washington Metropolitan Area Transit Authority, Local 2 Retirement Plan	Single employer	425	\$148,050,475	7/1/2009
• Washington Metropolitan Area Transit Authority, Local 922 Retirement Plan	Single employer	795	\$238,948,567	6/1/2004
• Washington State Council of Fire Fighters Employee Benefit Trust	Single employer	11,068	\$18,130,000	5/22/2014
• Wichita Employees Retirement System	Single employer	3,075	\$667,029,106	7/15/2019

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4.3 STAFF QUALIFICATIONS

Each proposal shall, at a minimum, describe the qualifications of all management and lead professional personnel who will participate in the audit. Each personnel description shall include: (1) a resume; (2) a summary of experience each has had in performing actuarial valuations, audits, or studies of public employee retirement systems; and (3) a management plan identifying the responsibilities each will have on the audit.

Each resume should include information on the current and past positions held with the firm, educational background, actuarial and other relevant credentials, and other relevant information to demonstrate the person's qualification.

Please see the following pages for resumes of the assigned Cheiron consultants, including a summary of experience performing actuarial valuations and audits of public employee retirement systems.

The actuarial audit will be directed by the co-lead actuaries Janet Cranna and Graham Schmidt who will also be the primary contacts. Daniel Rhodes and Kathleen Weaver will be the OPEB lead actuaries. The audit project will be co-managed by Mike Moehle and Dr. Amul Shah, who will supervise a team of actuarial analysts. More details on the management plan are provided later in this section.

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Janet Cranna, FSA, EA, MAAA, FCA
Principal Consulting Actuary

Janet Cranna has more than three decades of consulting experience with public pension funds.

Her experience includes supervising, reviewing and certifying actuarial valuations and GASB disclosures. She performs experience studies and recommends changes in actuarial assumptions and consults on plan design and interpretation of plan provisions and their relationship to ERISA, IRS regulations, and state statutes. She frequently presents and testifies before boards and legislative committees on plan design and funding strategies.



Her clients include the New Jersey Retirement Systems, Sussex County, DE, the Firefighters' Retirement Plan of the City of St. Louis, the Wichita Retirement Systems, the Cincinnati Retirement System, and the Maryland-National Capital Park and Planning Commission.

She has performed actuarial audits for the Pennsylvania Public School Employees' Retirement System, the Mississippi Public Employees' Retirement System, the New York State Teachers' Retirement System, the State Actuary for the State of Illinois, reporting to the Office of Auditor General, the Maryland-National Capital Park and Planning Commission, the Retirement Systems of Alabama, the Municipal Pensions Oversight Board of West Virginia, and the Texas State Auditor's Office.

She is active in professional organizations, including the Society of Actuaries and the National Council on Teacher Retirement.

She joined Cheiron in May 2013.

She is a Fellow of the Society of Actuaries, an Enrolled Actuary under ERISA, a Member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries. She graduated with a Bachelor of Arts in Economics and a minor in Political Science from Bryn Mawr College.

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Graham Schmidt, FSA, EA, MAAA, FCA
Principal Consulting Actuary

Graham Schmidt is a well-known expert on public pension plans with 25 years of experience and represents the State Association of County Retirement Systems (SACRS) on the California Actuarial Advisory Panel.

His experience includes working on audits and risk analyses. He oversees Cheiron's retiree medical benefit trusts practice, developing more than a dozen tax-advantaged union-run trusts that provide pooled lifetime benefits under a fixed contribution.

He heads Cheiron's Technology Committee and has led the firm's efforts to develop interactive online reports.



His clients include the Santa Barbara County Employees' Retirement System, Merced County Employees' Retirement Association, San Joaquin County Employees' Retirement Association, Marin County Employees' Retirement Association, Stanislaus County Employees' Retirement Association, Tulare County Employees' Retirement Association, the Oakland Police and Fire Retirement System, and the Denver Employees' Retirement Plan.

He is also the lead or co-lead consultant on many of our actuarial audits, including studies for the Los Angeles City Employees Retirement System, Water and Power Employees Retirement Plan, the Public Employees Retirement Association of New Mexico, and CalSTRS. He has served as the lead or co-lead on audits for twelve California 1937 Act Counties—Alameda, Contra Costa, Fresno, Imperial, Kern, Mendocino, Orange, Sacramento, San Bernardino, San Mateo, Sonoma, and San Diego.

He is a member of the Society of Actuaries' Retirement Plans Experience Committee and volunteered on other public plan committees of the Academy of Actuaries and the Conference of Consulting Actuaries.

He often discusses public pension issues at professional conferences, including the International Foundation of Employee Benefit Plans, the Conference of Consulting Actuaries, and the National Council on Teacher Retirement. He is a frequent instructor at the SACRS Public Plan Investment Management program.

He joined Cheiron in January 2013 and opened the firm's Bay Area office that year.

He is a Fellow of the Society of Actuaries, an Enrolled Actuary under ERISA, a Member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries. He received a Bachelor of Arts in Mathematics and a Bachelor of Science in Mathematical Science with Departmental Honors from Johns Hopkins University.

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Daniel Rhodes, FSA, MAAA, FCA
Principal Consulting Actuary

Danny Rhodes has more than 20 years of experience as a health actuary working with public sector, multiemployer, and single-employer plans.

His experience includes retiree medical valuations, retiree drug subsidy attestations, Affordable Care Act minimum value certifications, incurred but not reported reserves, and self-funded rate projections. He provided OPEB valuations to the states of Arizona, Connecticut, Nebraska, Nevada, New Hampshire, North Carolina, and Wisconsin, and Kern County, CA, Barnstable County, MA, also Bakersfield, CA, Boston, and Providence, RI.



He is a member of the Actuarial Standards Board Task Force to revise Actuarial Standard of Practice #6, and an Expert Question Writer for Group Health Valuation and Regulation Exam for the Society of Actuaries. He frequently speaks on actuarial topics to the Massachusetts Government Finance Officers Association, the Massachusetts Collectors Treasurers Association, the Massachusetts Municipal Association, the Massachusetts Public Employees Retirement Administration Commission, the Connecticut Conference of Municipalities, the New Mexico Retiree Health Care Authority, and the Air Line Pilots Association.

He joined Cheiron in May 2024. He was previously a senior vice president and consulting actuary at Segal.

He is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries. He received a Bachelor of Arts with Honors in Applied Mathematics from Harvard University.

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Kathleen Weaver, FSA, EA, MAAA, FCA
Consulting Actuary

Kathy Weaver has more than two decades of experience advising public pension and retiree medical plans, as well as private sector retiree medical plans.

Her experience includes pension and retiree medical actuarial valuations, plan design studies, preparing GASB disclosures for public pension and OPEB plans, benefit calculations and benefit statements, government filings, experience studies, actuarial audits, and programming actuarial models.

Her clients include the City of Alexandria, VA, Alexandria (VA) City Public Schools, Arlington (VA) Public Schools, Maine Public Employees Retirement System, DC Office of the Chief Financial Officer, the City of Newport News, VA, the City of Hampton, VA, Hampton (VA) City Schools, West Virginia Housing Development Fund, Pittsfield, MI Charter Township, Knoxville Utilities Board, and West Chester County Health Care Corporation.

She joined Cheiron in June 2010.

She is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries, an Enrolled Actuary under ERISA, and a Fellow of the Conference of Consulting Actuaries. She graduated *summa cum laude* from Towson University with a B.S. in Mathematics.



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Amul Shah, MD, ASA
Clinical Consultant and Associate Actuary

Amul Shah is a licensed physician who works closely with Cheiron's actuaries on health care actuarial services.

His clinical experience helps the firm in pricing benefit changes and interpreting technical language. His experience includes creating and updating proprietary databases with medical network provider contract terms, reviewing wellness and disease management plan designs for a medical plan renewal, and determining alternatives for medications in a formulary exclusion list.

His clients include the Los Angeles County Department of Health, Camden County Municipal Utilities Authority, Westchester Medical Center, Tri-County Metropolitan Transportation District of Oregon, City and County of San Francisco, San Diego County Employees Retirement Association (SDCERA), and DC Benefits Health.

He joined Cheiron in October 2018.

He has a Medical Doctorate and is an Associate of the Society of Actuaries.

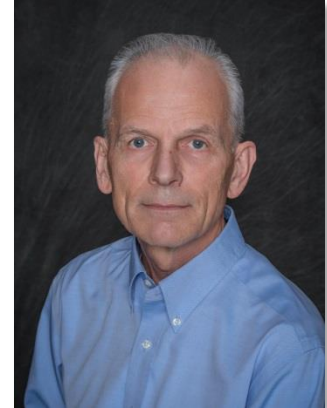


June 6, 2024

Michael Moehle, FSA, EA, MAAA, FCA
Public Pension Oversight

Michael Moehle has four decades of experience as an actuarial consultant working with California and other Western public sector and corporate pension funds.

He performs internal audits and reviews of all public sector and multiemployer pension work at Cheiron. In that role he conducts independent validations of liability and asset valuation results. He also reviews valuation assumptions and methods for compliance with applicable actuarial and GASB standards along with written evaluations of compliance with Cheiron’s internal quality control guidelines.



He also has participated in many of our public sector external audits, including those for the Counties of Kern, Orange, San Mateo, Sacramento, San Bernardino and San Diego. He recently led audits of the Mississippi PERS, New York State Teachers Retirement System, CalSTRS, the Pennsylvania Public School Employees’ Retirement System and the Texas County and District Retirement System.

He previously worked at the City of San Jose Retirement Services, California, as the in-house actuary and consultant. Before joining the City of San José, he was a principal and senior consultant with a large national benefit consulting firm in California and worked with several California 1937 Act County Retirement Systems. He also advised statewide public employees retirement systems in Nevada, North Dakota, Minnesota, and Washington, and provided funding valuations and GASB 25, 27, 43 and 45 valuations and disclosures, and analysis and consulting on plan changes and plan alternatives.

He joined Cheiron in July 2011.

He is a Fellow of the Society of Actuaries, an Enrolled Actuary under ERISA, a Member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries. He graduated with a Bachelor of Science with a double major in Mathematics and Economics from Southern Illinois University.

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Each proposal shall also include a description of the firm’s procedures in the event that a key person assigned to this engagement leaves the firm during the engagement.

Our policy of using teams with co-lead consultants to service our clients offers a built-in backup procedure in case a key consultant leaves the firm. This co-lead structure also offers a succession plan if a co-lead actuary is unavailable due to an emergency. It also ensures you can reach us anytime and one of our lead consultants will always be available.

The experience summaries should include information on the types and sizes of public employee retirement systems for which the designated staff have completed actuarial work, including whether the systems were defined benefit or defined contribution plans, the types and number of participating employers, number of participants, and other relevant indicators of plan type, size, and comparability to SERS. It is permissible to reference, rather than repeat, duplicative information provided elsewhere in the proposal. The experience summaries should describe the work performed and detail the roles and responsibilities that the individual staff had on the projects.

The management plan should specify the roles and responsibilities that each of the management and professional staff will have on the actuarial audit and include an estimated portion of the audit’s time that will be spent by each on the audit.

Actuaries included on the project team should meet the following criteria:

- **Be members of the American Academy of Actuaries;**
- **Be enrolled actuaries with experience in governmental plans;**
- **Be, at a minimum, associates with at least five years of experience in public practice, although preference will be given to actuaries that are Fellows of the Society of Actuaries; and**
- **Have performed an actuarial valuation, audit, or study of a public employee retirement system within the last two years.**

The characteristics of each of the clients mentioned below are described in our response to 4.2. Additional information about the proposed team for this engagement can be found in their bios.

The Cheiron team proposed for this engagement includes:

- **Janet Cranna, FSA, EA, MAAA, FCA, Principal Consulting Actuary, is the proposed co-lead actuary for this engagement.**

Experience summary of significant public sector engagements includes:

- New Jersey Retirement Systems – Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.

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- Sussex County, Delaware – Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- St. Louis Firefighters – Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Cincinnati Retirement System – Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Wichita Retirement Systems – Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Maryland-National Parks and Planning Commission – Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.

Janet has also performed audits for the following defined benefit plans as described in Section 4.2:

- District of Columbia Retirement Board
- Illinois Office of the Auditor General
- Maryland-National Capital Park & Planning Commission Employees' Retirement System
- New York State Teachers' Retirement System
- Retirement Systems of Alabama
- Texas State Auditor's Office
- West Virginia Municipal Pensions Oversight Board
- Pennsylvania Public School Employees' Retirement System
- Mississippi Public Employees' Retirement System

Contact:

8300 Greensboro Drive, Suite 800

jcranna@cheiron.us / 877-243-4766 Ext. 1145

- **Graham Schmidt, FSA, EA, MAAA, FCA**, is the proposed co-lead actuary for this engagement.

Experience summary of significant public sector engagements includes:

- Santa Barbara County Employees' Retirement System - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Merced County Employees' Retirement Association - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.

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- San Joaquin County Employees' Retirement System - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Marin County Employees' Retirement Association - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Stanislaus County Employees' Retirement Association - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Tulare County Employees' Retirement Association - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.
- Denver Employees' Retirement Plan - Responsible for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed.

Graham has also performed audits for the following defined benefit plans:

- Los Angeles City Employees Retirement System
- Los Angeles Water and Power Employees Retirement Plan
- Public Employees Retirement Association of New Mexico
- California State Teachers Retirement System.

He has also served as the lead or co-lead on audits for twelve 1937 Act Counties in California:

- Alameda County Employees' Retirement Association
- Contra Costa County Employees' Retirement Association
- Fresno County Employees' Retirement Association
- Imperial County Employees' Retirement System
- Kern County Employees' Retirement Association
- Mendocino County Employees' Retirement Association
- Orange County Employees' Retirement System
- Sacramento County Employees' Retirement System
- San Bernardino County Employees' Retirement Association
- San Mateo County Employees' Retirement Association
- Sonoma County Employees' Retirement Association
- San Diego County Employees' Retirement Association

Contact:

3685 Mount Diablo Blvd., Suite 250

Lafayette, CA 94549

gschmidt@cheiron.us / 877-243-4766 Ext. 1123

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- **Daniel Rhodes, FSA, MAAA, FCA**, Principal Consulting Actuary, is the proposed co-lead OPEB actuary for this engagement.

Experience summary of significant public sector OPEB engagements includes:

- State of Arizona
- State of Connecticut
- State of Nebraska
- State of Nevada
- State of New Hampshire
- State of North Carolina
- State of Wisconsin
- Barnstable County (MA)
- Kern County (CA)
- City of Bakersfield (CA)
- City of Boston (MA)
- City of Providence (RI)

Contact:

225 West 34th Street, Floor 9-48

New York, NY 10122

drhodes@cheiron.us / 877-243-4766 Ext. 1181

- **Kathleen Weaver, FSA, EA, MAAA, FCA**, Consulting Actuary, is the proposed co-lead OPEB actuary for this engagement.

Experience summary of significant public sector engagements includes:

- City of Alexandria, VA – Responsible for annual pension and OPEB valuations, GASB 67/68 and 74/75 reporting, experience studies and additional projects as needed
- San Joaquin County Employees’ Retirement System – Project manager for annual pension valuations, GASB 67/68 reporting, experience studies and additional projects as needed
- City of Oakland Postretirement Health Insurance Plan – Responsible for biennial OPEB valuations, annual GASB 74/75 reporting and additional projects as needed
- District of Columbia Office of the Chief Financial Officer Other Post-Employment Benefits Fund – Responsible for annual OPEB valuations, GASB 74/75 reporting, experience studies, and other projects as needed
- Maine Public Employees Retirement System – Project manager for annual pension valuations, experience studies, and additional projects as needed
- City of Newport News Employees’ Retirement Fund – Responsible for annual OPEB valuations, GASB 74/75 reporting, and additional projects as needed. Also assist with the pension annual valuation, GASB 67/68 reporting, and experience studies.
- Arlington County (VA) Retiree Welfare Benefit Plan and Arlington Public Schools Retiree Welfare Benefit Plan - Responsible for annual pension and OPEB valuations, GASB 67/68 and 74/75 reporting and additional projects as needed

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Kathy has also performed audits for the following defined benefit and OPEB plans.

- Los Angeles City Employees' Retirement System
- State of New Mexico Public Employees Retirement Association

Contact:

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McLean, VA 22102

kweaver@cheiron.us / 877-243-4766 Ext. 1026

- **Michael Moehle, FSA, EA, MAAA, FCA**, Public Pension Oversight, is the proposed audit specialist and project manager for this engagement.

Significant public sector engagements include leading audits for the following:

- Mississippi Public Employees' Retirement System
- New York State Teachers Retirement System,
- California State Teachers' Retirement System
- Texas County and District Retirement System.
- Pennsylvania Public School Employees; Retirement System

Mike was the audit specialist and project manager for audits of the following defined benefit plans:

- Educational Employees' Supplementary Retirement System of Fairfax County
- Contra Costa County Employees' Retirement Association
- Illinois Office of the Auditor General
- Kern County Employees' Retirement Association
- Los Angeles City Employees Retirement System
- Maryland-National Capital Park & Planning Commission Employees' Retirement System
- Mendocino County Employees' Retirement Association
- Mississippi Public Employees' Retirement System
- Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS)
- Municipal Employees' Retirement System of Michigan (MERS)
- New Mexico Public Employees' Retirement Association
- Orange County Employees' Retirement System
- Pennsylvania Public School Employees' Retirement System
- San Mateo County Employees' Retirement Association
- Sacramento County Employees' Retirement System
- San Bernardino County Employees' Retirement Association
- San Diego County Employees' Retirement Association
- University of California Retirement System

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Lafayette, CA 94549

mmoehle@cheiron.us / 877-243-4766 Ext. 1123

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- **Amul Shah, ASA, MD**, Clinical Researcher and Associate Actuary, is the proposed OPEB project manager for this engagement.

Experience summary of significant public sector engagements includes:

- Los Angeles County Department of Health – Responsible for assisting with developing substance use disorder rates, guiding implementation of payment reform and transition to value-based care, and additional projects as needed
- City and County of San Francisco – Responsible for assisting with annual OPEB valuations, annual GASB 74/75 reporting, and additional projects as needed
- San Diego County Employees Retirement Association – Responsible for assisting with annual healthcare vendor renewals and additional projects as needed
- DC Benefits Health – Responsible for assisting with annual medical and prescription drug vendor renewals and additional projects as needed
- Westchester Medical Center – Responsible for assisting with annual OPEB valuations, annual GASB 74/75 reporting, and additional projects as needed
- Tri-County Metropolitan Transportation District of Oregon – Responsible for assisting with annual OPEB valuations, annual GASB 74/75 reporting, and additional projects as needed

Contact:

201 Lomas Santa Fe, Suite 400
Solana Beach, CA 92075
ashah@cheiron.us / 877-243-4766 Ext. 1116

Management Plan

The actuarial audit will be directed by the co-lead actuaries, Janet Cranna and Graham Schmidt, who will be the primary contacts to the SERS and ORSC and will attend most meetings. Janet and Graham will also be responsible for drafting reports and other communications regarding the audit.

Mike Moehle and Amul Shah will manage the audit project. They will supervise a team of actuarial analysts. Mike will also be available as a day-to-day contact regarding issues such as data collection and processing questions.

The estimated overall time allocation of these individuals to the total audit time is as follows:

- Janet Cranna 13%
- Graham Schmidt 13%
- Daniel Rhodes 13%
- Kathleen Weaver 16%
- Amul Shah 8%
- Mike Moehle 27%
- Actuarial analysts: 9%
- Administrative staff: 2%

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In the event that the firm or any personnel listed in the proposal has had any professional relationships involving the ORSC, the five Ohio public retirement systems, the State of Ohio, or its political subdivisions for the past five years, the firm shall provide a statement explaining why such relationships do not constitute a conflict of interest relative to performing the proposed review, or, if necessary, an explanation of the actions that will be taken to ensure an independent review.

As mentioned earlier, Cheiron Inc. currently provides actuarial consulting services to the State Teachers Retirement System of Ohio (STRS). Cheiron has served in this capacity since May 29, 2018. We do not believe this represents any conflict of interest regarding our ability to do the requested work for SERS because none of the proposed members for this assignment are currently assigned to the Ohio STRS account. We have confirmed with STRS that they have no concerns with us providing these services to SERS.

4.4 REFERENCES

Each proposal must include a list of at least three organizations, but no more than five, that may be used as references for the firm’s work on actuarial audits or studies. References may be contacted to determine the quality of the work performed, personnel assigned to the project, and contract adherence. The following should be included for the references listed:

- **Date of the actuarial audit work;**
- **Name, email address, and address of client;**
- **Name, email address, and telephone number of an individual in the client organization who is familiar with the work; and**
- **Description of the work performed.**

Client:	Mississippi Public Employees’ Retirement System
Service Dates:	2022
Contact:	Terri Hudson, Sr. Deputy, Administrative Services 429 Mississippi Street Jackson, MS 39201 thudson@pers.ms.gov / 601-359-2296
Description of Work:	Full replication audit of the June 30, 2021 actuarial valuations (4 systems), review of June 30, 2020 experience study, and review of GASB 67/68 disclosure

Client:	Pennsylvania Public School Employees’ Retirement System
Service Dates:	2022
Contact:	Mei Gentry, Chief Audit Officer 5 North 5th Street Harrisburg, PA 17101

June 6, 2024

Client:	Pennsylvania Public School Employees' Retirement System
	megentry@pa.gov / 717-743-0574
Description of Work:	Full replication of June 30, 2020 actuarial valuation, and review of actuarial assumptions and GASB 67/68 disclosure

Client:	California State Teachers Retirement System
Service Dates:	2010 - 2020
Contact:	David Lamoureux, Deputy System Actuary 100 Waterfront Place West Sacramento, CA 95605 DLamoureux@CalSTRS.com / 916-414-1303
Description of Work:	Replication and review of the 2008 Defined Benefit Program valuation. Replication and review of the 2015 DB Supplement and Cash Balance valuations and the 2014 MPP valuation. Replication and review of 2010-2015 experience analysis. Replication and review of all 2019 actuarial valuations and 2020 experience analysis.

Client:	Orange County Employees' Retirement System
Service Dates:	2017 - 2023
Contact:	David Kim, Director of Internal Audit 2223 E. Wellington Ave., Ste. 100 Santa Ana, CA 92701 dkim@ocers.org / 714-569-4809
Description of Work:	Full replication audit of 2017 and 2021 actuarial valuations and reviews of experience studies.

Client:	Los Angeles City Employees' Retirement System
Service Dates:	2020
Contact:	Rahooof (Wally) Oyewole, Departmental Chief Accountant 202 West First Street, Suite 500 Los Angeles, CA 90012 Rahooof.oyewole@lacers.org / 213-978-6897
Description of Work:	Full replication of the 6/30/2019 valuation and 2014-2017 Experience Study

4.5 METHODOLOGY, WORK PRODUCT, AND TIMELINE

Each proposal shall describe the proposed methodology for each element of the components listed under *Scope of Audit*. The description should include specific techniques that will be used, including anticipated sampling techniques and sizes, and proposed sources of data and information. You may propose alternative ways of addressing the elements of the audit's scope.

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In describing the proposed methodology, also identify the type and level of assistance that you anticipate will be needed from the staff of SERS and the consulting actuary, including: assistance to understand the operations and records of SERS; assistance to understand the actuarial assumptions, method, and procedures; and assistance to access, obtain, and analyze information needed for the audit. The description of the proposed methodology shall also identify meetings, interviews, programming support, space needs, etc., that you anticipate requiring from SERS and the consulting actuary.

Each proposal shall also include one or more examples of work product(s) from actuarial valuations or audits that may help to illustrate the proposed methodology and final work product.

- ***Data Validity*** - Assessment of the validity, completeness, and appropriateness for SERS' structure and funding objectives of the demographic and financial information used by the consulting actuary in the valuations of SERS.

Cheiron will request the original census data from SERS that was provided to the consulting actuary. Cheiron will also request from the consulting actuary the processed data that was used to produce the valuations. By having these two sets of files, Cheiron will be able to determine whether the data used for the valuations were appropriate and complete. This process will include a review of records that have been adjusted for data discrepancies. Cheiron will pay particular attention to participants whose status has changed from active to retired status. We will request from the consulting actuary detailed sample life output for a few of the active to retiree transfers in order to determine whether the liability and reserves have been calculated consistently.

Cheiron will also request the financial statements used to produce the valuations from SERS. These statements should include a reconciliation from the prior valuation date, contributions made to the system, benefits paid from the system, expenses, and investment returns.

Our review will also consider the requirements of Actuarial Standard of Practice No. 23, *Data Quality*.

- ***Actuarial Valuation Method and Procedures*** - Assessment of whether the consulting actuary's valuation method and procedures are reasonable and consistent with generally accepted actuarial standards and practices appropriate for SERS' structure and funding objectives and are applied as stated by the actuary. If deviations from accepted standards are found during the audit, the Contractor should obtain the rationale for the deviations and determine their effects, including their monetary impact.

Cheiron's review of funding methods and procedures will encompass each of the items

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specified above and will consider all of the following:

- Relevant Actuarial Standards of Practice (ASOPs): These include primarily, ASOP No. 4 (*Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*), No. 6 (*Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions*), and No. 44 (*Selection and Use of Asset Valuation Methods for Pension Valuations*).
- GASB Statements No. 74 and 75, 67 and 68: We will determine whether the methodology is appropriate for reporting results within the System's and the employers' financial statements.
- Goals and objectives of the retirement system and of the participating employers. In order to help determine these goals, we will speak with SERS staff.
- Long-term implications of the actuarial funding methods. For this analysis, Cheiron will use our proprietary projection software tools *P-Scan* and *H-Scan*, as described below, which will permit us to illustrate how the funding method will react to varying future economic scenarios. This process is described below.

We will request a number of sample lives from the consulting actuary to determine how the funding method(s) and assumptions have been applied in the determination of liabilities under the valuation. This will allow us to determine how well current methods and assumptions have been applied. We will also ask for sample lives of recent retirees to compare against actual benefits in payment status to determine if the assumptions are a fair predictor of the ultimate obligations of the System.

Our proprietary *P-Scan* and *H-Scan* models will provide us with insight as to how the assumptions and funding policy align with the long-term objections of SERS. These projections are useful to further improve your understanding of the risks associated with your plan and make prudent and informed decisions.

Each *P-Scan/H-Scan* is customized so that it reflects the current operation of the plan and can have a variety of policy options programmed in to facilitate the Board's discussion of alternatives. The *P-Scan* example shows a defined benefit plan, but we have used *P-Scan* to model defined contribution plan designs as well as plans that include both types of benefits.

Our P-Scan Interactive Model

Our modeling is performed for all of our recurring client work as well as for actuarial audits. This modeling will allow us to make a determination of the implications of the current results into the future and identify results that are not intuitive and/or reflect inconsistencies in the methods and assumptions. This modeling will be an integral part of

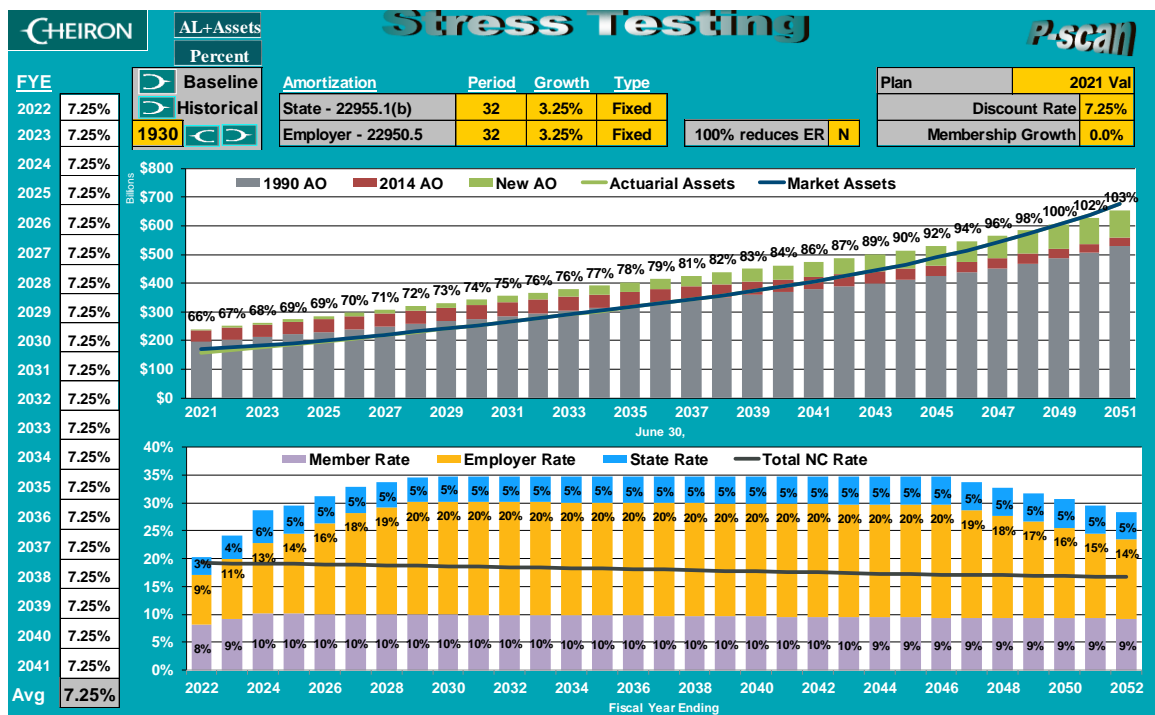
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our report in providing an assessment of the plan’s risks, how the valuation process, methods and assumptions act in mitigating the risk, and whether the System’s financial objectives are being met.

P-Scan is our proprietary software that forecasts assets and liabilities based on any user selected economic scenario. In addition, we can enhance our standard forecasts to include any other projections required, for example, changes in benefits, assumptions, funding methods, and contributions. *P-Scan* can also perform multiple stochastically based forecasts, enabling all our projections to incorporate probabilistic answers.

For plan reviews, audits and replications, the *P-Scan* modeling can demonstrate the effectiveness of the funding methods and assumptions in meeting explicit or implicit funding policies of the System. The modeling can also easily demonstrate the long-term implications in changing such policies or responding to current or projected economic conditions as well as demonstrate the implications of legislative changes.

The following screenshot from *P-Scan* is intended to illustrate its capabilities and how using this tool in our consulting is different from what our competitors provide. If selected for a finalist presentation, we would be happy to demonstrate the interactive capabilities of this tool.



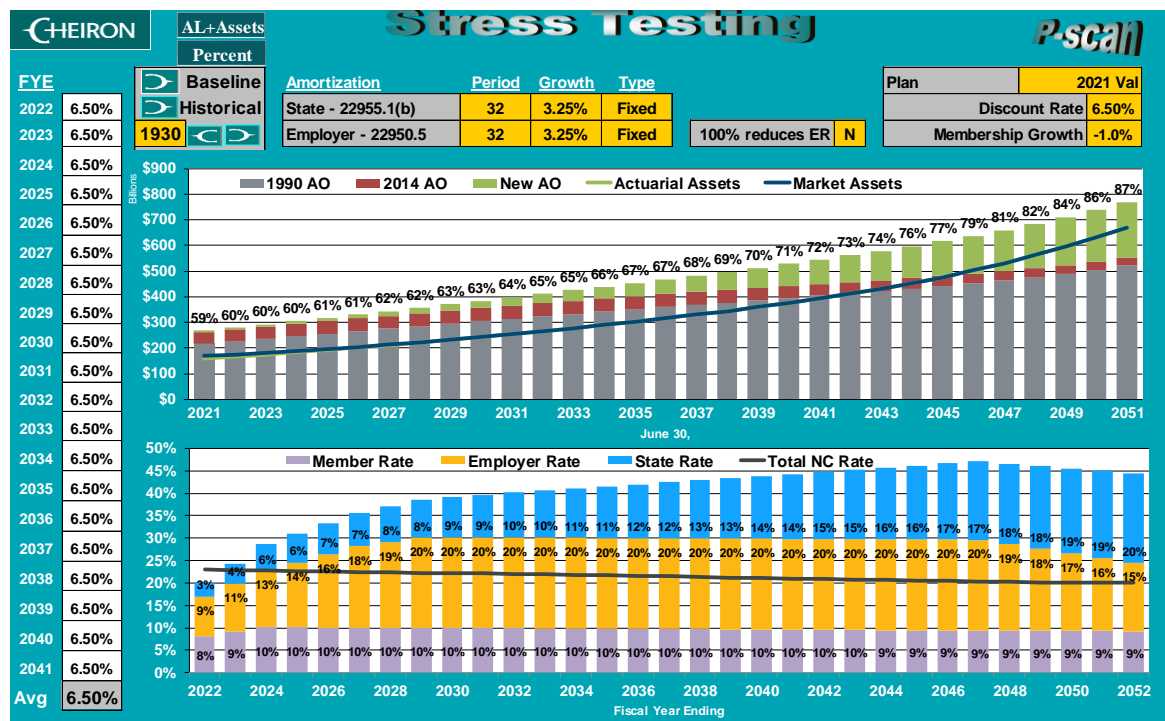
The orange boxes across the top represent variables that can be changed interactively. These variables are customized for the specific topics of a Board meeting. For example, we can program discount rate changes, other assumption changes, or benefit changes for current and/or future members.

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The top graph shows the projected actuarial liability by benefit formula change (the gray, red and green bars) and the actuarial and market value of assets (blue and green lines). The numbers above the bars represent the projected funded status. The bottom graph shows the projected contributions for the members, employers and the state. The black line on this graph represents the contribution attributable to the normal cost. All contributions above the black line go toward the unfunded liability. In this example, the employer and state contributions vary according to parameters set in statute.

On the left side of the screen, the actual investment return is shown for each year of the projection. These returns can be changed to develop different economic scenarios. This particular scenario is the baseline projection using the assumed rate of return of 7.25%.

We believe that communicating the potential risks in a system is fundamental to our work. This includes demonstrating the sensitivity to a variety of scenarios and understanding what could harm the system. The screenshot below shows the same Stress Test but assuming the discount rate is reduced to 6.50% and active membership declines by 1% each year. Under the statutory contribution structure, funding levels are much lower even as the state’s contribution rate increases significantly.



It is important to note that *P-Scan* is a regular part of our actuarial auditing process and not an optional add-on. We will use it at our Board presentation as well as within the actuarial audit report.

Our H-Scan Interactive Model

H-Scan provides similar interactivity as *P-Scan* but applied to health plans, with the OPEB

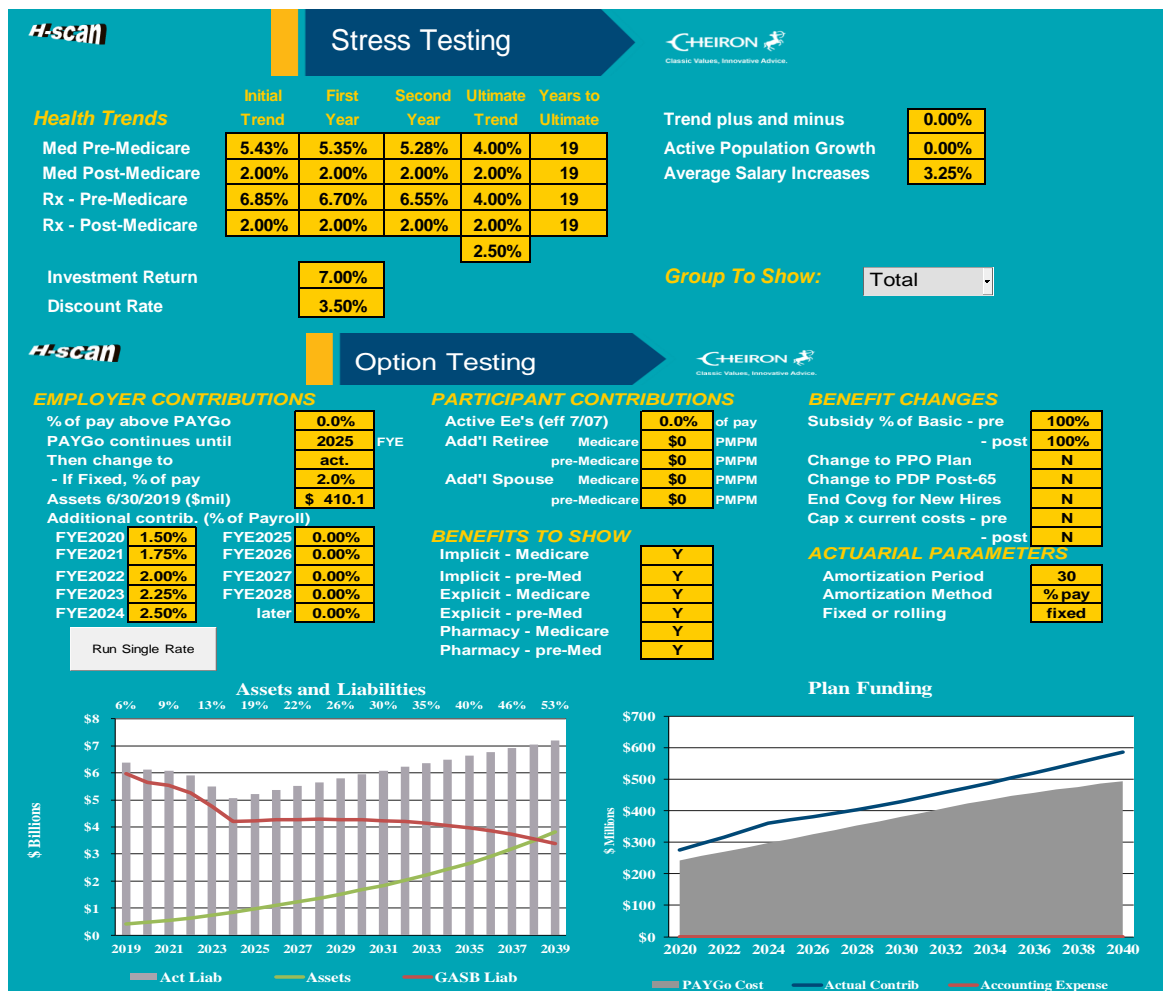


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module focusing on retiree health (and other postemployment benefits). In the screen shot that follows, the left graph shows the projected actuarial liability (gray bars), the market value of assets (green lines), and the liability for the financial statements (the Net OPEB Obligation). The numbers at the top of the bars represent the projected funded status. The right graph shows the projected contribution rates for both the employer and (if any) employees, compared to the pay-as-you-go costs (benefits for retirees net of any retiree contributions). The line on this graph represents the accounting expense.

The top of the screen contains the key assumptions including health care trend, discount rate, and salary scale. Specific inputs are customized based on the client’s plan and funding approach. The actual investment return and employer contribution rates are shown for each year of the projection, or we can model pay-as-you-go funding. As with *P-Scan*, we can model changes in investment return; however, most retiree health care plans are less funded and, therefore, less sensitive to this assumption. Of more interest are usually changes to health care trends and the assumed discount rate.

Any potential scenario of health care trends, discount rates, and/or funding approaches may be modeled.



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- ***Actuarial Valuation Assumptions*** - *Assessment of whether the actuarial valuation assumptions are reasonable and consistent with generally accepted actuarial standards and practices; are reasonable based on SERS' experience; and are appropriate for SERS' structure and funding objectives. The assumptions evaluated should include both demographic and economic assumptions, such as mortality, retirement, separation rates, levels of pay adjustments, rates of investment return, and disability factors. As part of this assessment, the Contractor should consider and specifically address whether actual experience is appropriately evaluated in experience studies conducted by the consulting actuary at least every five years and whether recent changes in assumptions are appropriate, reasonable, and supported by the experience studies. Also, the Contractor should review the gain/loss analyses from the last four actuarial valuation reports.*

We will review the actuarial assumptions that are contained within the actuarial reports being reviewed as well as consider the process and conclusions drawn in the experience study being audited. We will use information provided by the System actuary, industry trends, and professional judgment in this process. Below we describe in additional detail some of the considerations going into specific assumptions.

Actuarial assumptions are intended to be the actuary's best estimate of future experience of the System. However, since the future is unknown, the actuaries develop these estimates based on a combination of historical experience, anticipated changes to historical patterns in the future, professional judgment, and the degree of conservatism desired.

For most demographic assumptions, historical experience is an appropriate guide, but this experience should be modified for any expected trends in the future. For example, there is a long historical trend of improvements in mortality, so mortality assumptions often include a continued trend of future improvements in mortality. Our analysis of demographic assumptions will rely heavily upon the results of the last experience study.

Similarly, for retiree health care costs, historical experience is a starting point. However, such experience must be adjusted for changes that have been adopted or are expected in this rapidly changing environment. The data collected for the review of retiree contributions will also be used to evaluate the assumptions for future retiree claims and expenses and for retiree contributions.

For some economic assumptions, such as inflation, there are measures in the market that provide a market consensus assumption about the future, which we take into account along with historical patterns. We will also ask for the capital market (or asset allocation assumptions) that are used by SERS in order to determine if the investment rate of return is consistent with such assumptions. The retiree health care trend and discount rate assumptions will be reviewed for consistency with the other economic assumptions. The economic assumptions will also be reviewed in comparison with assumptions used by other large public retirement systems as shown in recent surveys.

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The actuarial assumptions will also be reviewed with respect to Actuarial Standards of Practice No. 27 (*Selection of Economic Assumptions for Measuring Pension Obligations*) and No. 35 (*Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*). Assumptions specific to the OPEB valuation will be reviewed with respect to ASOP No. 6 (*Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions*).

The degree of conservatism will be assessed after considering the long-term objectives of the system and the employers and recognizing which assumptions present the greatest risk to the system.

- ***Parallel Valuation*** - Perform parallel valuations of pension benefits as of June 30, 2023, and of retiree health care benefits as of June 30, 2023, using the validated member census data and the same actuarial assumptions.

Methodology – (Full Replication of Actuarial Valuation)

To audit the results of the actuarial valuations, including the development of actuarial liabilities and contribution rates as well as the proper application of the methods and assumptions, we propose the following methodology.

Review Plan Provisions – To start the project, we will review the provisions of the plan both as written in statute and as summarized in the actuarial valuation reports and member handbooks.

Data Testing – To test the validity of the data used in the actuarial valuation, we will collect the raw census data provided to the consulting actuary and the final census data used in the valuations. We will review the procedures used by the consulting actuary to process the data, and we will compare summary statistics between the raw and processed data to determine if they are substantially the same, reflecting the processing performed by the consulting actuary. We will also test the data to make sure it is complete and reasonable.

Actuarial Assumptions – We will collect the full set of actuarial assumption tables from the consulting actuary to compare to those reported in the valuation and experience study reports.

Our review of actuarial methods and assumptions will draw heavily from the analysis done in the most recent actuarial experience study supplemented by the gain/loss analysis in the last four valuation reports. We will opine on whether the conclusions and recommendations made from this study were reasonable. We will also review the assumptions for compliance with all applicable Actuarial Standards of Practice.

Specifically with regard to economic actuarial assumptions, we will also review these

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assumptions with respect to appropriate economic data as well as compare to assumptions being used by other public retirement systems.

To the extent that we might have a material disagreement in the selection of any assumptions, we will comment on the approximate effect on system liabilities.

Replication of Liabilities – To test the calculation of the actuarial liabilities, we will independently program the plan into our valuation systems using the data and assumptions provided by the consulting actuary. We will then compare our calculated liabilities, including present value of future benefits, actuarial liability and normal cost, with the liabilities calculated by the consulting actuary. The comparison will be made for active members and inactive members for both the pension and retiree health valuations. Calculations for individual decrements may also be compared as needed.

It should be noted that due to differences in valuation systems and other factors, it is common for the actual calculated values to differ slightly from one actuarial system to another. However, significant differences would require additional analysis to explain the source of the difference and verify the results of the valuation.

Sample Life Review – To further test the accuracy of the liability calculations and to ensure that all benefits are being properly valued, we will select some test cases from the data and ask the consulting actuary to provide full sample life output from their valuation systems on those individual test cases.

Historical Review – As part of our audit process we will ask for a minimum of five years of past valuation results to build what we refer to as a **Trend Model**. This model incorporates key results from past reporting and allows us to demonstrate if the results in the year of the audit are consistent with the past, and if not, why.

Review of Actuarial Value of Assets – We will ask for the last five years of the market value of assets and will reproduce the calculation of the actuarial value of assets produced in the actuarial valuation reports.

We will also build our **P-Scan** and **H-Scan** models in this phase of the assignment. Our modeling is performed for all of our recurring client work as well as for actuarial audits. This modeling is an integral part of our quality control cycle because by projecting valuation results, we can make a determination of the implications of the current results into the future and identify results that are not intuitive and/or reflect inconsistencies in the methods and assumptions. This modeling, discussed previously, will be an integral part of our report in providing an assessment of the retirement system's risks and how the valuation process, methods and assumptions act in mitigating the risk.

Review of Actuarial Methods – The actuarial methods, including cost method, asset valuation method, amortization method and other processes used to develop contribution rates and remaining amortization periods, must meet all applicable Actuarial Standards of

June 6, 2024

Practice where they are not otherwise prescribed by law, as well as being consistent with the System's benefit structure and the objectives of the SERS Board. As we review the selection of the actuarial methods, we will form an opinion about whether the funding policies are appropriate and reasonable.

To illustrate the impact of the selected actuarial methods compared to alternatives on a macro level, we will again apply our proprietary *P-Scan* and *H-Scan* models to perform a series of "what if" projection scenarios as well as stochastic projections to determine the long-term implications of the current set of methods and assumptions. This modeling will allow ORSC to see how well the current and alternative methods achieve given objectives under a variety of stresses.

Review of Accounting Disclosures – We will review the accounting disclosures included in the actuarial report to determine whether such disclosures follow the requirements of GASB 67, 68, 74 and 75.

- ***Recommendations*** - *If the Contractor recommends assumption adjustments to more accurately reflect present and future assets, liabilities, and costs of SERS, the Contractor should provide detailed rationale for your recommendations and describe the general effect on SERS' condition resulting from the proposed changes in assumptions.*

If in our review we identify any actuarial assumptions where we would recommend that the SERS Board should consider alternative assumptions, we will give detailed information on why we are recommending this change as well as the general impact such a change would have on the results of the valuation.

- ***Review of Health Care*** - *Assessment of whether the system appropriately and consistently determines retiree contributions to health care and whether the implementation of the SERS' health care policies differ from those determinations.*

To start, we will meet with the appropriate parties to understand what the underlying goals and philosophies are regarding retiree contributions and to know what the intent is of the retiree contribution policy(ies). (For example: what portion of the costs are retirees supposed to pay? Does that portion vary for dependents? By Medicare status?)

We will then review the data and methods used to determine the retiree contributions, and review the actual calculations made to determine the retiree contribution rates. We envision this review will include several years of calculations to see how changes in the plans available, fluctuations in claims/premiums, and changes in enrollment affect the calculations. We will compare those to best practices in the industry, based on our consulting to other public sector entities. We will also stress test the calculation methods to identify any potential risks. (For example, is a plan at risk for a "death spiral" if enrollment drops.)

June 6, 2024

Finally, we will compare the calculation of the retiree contributions to the data received for the retiree health valuation (as well as more recent data if the rates have changed since the valuation) to ensure the implementation is consistent with the retiree contribution rates determined.

If we find any issues, we will report the potential impact of making changes on both the retirees and on the System.

Please see Appendix B for a sample actuarial audit report.

Each proposal shall provide an estimated date that the final report will be submitted and the projected timeline or the anticipated work requirements and milestone dates to reach that date.

The timeline below is based upon our experience with other actuarial audits but may be adjusted depending upon the needs of the ORSC or when data can be provided by the various bodies. Please refer to other sections of this proposal regarding our general philosophy in conducting an actuarial audit. The date on which the work will start will be based on when the contract is awarded and finalized.

1. Initial planning meeting, request data from SERS and consulting actuary, and review plan provisions – Week 1
2. Perform data testing and request sample lives and benefit calculations; request retiree health contribution calculations – Weeks 2-3
3. Program our valuation system, and complete sample life review and historical review – Weeks 4-7
4. Complete review of actuarial value of assets, actuarial methods and assumptions, valuation reports, and retiree health contribution calculations – Weeks 8-9
5. Review draft findings with the ORSC – Week 10
6. Preparation of draft report – Week 11
7. Preparation of final report – Week 12
8. Presentation to ORSC and SERS – as scheduled

4.6 ADDITIONAL INFORMATION

It is permissible to include additional information that will be helpful to gain an understanding of the proposal. This may include diagrams, excerpts from reports, or other explanatory documentation that would clarify or substantiate the proposal.

June 6, 2024

Any material included here should be specifically referenced elsewhere in the proposal.

All relevant information has been addressed elsewhere in this proposal.

4.7 GLOSSARY

Each proposal shall provide a glossary of all abbreviations, acronyms, and technical terms used to describe the services or products proposed. This glossary should be provided even if the terms are described or defined when first used in the proposal response.

Glossary

1. Actuarial Asset Method

The method used to determine the asset value used within the actuarial valuation. If the method does not use market value, it will normally smooth asset gains or losses over some period of future years.

2. Actuarial Assumptions

Estimates of future experience concerning rates of mortality, disability, turnover, retirement, investment income, and salary increases. Demographic assumptions—rates of mortality, disability, turnover, and retirement—are generally based on past experience, and 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. Actuarial Cost Method

The procedure for allocating actuarial present values to time periods and to determine current year required contributions or expense.

4. Actuarial Gain (Loss)

The difference between actual experience and actuarial assumption anticipated experience during the period between two actuarial valuation dates, as determined by a particular actuarial funding method.

5. Actuarial Liability

The Actuarial Liability is the present value of all benefits accrued as of the valuation date using the methods and assumptions of the valuation. It is also referred to by some actuaries as the “accrued liability” or “actuarial accrued liability.”

June 6, 2024

6. 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.

7. Actuarial Standards of Practice (ASOPs)

ASOPs are issued by the Actuarial Standards Board. All credentialed actuaries are expected to comply with the ASOPs. Deviations from ASOPs within actuarial reports must be disclosed.

8. Actuarial Valuation Method

The general procedures of allocating cost within an actuarial valuation. The actuarial valuation method includes the actuarial cost method, the amortization method and the actuarial asset method.

9. Actuarial Value of Assets

The Actuarial Value of Assets equals the Market Value of Assets adjusted according to the smoothing method. The smoothing method is intended to smooth out the short-term volatility of investment returns to stabilize contribution rates and the funded status.

10. Actuarial Cost Method

A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future fund benefits” between the actuarial present value of future normal costs and the actuarial liability. It is sometimes referred to as the “actuarial funding method.”

11. Amortization Payment

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

12. Funded Status

The Actuarial Value of Assets divided by the Actuarial Liability. The Funded Status can also be calculated using the Market Value of Assets. In this case, the Actuarial Value of Assets equals the Market Value of Assets.

13. Governmental Accounting Standards Board

The Governmental Accounting Standards Board (GASB) defines the accounting and

June 6, 2024

financial reporting requirements for governmental entities. GASB Statement No. 67 defines the plan accounting and financial reporting for governmental pension plans, and GASB Statement No. 68 defines the employer accounting and financial reporting for participating in a governmental pension plan. GASB Statement No. 74 defines the plan accounting and financial reporting for governmental postemployment benefit plans other than pension plans, and GASB Statement No. 75 defines the employer accounting and financial reporting for participating in a governmental postemployment plan other than a pension plan.

14. Market Value of Assets

The fair value of the Fund's assets assuming that all holdings are liquidated on the measurement date.

15. Normal Cost

The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. It is sometimes referred to as "current service cost." Any payment toward the unfunded actuarial liability is not part of the normal cost.

16. Present Value of Future Benefits

The estimated amount of assets needed today to pay for all benefits promised in the future to current members of the Fund, assuming all Actuarial Assumptions are met.

17. Present Value of Future Normal Costs

The Actuarial Present Value of retirement system benefits allocated to future years of service.

18. *P-Scan and H-Scan*

Cheiron's proprietary projection software, *P-Scan* and *H-Scan* is used interactively during meetings to illustrate the effects of various changes in economic scenarios, plan provisions or actuarial methods and assumptions as well as being used to produce graphs for the reports.

19. ProVal

The actuarial software used by Cheiron for pension actuarial valuations. ProVal is leased from Winklevoss Technologies (WinTech).

20. Unfunded Actuarial Liability (UAL)

The difference between the Actuarial Liability and the Actuarial Value of Assets. This is sometimes referred to as the "unfunded accrued liability."

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4.8 COST INFORMATION

The pricing summary should include a breakdown of costs per element listed under *Scope of Audit*, including: personnel costs (including hourly rates and estimated hours for professional and clerical staff assigned to the audit); travel and lodging; data processing costs; materials, and any other potential costs. The cost estimates in the pricing summary must include all necessary charges to complete the audit and must be a "not to exceed" figure.

The following is our best estimate and not to exceed fee and includes all expenses. Our not to exceed fee is \$129,000.

	Cranna	Fee	Schmidt	Fee	Rhodes	Fee	Moehle	Fee	Weaver	Fee
	Hours	\$480	Hours	\$480	Hours	\$425	Hours	\$415	Hours	\$380
Element										
1) Data Validity	2	\$960	2	\$960	2	\$850	10	\$4,150	5	\$1,900
2) Actuarial Valuation Method and Procedures	10	\$4,800	10	\$4,800	5	\$2,125	5	\$2,075	5	\$1,900
3) Actuarial Valuation Assumptions	10	\$4,800	10	\$4,800	5	\$2,125	5	\$2,075	5	\$1,900
4) Parallel Valuation	10	\$4,800	10	\$4,800	10	\$4,250	60	\$24,900	20	\$7,600
5) Recommendations/Report	10	\$4,800	10	\$4,800	10	\$4,250	5	\$2,075	5	\$1,900
6) Review of Health Care	0	\$0	0	\$0	10	\$4,250	0	\$0	10	\$3,800
TOTAL	42	\$20,160	42	\$20,160	42	\$17,850	85	\$35,275	50	\$19,000

School Employees Retirement System of Ohio
RFP for Independent Actuarial Audit

June 6, 2024

	Shah	Fee	Analysts	Fee	Admin	Fee	Total	Total
	Hours	\$395	Hours	\$200	Hours	\$144	Hours	Fee
Element								
1) Data Validity	5	\$1,975	10	\$2,000	0	\$0	36	\$12,795
2) Actuarial Valuation Method and Procedures	2	\$790	0	\$0	0	\$0	37	\$16,490
3) Actuarial Valuation Assumptions	2	\$790	0	\$0	0	\$0	37	\$16,490
4) Parallel Valuation	5	\$1,975	10	\$2,000	0	\$0	125	\$50,325
5) Recommendations/Report	5	\$1,975	5	\$1,000	5	\$720	55	\$21,520
6) Review of Health Care	5	\$1,975	5	\$1,000	0	\$0	30	\$11,025
TOTAL	24	\$9,480	30	\$6,000	5	\$720	320	\$128,645

For services, if any, outside the stated requirements, the fee would be based on the extent of the project and the number of staff hours required based on standard hourly rates. Our hourly rates vary by the credentials of the person performing the service and are shown below.

2024 hourly rates:

Category/Consultant	2024 Hourly Rate*
Principal Consulting Actuaries	\$415 – \$530
Consulting Actuaries	\$300 – \$509
Associate Actuaries	\$218 – \$333
Senior Actuarial Analysts	\$199 – \$256
Actuarial Analysts	\$165 – \$218
Administrative Staff	\$124 – \$164

* Hourly billing rates are expected to increase with CPI-U every year on May 1st.

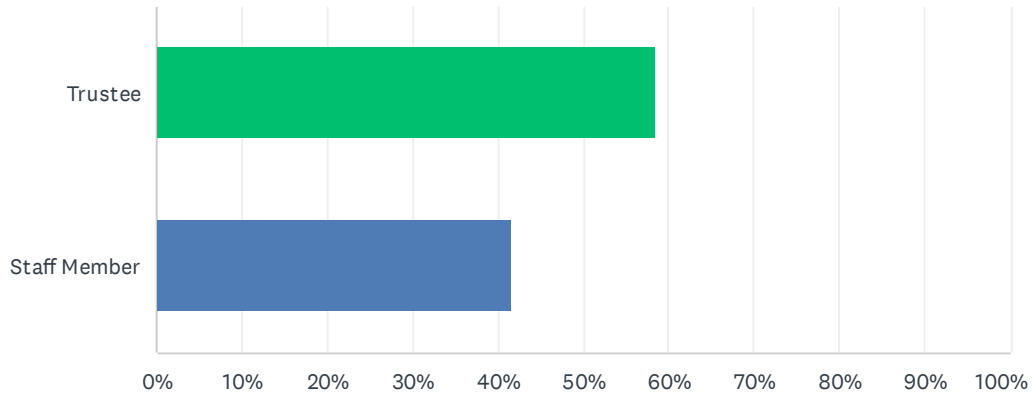


Appendix A

*Sample Actuarial Consultant
Evaluation Report*

Q2 Evaluator is:

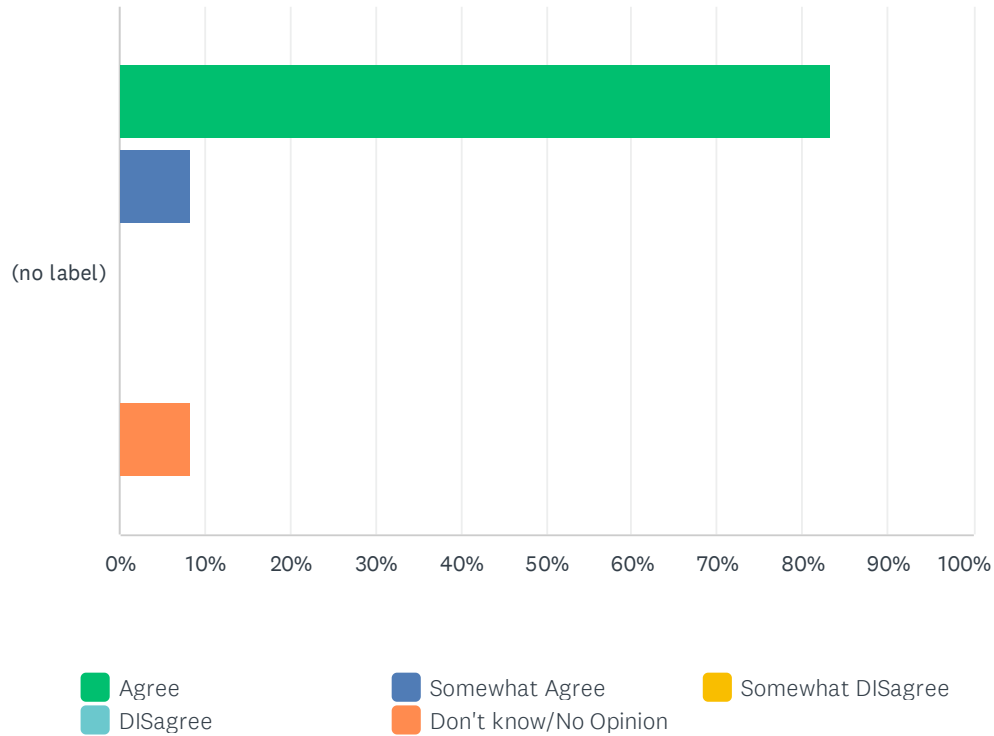
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES
Trustee	58.33% 7
Staff Member	41.67% 5
TOTAL	12

Q3 I have confidence in the advice SJCERA receives from its Actuarial Consultant

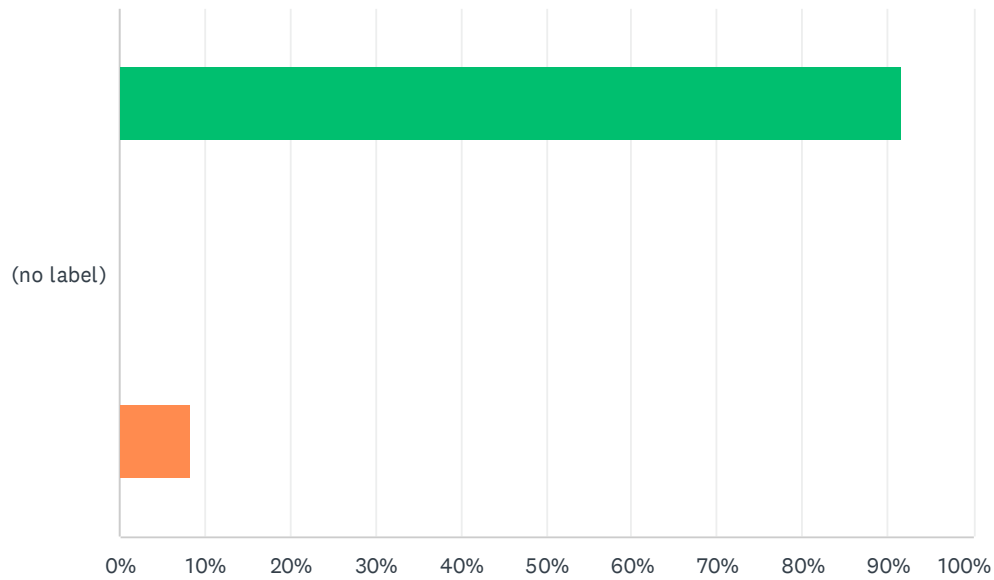
Answered: 12 Skipped: 0



	AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	DISAGREE	DON'T KNOW/NO OPINION	TOTAL	WEIGHTED AVERAGE
(no label)	83.33% 10	8.33% 1	0.00% 0	0.00% 0	8.33% 1	12	4.58

Q4 The Actuarial Consultant explains things in an understandable way.

Answered: 12 Skipped: 0



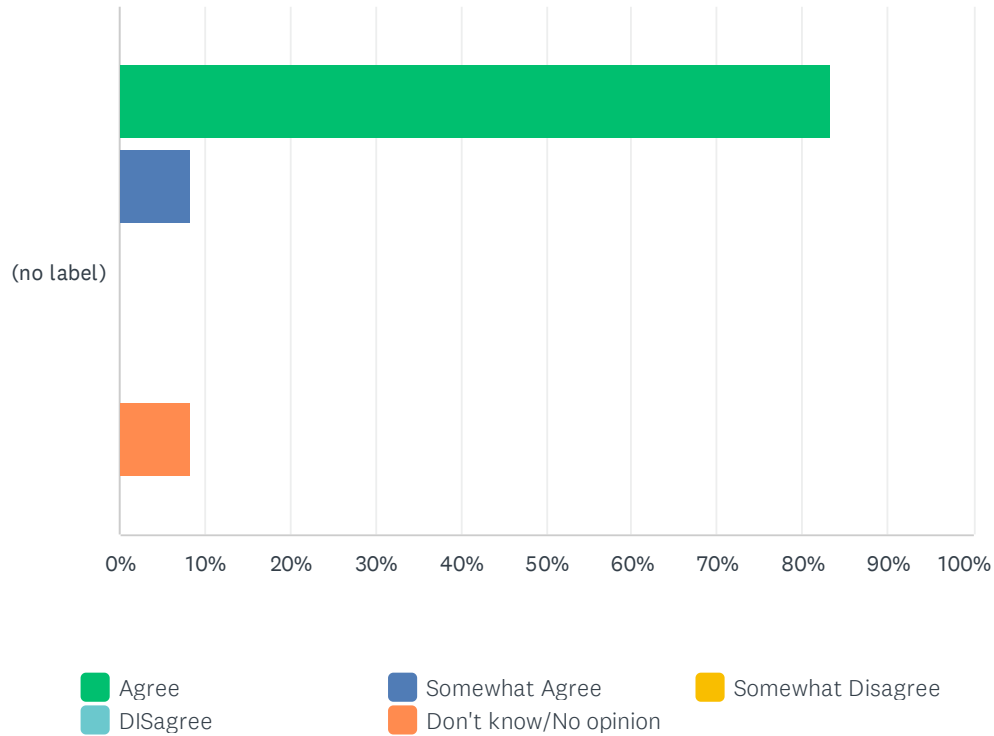
■ Agree
 ■ Somewhat Agree
 ■ Somewhat DISagree
■ DISagree
 ■ Don't know/No opinion

	AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	DISAGREE	DON'T KNOW/NO OPINION	TOTAL	WEIGHTED AVERAGE
(no label)	91.67% 11	0.00% 0	0.00% 0	0.00% 0	8.33% 1	12	4.67

#	COMMENTS & SUGGESTIONS:	DATE
1	Graham has exceptional communication skills and makes complex topics understandable. In addition, he is very patient and supportive in providing explanations--he makes each person feel like they are capable of comprehending the content.	10/27/2021 3:40 PM

Q5 The Actuarial Consultant presents data that supports their recommendations.

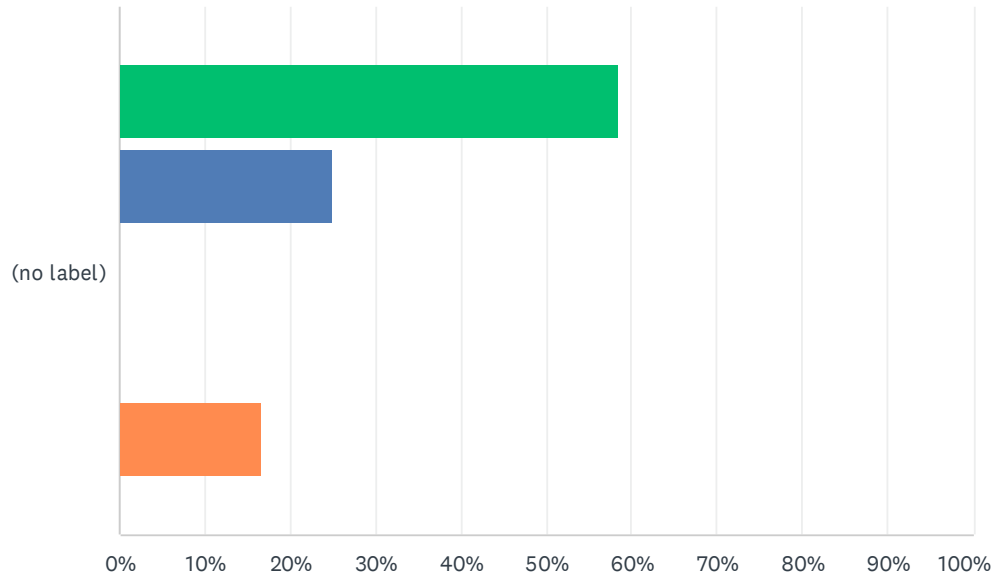
Answered: 12 Skipped: 0



	AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	DISAGREE	DON'T KNOW/NO OPINION	TOTAL	WEIGHTED AVERAGE
(no label)	83.33% 10	8.33% 1	0.00% 0	0.00% 0	8.33% 1	12	4.58

Q6 The Actuarial Consultant keeps the Board informed of issues affecting SJCERA.

Answered: 12 Skipped: 0



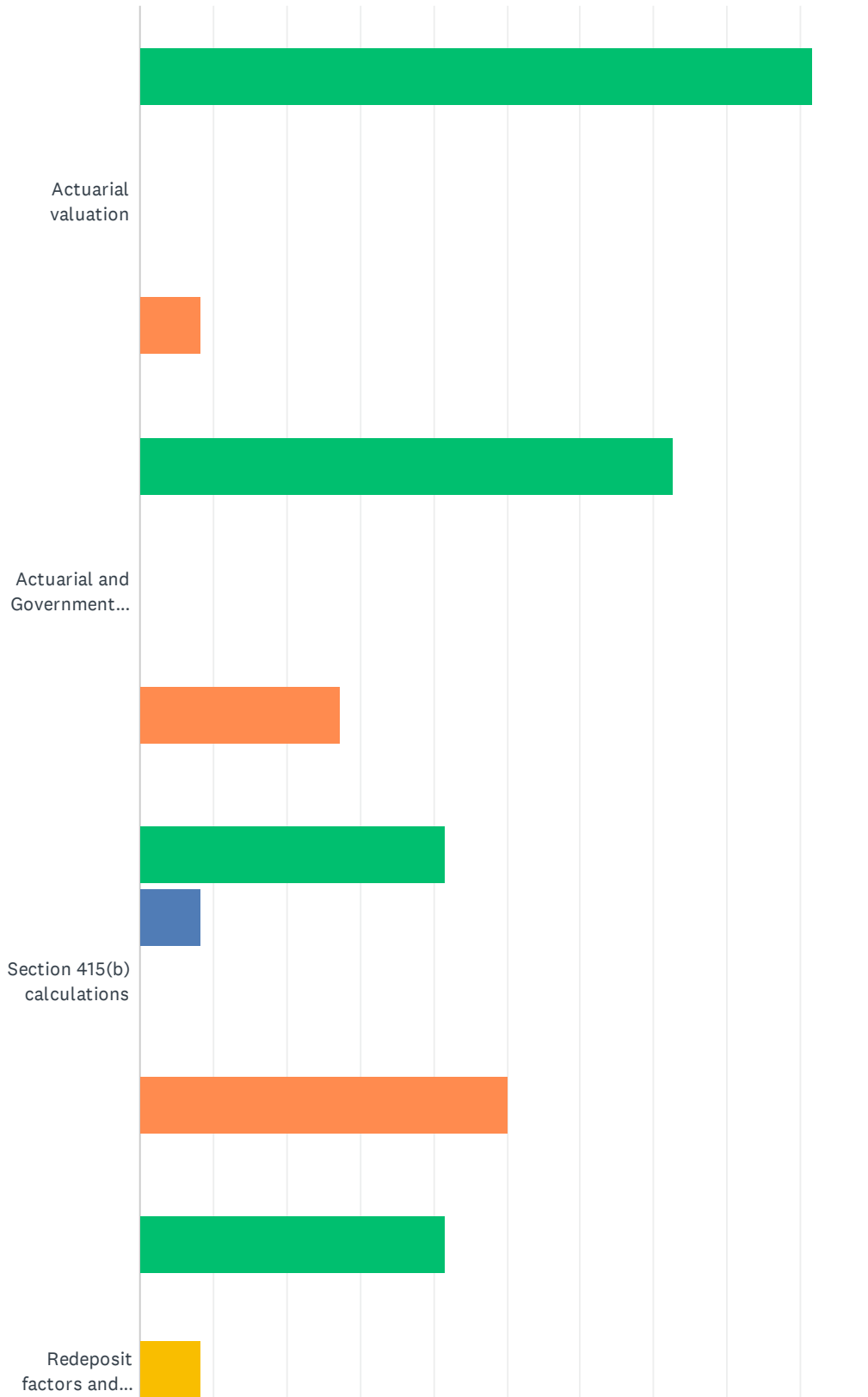
■ Agree
 ■ Somewhat Agree
 ■ Somewhat DISagree
■ DISagree
 ■ Don't know/No opinion

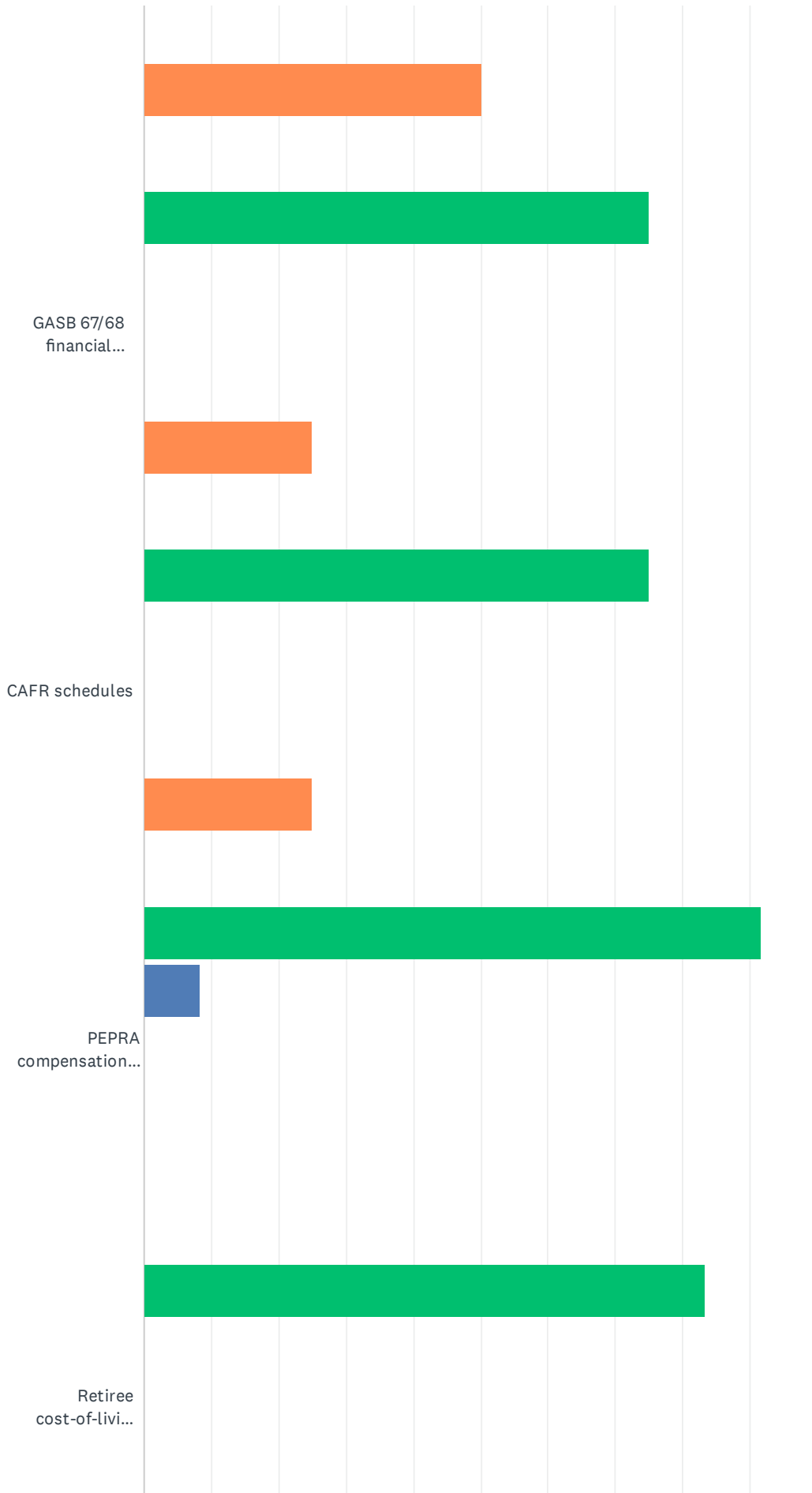
	AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	DISAGREE	DON'T KNOW/NO OPINION	TOTAL	WEIGHTED AVERAGE
(no label)	58.33% 7	25.00% 3	0.00% 0	0.00% 0	16.67% 2	12	4.08

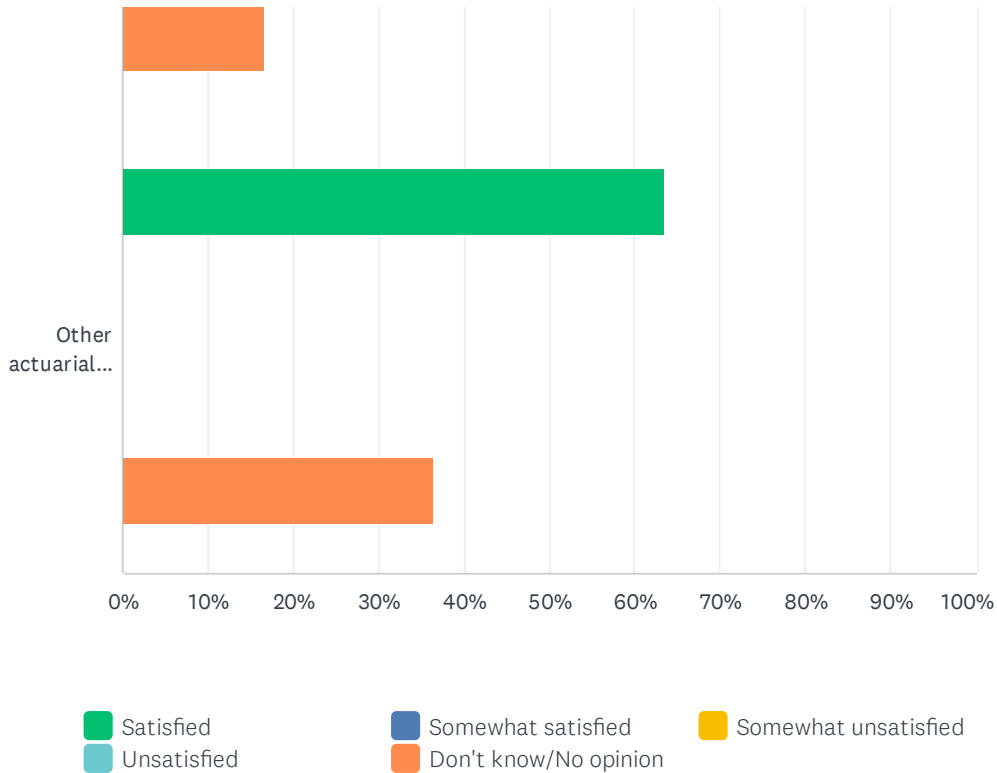
#	COMMENTS & SUGGESTIONS:	DATE
1	I would appreciate analysis and recommendations about what else SJCERA, our employers, or the legislature can do to improve our funding as quickly as possible. If we were to propose changes, what should we focus on first?	10/27/2021 3:40 PM

Q7 Please rate your satisfaction with the quality of the following contractually required services.

Answered: 12 Skipped: 0



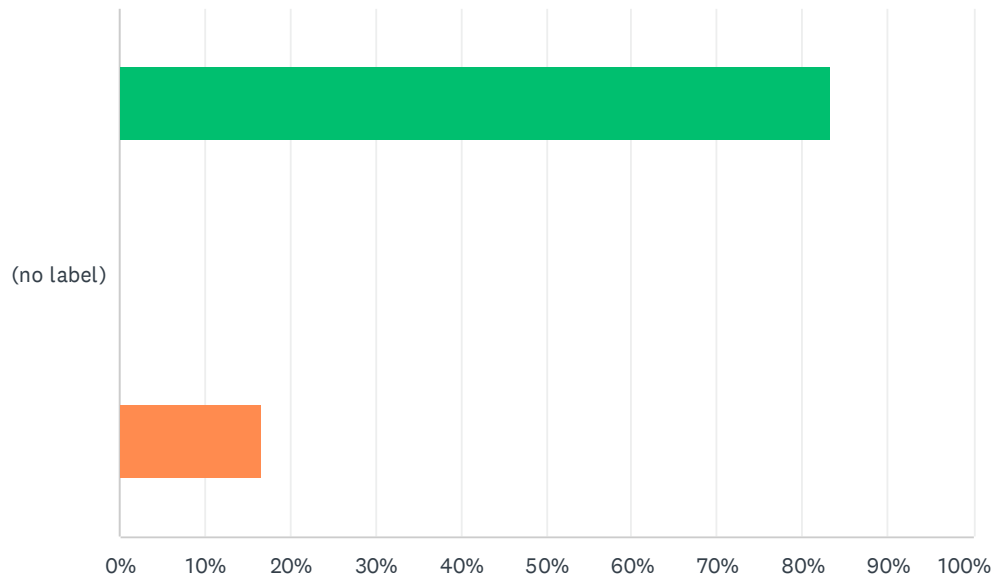




	SATISFIED	SOMEWHAT SATISFIED	SOMEWHAT UNSATISFIED	UNSATISFIED	DON'T KNOW/NO OPINION	TOTAL	WEIGHTED AVERAGE
Actuarial valuation	91.67% 11	0.00% 0	0.00% 0	0.00% 0	8.33% 1	12	4.67
Actuarial and Government Table Updates and Testing	72.73% 8	0.00% 0	0.00% 0	0.00% 0	27.27% 3	11	3.91
Section 415(b) calculations	41.67% 5	8.33% 1	0.00% 0	0.00% 0	50.00% 6	12	2.92
Redeposit factors and bi-weekly payment schedules	41.67% 5	0.00% 0	8.33% 1	0.00% 0	50.00% 6	12	2.83
GASB 67/68 financial statement disclosure report	75.00% 9	0.00% 0	0.00% 0	0.00% 0	25.00% 3	12	4.00
CAFR schedules	75.00% 9	0.00% 0	0.00% 0	0.00% 0	25.00% 3	12	4.00
PEPRA compensation limits	91.67% 11	8.33% 1	0.00% 0	0.00% 0	0.00% 0	12	4.92
Retiree cost-of-living adjustment (COLA)	83.33% 10	0.00% 0	0.00% 0	0.00% 0	16.67% 2	12	4.33
Other actuarial consulting	63.64% 7	0.00% 0	0.00% 0	0.00% 0	36.36% 4	11	3.55

Q8 I have confidence in the firm for which our Actuarial Consultant works.

Answered: 12 Skipped: 0



- Agree
- Somewhat Agree
- Somewhat DISagree
- DISagree
- Don't Know/No Opinion

	AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	DISAGREE	DON'T KNOW/NO OPINION	TOTAL	WEIGHTED AVERAGE
(no label)	83.33% 10	0.00% 0	0.00% 0	0.00% 0	16.67% 2	12	4.00

Q9 The actuarial issues or areas of concern I would like the consultant to address in the next twelve months are:(Identify your top 3 issues/concerns)

Answered: 6 Skipped: 6

ANSWER CHOICES	RESPONSES	
1.	100.00%	6
2.	33.33%	2
3.	16.67%	1
Other Comments:	0.00%	0

#	1.	DATE
1	base rate of pay assumptions - what happens if our employers exceed in subsequent years.	10/28/2021 5:23 PM
2	Mortality rates	10/28/2021 1:51 PM
3	Actuarial Rates	10/27/2021 12:43 PM
4	Redeposit and biweekly payment factors are provided in pdf format, we need them in excel format as well	10/26/2021 9:23 AM
5	Discount rate	10/26/2021 9:04 AM
6	Improving unfunded liability	10/26/2021 8:40 AM
#	2.	DATE
1	Are they depending on consultant projections	10/28/2021 1:51 PM
2	Inflation	10/27/2021 12:43 PM
#	3.	DATE
1	Not different, use their own calculations for long term returns	10/28/2021 1:51 PM
#	OTHER COMMENTS:	DATE
	There are no responses.	

Q10 What would you like the Actuarial Consultant to do differently?

Answered: 1 Skipped: 11

#	RESPONSES	DATE
1	Make actuarial evaluation final data file available to SJCERA IT as soon as it has been finalized.	10/26/2021 9:23 AM

Q11 Other Remarks

Answered: 3 Skipped: 9

#	RESPONSES	DATE
1	Graham is amazing and does a wonderful job at explaining complex information in a way many can understand.	10/29/2021 8:56 AM
2	Graham is exceptionally responsive. He responds to emails and phone calls timely, and has always made himself available for presentations, even on short notice.	10/27/2021 3:40 PM
3	I have great confidence in Graham. His reports to both the SJCERA Board and the Board of Supervisors are always thorough and presented in an understandable manner.	10/26/2021 8:40 AM

Appendix B

Sample Actuarial Audit Report

20 CHEIRON
Celebrating 20 years

**Employees’
Retirement System**

**Actuarial Audit Report on the
June 30, 2020 Actuarial Valuation
and the June 30, 2020 Experience
Review**

Produced by Cheiron

October 2022

This document is the work product for ■■■ERS’ Internal Audit Office and may be privileged or otherwise protected by work product immunity. This document is not intended to be shared publicly or distributed to individuals external to ■■■ERS.

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October 7, 2022

Board of Trustees

██████████ Employees' Retirement System
██████████
██████████

Dear Trustees:

Cheiron has performed an independent full replication audit of the June 30, 2020 Actuarial Valuation of the ██████████ Employees' Retirement System (██████ ERS or System) and a review of the July 1, 2015 to June 30, 2020 Experience Review prepared by ████████.

The purpose of this report is to present the results of our audit. Section I of this report describes the project scope and Section II summarizes our findings. Section III provides the detailed results of Cheiron's replication of the June 30, 2020 Actuarial Valuation. Section IV presents Cheiron's findings on our review of the actuarial assumptions and methods recommended in the July 1, 2015 to June 30, 2020 Experience Review, which will be employed in the June 30, 2021 Actuarial Valuation.

We would like to thank the ████████ ERS Staff and ████████ for providing us with information and explanations that facilitated the actuarial audit process and ensured that our findings are accurate.

Based on our review, we believe the June 30, 2020 actuarial valuation is accurate and produces reasonable required employer contributions, based on the assumptions and methods in effect at the time the valuation was prepared. However, we have recommendations for ████████ ERS and/or ████████ to consider. None of these recommendations would materially change the valuation results. More details on these key findings will follow in this report.

In preparing this report, we relied on information (some oral and some written) supplied by the ██████████ Employees' Retirement System and ████████. This information includes census data, the actuarial assumptions and methods adopted by the System, plan provisions, the 2019 and 2020 annual actuarial valuation reports, and the Experience Review covering the five-year period ending June 30, 2020. A detailed description of all information provided for this review is contained in Appendix B.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

THE ACTUARIAL AUDIT REPORT OF THE
████████████████████ EMPLOYEES' RETIREMENT SYSTEM

SECTION I – REPORT SCOPE

Cheiron was retained by the ██████████ Employees' Retirement System (████ ERS or System) to perform the following services:

- Conduct a full replication of the Actuarial Valuation as of June 30, 2020,
- Determine whether the valuation was performed in accordance with principles and practices prescribed by the Actuarial Standards Board and Actuarial Standards of Practice (ASOP),
- Determine whether the System's financial objectives are being met,
- Review and evaluate the June 30, 2020 Experience Review, and
- Review and evaluate the June 30, 2020 GASB 67 and 74 Reports.

In conducting the 2020 actuarial valuation replication, Cheiron received the complete June 30, 2020 actuarial valuation census data, plan provisions and financial information from the System. Additionally, Cheiron received the actuarial valuation census data, and information related to actuarial assumptions and methods from ██████. With this information, we coded our valuation software to independently calculate and verify the June 30, 2020 actuarial valuation results.

For purposes of this replication of the valuation results, Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have used ProVal in accordance with its original intended purpose. We have not identified any material inconsistencies in assumptions or output of ProVal that would affect these results.

This audit report includes projections of future assets, liabilities, funded status and contributions for the purpose of assessing whether the funding objectives of the Board are being met. The projections utilize *P-Scan*, our proprietary projection software. These projections are based on the same census data and financial information as of June 30, 2020 which were provided to us. The projections assume continuation of the plan provisions and actuarial assumptions in effect as of June 30, 2020 and do not reflect the impact of any changes in benefits or actuarial assumptions that may be adopted after June 30, 2020 unless otherwise indicated. The future outcomes become increasingly uncertain over time, and therefore, the general trends and not the absolute values should be considered in the review of these projections.

SECTION II – EXECUTIVE SUMMARY

Our primary findings are as follows:

1. Cheiron's replication of the June 30, 2020 Actuarial Valuation was almost exactly the same as that prepared by ██████. Cheiron's calculations of total System liabilities were within 1% of the ██████ liabilities. To put this in better perspective, in the private sector, the Internal Revenue Service (IRS) generally regards a replication valuation to be acceptable if the replication valuation comes within 3% of the original valuation.
2. The actuarial valuation was performed in accordance with principles and practices prescribed by the Actuarial Standards Board and Actuarial Standards of Practice (ASOP).
3. With respect to the actuarial methods and assumptions, we found that ██████'s recommended assumptions and methods shown in the June 30, 2020 Experience Review were reasonable and performed in accordance with the ASOPs.
4. We found that the actuarial valuation report and GASB 67 and 74 reports prepared by ██████ meet the professional standards set by the ASOPs. However, throughout this report, we have made some recommendations that will improve the clarity of the reports.
5. Cheiron has performed projections for ██████ ERS and confirm that the employer and employee contributions are currently sufficient to meet the funding objections, assuming all assumptions are as expected.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

This section provides the detailed results of Cheiron's replication of the June 30, 2020 Actuarial Valuation.

Valuation Results

Overall, we find that the results in the June 30, 2020 Actuarial Valuation Report, including the calculations of the liabilities, actuarial value of assets, funded status, and employer contribution rates, based on the current funding policies, methods and assumptions, are technically reasonable and conform to Actuarial Standards of Practice (ASOPs). This is based on our full replication of the June 30, 2020 Actuarial Valuation, and our review of the Actuarial Valuation Report, the census data used in the valuation, the economic and demographic assumptions, and the funding methods. Our determination of the gross normal cost rate is slightly lower than ██████'s calculation. ██████ has explained that they adjust their rate to the middle of the year by the effective average salary scale (approximately a 2.5% adjustment). We are not making that adjustment in our calculation because the rate will be applied to payroll which presumably would contain any salary increases during the year. We recommend that ██████ consider removing that adjustment for future valuations or add a justification in the funding method section of the report for the rationale for this adjustment. Our understanding is that ██████ will include a description of their methodology in future reports.

Census Data

██████ERS provided us with the data that was sent to ██████ for the June 30, 2020 Actuarial Valuation. ██████ also provided us with the final data used in the valuation, after any adjustments they deemed necessary after their review of the initial data provided by ██████ERS. We find that the data used in the valuation is valid, complete and contains the necessary data elements.

The table below shows the comparison of the final ██████ data used in the valuation and the original data provided to Cheiron by ██████ERS, after exclusions for non-participants. The annual salary for ██████ includes adjustments for the 12 months beginning on the valuation date.

**THE ACTUARIAL AUDIT REPORT OF THE
[REDACTED] EMPLOYEES' RETIREMENT SYSTEM**

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

[REDACTED] Employees' Retirement System Data Review - Membership Data			
	[REDACTED] ERS Data *	[REDACTED]	Ratio
Headcounts for:			
Active	256,253	256,246	100.0%
Retired	216,963	218,478	100.7%
Disabled	9,044	9,064	100.2%
Survivor	12,145	12,072	99.4%
Terminated Vested	25,733	25,903	100.7%
Terminated Not Vested	135,783	135,613	99.9%
Total	655,921	657,376	100.2%
Annual Salary	\$ 14,336,880,278	\$ 14,675,952,917	102.4%
Annual Benefits	\$ 6,104,346,355	\$ 6,170,845,715	101.1%

* After exclusions for non-participants

Plan Provisions

We compared the summary of benefit and contribution provisions shown in Table 13 of the June 30, 2020 Actuarial Valuation Report to what is contained in the [REDACTED] Code, the member handbooks and other information provided by [REDACTED] ERS. We found that the benefit and contribution provisions matched our source documents.

However, we recommend that [REDACTED] indicate in the Actuarial Valuation Report the employer contribution rates to the DC plan for Class T-G (2.25%), Class T-H (2.0%) and, Class DC (2.0%) and note that the employer contributions are 100% vested after 3 years of service. [REDACTED] has indicated that they will include a description of the DC plan provisions in future valuation reports.

Liabilities and Normal Cost

Based on our replication of the June 30, 2020 Actuarial Valuation, we find that the calculations of the present value of future benefits, the actuarial liability, normal cost, assets and contribution rates are reasonable.

The following table shows the comparison of the calculation of present value of future benefits, actuarial liability, and employer contribution rates in [REDACTED]'s valuation and Cheiron's replication.

**THE ACTUARIAL AUDIT REPORT OF THE
[REDACTED] EMPLOYEES' RETIREMENT SYSTEM**

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

[REDACTED] Employees' Retirement System			
		Cheiron	Ratio
Present Value of Future Benefits			
Actives	\$ 66,004,230,959	\$ 66,221,160,403	1.003
Retirees/Disabled/Beneficiaries	58,415,383,000	58,670,057,636	1.004
Vested Terminations/Inactives	2,444,758,000	2,432,910,073	0.995
Health Insurance Premium Assistance	130,417,000	130,417,000	1.000
Total	\$ 126,994,788,959	\$ 127,454,545,112	1.004
Actuarial Liability			
Actives	\$ 46,973,258,216	\$ 46,792,485,764	0.996
Retirees/Disabled/Beneficiaries	58,415,383,000	58,670,057,636	1.004
Vested Terminations/Inactives	2,444,758,000	2,432,910,073	0.995
Health Insurance Premium Assistance	130,417,000	130,417,000	1.000
Total	\$ 107,963,816,216	\$ 108,025,870,473	1.001
Market Value of Assets	\$ 58,687,203,000	\$ 58,687,203,000	1.000
Actuarial Value of Assets	\$ 63,929,354,365	\$ 63,929,354,365	1.000
Market Value Funding Ratio	54.36%	54.33%	0.999
Actuarial Value Funding Ratio	59.21%	59.18%	0.999
Actuarially Determined Contribution Rate			
Gross Normal Cost Rate	14.76%	14.42%	0.977
Less Member Contribution Rate	-7.56%	-7.56%	1.000
Employer Normal Cost Rate	7.20%	6.86%	0.953
UAL Contribution Rate	26.79%	26.82%	1.001
Preliminary Pension Rate	33.99%	33.68%	0.991
Health Insurance Premium Assistance	0.80%	0.83%	1.038
Act 5 DC Rate	0.15%	0.13%	0.876
Total Employer Rate	34.94%	34.64%	0.991

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Funding Goals and Objectives

The financing objective of the Retirement System is to:

- Fully fund all current costs based on the normal contribution rate determined under the funding method; and
- Liquidate the unfunded accrued liability based on level-percent-of-pay amortization schedules required by the Retirement Code as amended by Act 120-2010, i.e., a schedule of 24 years for the unfunded accrued liability as of June 30, 2010 and each change in the unfunded accrued liability due to actuarial experience after the June 30, 2010 valuation. Any legislation after June 30, 2010 that increases the liability due to benefit enhancements will be funded over 10 years based on level-percent-of-pay amortization.
- As directed by Act 120-2010, the minimum employer pension contribution rate will be the normal cost rate.
- Fully fund the employer contribution to the Defined Contribution Plan.

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different.

The overall projections provided in the December 2021 Stress Testing Analysis prepared by AON seem reasonable.

Cheiron projects █████ ERS to be 100% funded by 2043 if the employer continues to contribute the actuarially determined contribution rate each year. These projections also assume that all demographic assumptions used in the June 30, 2020 Actuarial Valuation Report occur as expected and investment returns are 7.25% each year. The projections are summarized in the two graphs on the next page and do not include contributions or liabilities related to Defined Contribution benefits or Health Insurance Premium Assistance benefits.

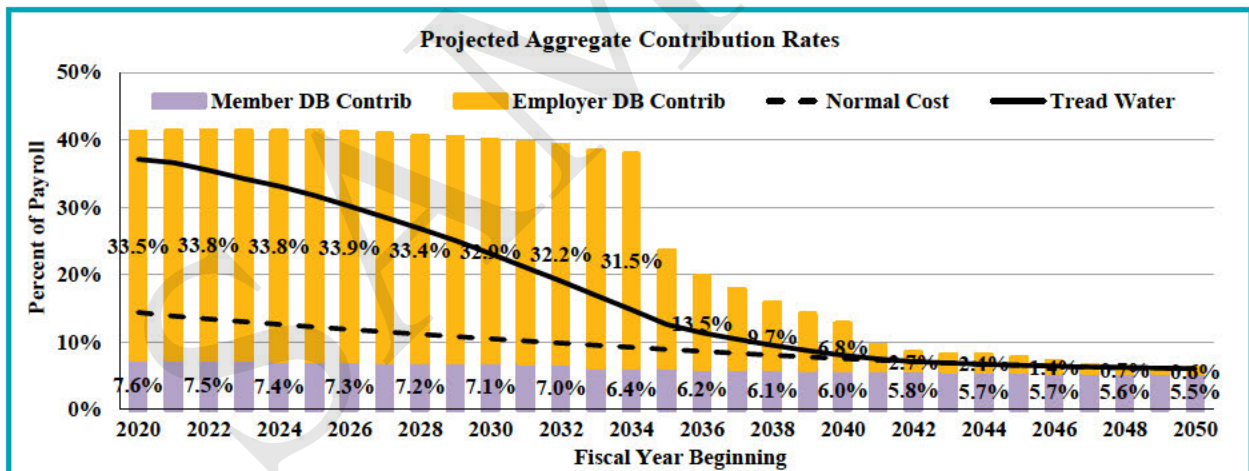
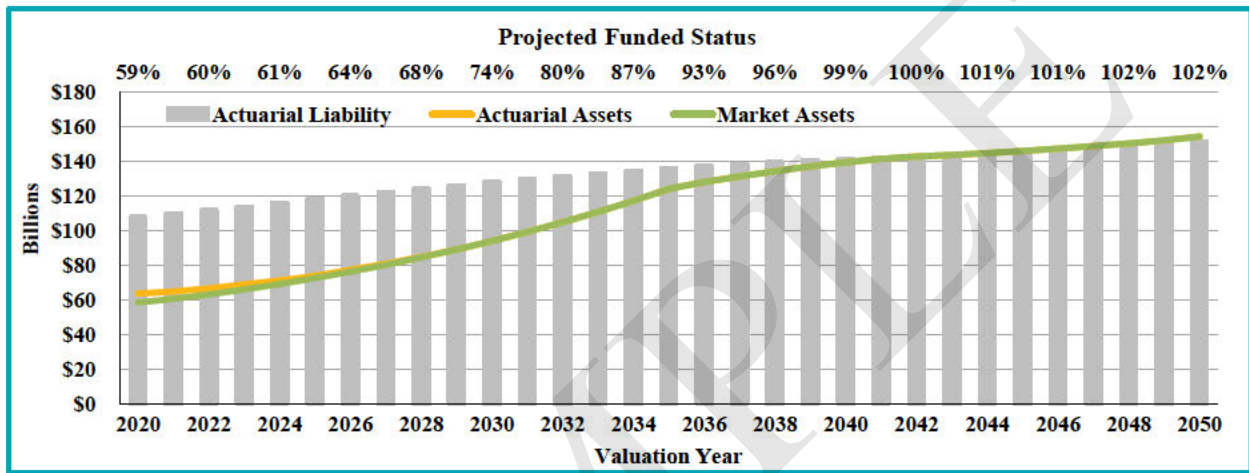
The top chart shows the projected assets (gold and green lines) and liabilities (gray bars) for █████ ERS. The percents above the bars represent the Actuarial Value of Assets (AVA) funded ratio. The bottom chart shows the projected employer contributions (gold bars) and member contributions (purple bars) as a percent of payroll. For █████ ERS, the member plus employer contributions, which equal the Actuarially Determined Contributions, are the sum of the normal cost and the amortization of the unfunded actuarial liability using a 24-year layered, percent of payroll method.

Additionally, we show the total normal cost (dashed black line) and the Tread Water contribution (solid black line). The difference between the dashed black line and the purple bars is the employer portion of the normal cost.

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EMPLOYEES' RETIREMENT SYSTEM**

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

The Tread Water contribution is the normal cost plus the interest on the unfunded actuarial liability on an AVA basis. This amount shows the minimum contributions that are needed to avoid an increase in the unfunded actuarial liability. The difference between the solid black line and the dashed black line is the interest on the unfunded actuarial liabilities. When the contributions exceed the solid black line, as is the case throughout the projection period, the unfunded actuarial liability is expected to decrease, and the funded ratio is expected to increase. If contributions were to fall below the solid black line, then the unfunded actuarial liability would be expected to increase and the funded ratio would be expected to decrease.



GASB 67 and 74

Liabilities for GASB 67 and 74 are based on the Entry Age Normal funding method, which is required under GASB 68.

The discount rate used to determine the Total Pension Liability was based on the procedures set forth in paragraphs 39-45 of GASB 67. For the June 30, 2021 GASB 67 disclosure, Total Pension Liability is a roll-forward from the June 30, 2020 valuation; however, it does reflect the recommended assumptions from the 2020 experience study, including the discount rate of 7.00%.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

Based on our analysis, we find the methodology and assumptions used to determine the Total Pension Liability for the System is reasonable and in compliance with GASB 67.

The discount rate used to determine the Total OPEB Liability as of June 30, 2021 was based on the S&P Municipal Bond 20-Year High Grade Rate Index as of the end of the fiscal year, which was 2.18%, due to the short term nature of the asset mix. For the June 30, 2021 GASB 74 disclosure, the Total OPEB Liability is a roll-forward from the June 30, 2020 valuation; however, it does reflect the recommended assumptions from the 2020 experience study, with the exception of the discount rate mentioned above.

Based on our analysis, we find the Total OPEB Liability for the System is reasonable and in compliance with GASB 74.

Valuation Report Content

We find the actuarial valuation Report is in compliance with Actuarial Standards of Practice (ASOP). However, we have the following comments and recommendations:

Funding Report

1. The GASB 67 report shows participant counts for (1) inactive members entitled to but not yet receiving benefits, (2) non-participants valued for accumulated deductions and (3) beneficiaries entitled to a pending lump sum. We recommend that these participant counts be more prominently disclosed in the funding valuation summaries. ██████ has indicated that this information was previously included in Table 1 of the valuation report; however, beginning with the June 30, 2013 valuation report, ██████ ERS requested this information be disclosed as a footnote, since these participants generally have a limited impact on the System's liabilities.
2. While the report contains a section on risk, as required by ASOP 51, the information contained here is on the minimal side for a system of this size. The ██████ Retirement Code requires 20-year projections, sensitivity analysis and simulations. We recommend ██████ include more information about risk, including baseline projections. ██████ has indicated that in future reports they will refer to a separate report that contains additional information, including projections.

GASB 67 Report

1. The Total Pension Liability is a roll-forward from the June 30, 2020 valuation; however, it does reflect the recommended assumptions from the June 30, 2020 Experience Review. The paragraph on the bottom of page 1, however, is misleading because it says this valuation was based on the 2015 experience study. The first paragraph on page 2 says this valuation is based on the new assumptions from the June 30, 2020 experience study. We recommend that ██████ clarify this in the next GASB 67 report. ██████ has indicated they will provide a more precise narrative in future reports when the prior year's and current year's Total Pension Liability are based on different valuation assumptions.

SECTION III – RESULTS OF THE ACTUARIAL VALUATION REPLICATION

2. The report does not show a depletion test. While this is not required to be shown in the report, [REDACTED] may want to consider adding this to the report for full transparency. [REDACTED] has indicated that the depletion test was prepared and provided directly to the auditor.

GASB 74 Report

1. The Pension Actuarial Valuation Report describes the eligibility criteria for the DC only participants for the health care premium assistance; however, the GASB 74 report does not mention DC only participants. We recommend that [REDACTED] clarify this wording in the next GASB 74 report. [REDACTED] has indicated that future GASB 74 reports will include a description of all health care premium assistance plan eligible employees.
2. The report should disclose that the participant election percentages in this report are different than the election percentages in the funding valuation report and the rationale for the difference. [REDACTED] has indicated that future GASB 74 reports will disclose the differences in assumptions and the reasons for those differences.
3. The Total OPEB Liability is a roll-forward from the June 30, 2020 valuation; however, it does not reflect the recommended assumptions from the June 30, 2020 Experience Review. Similar to the GASB 67 report, the wording regarding which assumptions were used should be clarified in the next GASB 74 report. [REDACTED] has indicated they will provide a more precise narrative in future reports when the prior year's and current year's Total OPEB Liability are based on different valuation assumptions.
4. The mortality assumption was adjusted for credibility of the data; however, the report does not disclose how the table was adjusted. [REDACTED] has indicated that future GASB 74 reports will include full descriptions on the development of its mortality bases.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

In this section, we provide detailed analysis of the assumptions and methods recommended in the July 1, 2015 to June 30, 2020 Experience Review. These assumptions will first be effective with the June 30, 2021 Actuarial Valuation.

Economic Assumptions

We find that the recommended economic assumptions are reasonable and in compliance with ASOP 27 *Selection of Economic Assumptions for Measuring Pension Obligations*.

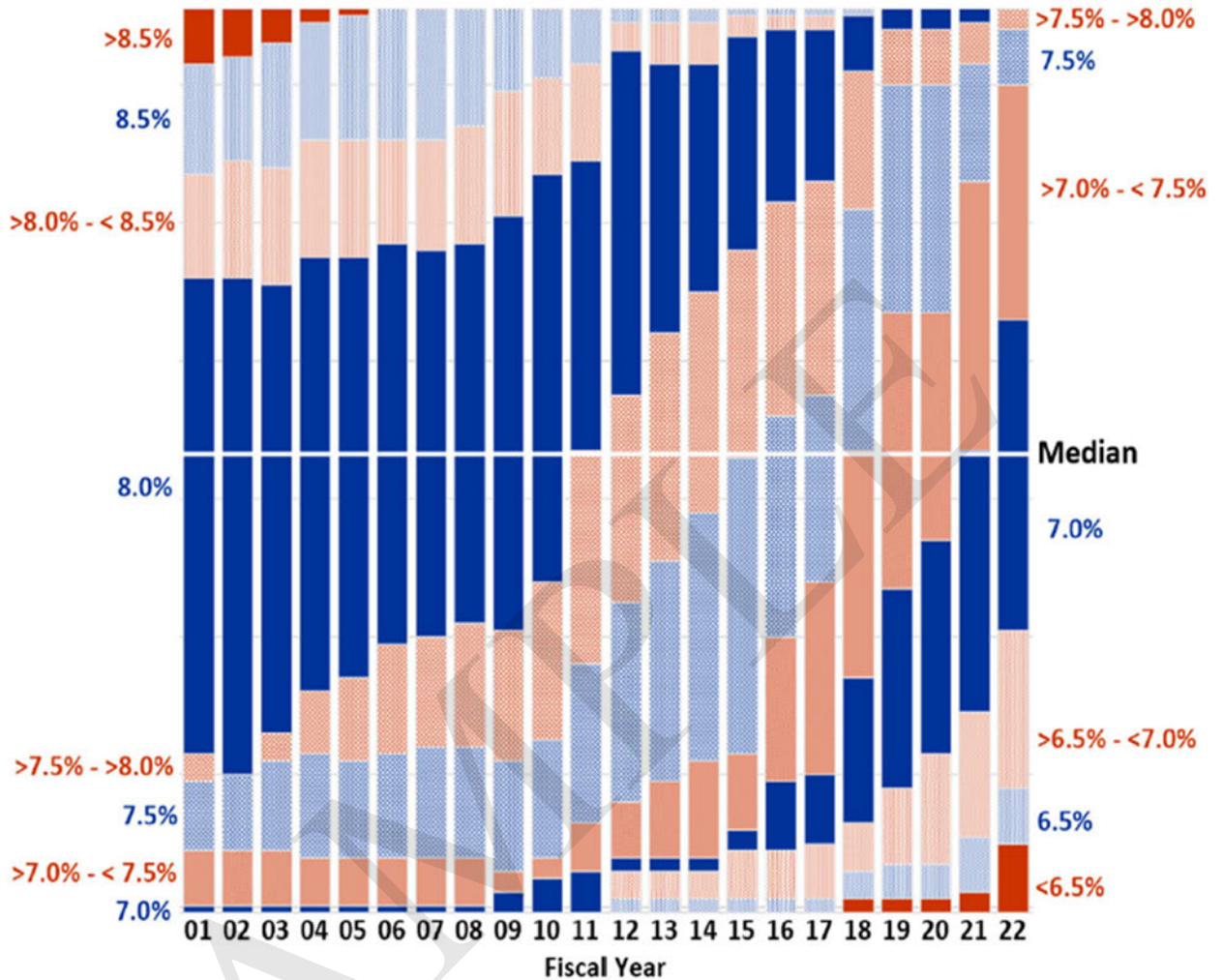
1. Interest Rate

The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the actuarial valuation. In the June 30, 2020 Experience Review, ██████ recommended decreasing the interest rate from 7.25% to 7.00%.

Our rationale for supporting ██████'s 7.00% investment rate recommendation is as follows:

- In the June 30, 2020 Experience Review, ████████████████████ each performed an independent expected return on assets (EROA) analysis. The analysis showed an EROA ranging from 6.40% to 6.99%. Note that the analysis does not indicate whether the recommended 7.00% investment rate is net of administrative expenses.
- While the discount rate assumption should be based on the future expected investment returns for the System's investment portfolio, survey information can provide an important context for evaluating the assumption. The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 131 large retirement plans. The following graphic from the survey shows the distribution of investment return assumptions since 2001. The latest data includes results collected through March 2022.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS



Over the period shown in the latest survey, there continues to be a pattern of reducing the investment return assumption. Of the 131 plans shown, 102 or nearly 80% have reduced their assumed rate of return since 2018, and all but two have reduced their assumed rate of return since fiscal year 2010. The average return assumption is 6.99%. The data is consistent with the experience of other Cheiron clients, which have generally shown a significant trend of reducing their investment return assumptions over the last several years.

- As is the case with most maturing pension plans, the System is experiencing negative cash flows measured as contributions less benefits and administrative expenses. The System’s negative cash flow is 2.0% of assets. Negative cash flows present an additional investment risk to the System.

2. Inflation Assumption

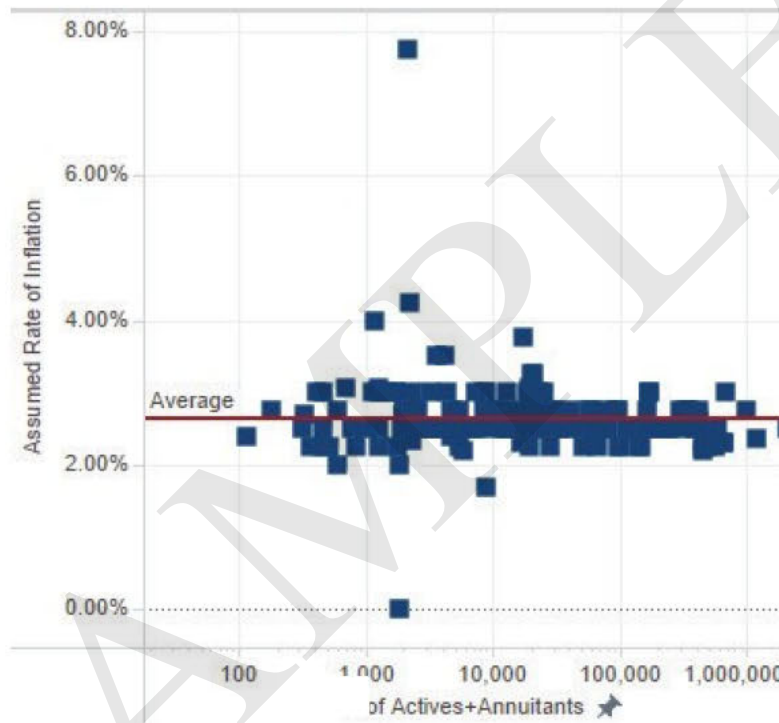
The inflation assumption impacts the discount rate and salary increase assumptions.

We find the inflation assumption of 2.50% reasonable.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Our rationale for concurring with the 2.50% assumption:

- The 2022 Old-Age, Survivors, and Disability Insurance (OASDI) Trustees Report projects that over the long-term (next 75 years) inflation will average somewhere between 1.8% and 3.0%. The Social Security Administration uses an assumption of 2.4% under the intermediate cost projection.
- The *National Conference on Public Employers Retirement Systems* (NCPERS) February 2022 Public Retirement System Study includes the following graphic of respondents' inflation assumptions:



This shows that the recommended assumption of 2.50% is close to the inflation assumptions used among the 156 systems that responded to this study, with 2.7% as the average.

- A measure of the market consensus of expected future inflation rates is the difference in yields between conventional Treasury bonds and Treasury Inflation-Protected Securities (TIPS) at the same maturity. The following table shows the yields on both types of bonds and the break-even inflation rates as of June, 30, 2019, June 2020, June 2021 and June 2022. Break-even inflation is the level of inflation needed for an investment in TIPS to “break even” with an investment in conventional Treasury bonds of the same maturity. These inflation expectations were lower than 2.00% before and during the onset of the COVID-19 pandemic. However, since 2021, both short- and long-term expectations have been near 2.50%.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Break-Even Inflation Based on Treasury Bond Yields			
Time to Maturity	Conventional Yield	TIPS Yield	Break Even Inflation
June 2019			
5 Years	1.83%	0.28%	1.55%
10 Years	2.07%	0.37%	1.70%
20 Years	2.36%	0.59%	1.77%
June 2020			
5 Years	0.34%	-0.67%	1.01%
10 Years	0.73%	-0.54%	1.27%
20 Years	1.27%	-0.28%	1.55%
June 2021			
5 Years	0.84%	-1.63%	2.47%
10 Years	1.52%	-0.82%	2.34%
20 Years	2.09%	-0.34%	2.43%
June 2022			
5 Years	3.19%	0.30%	2.89%
10 Years	3.14%	0.53%	2.61%
20 Years	3.48%	0.70%	2.78%

Data source: Federal Reserve, Constant Maturity Yields, Monthly Series

The Federal Reserve Bank of Philadelphia publishes a quarterly survey of professional economic forecasters that includes their forecasts of inflation over the next 10 years. The following table summarizes the results of three surveys since 2020.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Federal Reserve Bank of Philadelphia Survey of Professional Forecasters			
Inflation (CPI) Forecast: Annual Average Over the 10 Years Following the Survey			
Date	Median	Minimum	Maximum
Q3 2020	2.03%	1.46%	2.60%
Q3 2021	2.44%	2.00%	3.00%
Q3 2022	2.80%	2.10%	4.50%

Similar to the break-even inflation rates, the professional forecasts were generally lower shortly after the onset of the pandemic but have since risen.

The recommended inflation assumption of 2.50% is consistent with both the market expectations and the professional forecasts.

3. Salary Increase Assumption

The salary increase assumption is based on age and ranges from 9.65% for age 19 to 2.75% at age 54 and beyond.

We find this assumption to be reasonable based on the data provided.

4. Payroll Growth

In the June 30, 2020 Experience Review, ████████ recommended decreasing the payroll growth assumption from 3.50% to 3.25%.

The annual increase in the budgeted payroll over the last ten years, as shown in Table 10 in the June 30, 2020 Actuarial Valuation Report, has been approximately 1.00%. This is significantly lower than the recommended payroll growth assumption of 3.25%. Since the amortization method is based on a level percent of payroll, lower than expected payroll growth will increase the contribution risk to the System since actual contributions may not be sufficient to pay off the unfunded actuarial liability. We understand that ████████ ERS' in house survey showed expected payroll growth of 3.5% for FYE 2022 and 2.5% per year thereafter. We recommend that ████████ review this assumption in advance of the next Experience Review. ████████ has indicated that this assumption will be reviewed annually with ████████ ERS.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Demographic Assumptions

The June 30, 2020 Experience Review covers the period July 1, 2015 through June 30, 2020. ██████ notes that there is insufficient data to analyze experience for Classes T-E and T-F early retirement and withdrawals with 10 or more years of service, and Classes T-G and T-H withdrawal, early and superannuation. Therefore, for Classes T-E and T-F withdrawals with more than 10 years of service, they recommend using the Classes T-C and T-D withdrawal rates, and for Classes T-G and T-H they recommend using Classes T-E and T-F withdrawal rates.

We find the recommended demographic assumptions reasonable and in compliance with ASOP 35 *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*.

We recommend that ██████ continue to monitor the experience and recommend assumption changes as needed. We have the following observations on the demographic assumptions:

1. *Post-Retirement Healthy and Disabled Mortality*

Post-retirement mortality for healthy service retirements is based on a blend of 50% of the PubT-2010 Retiree and 50% of the PubG-2010 Retiree Amount-Weighted Tables with a 99.7% adjustment for males and a 95.4% adjustment for females. For disabled annuitants, post-retirement mortality is based on the Pub-2010 Disability Mortality Non-Safety Amount-Weighted tables with a 105.4% adjustment for males and a 95.0% adjustment for females. Post-retirement mortality for healthy beneficiaries and survivors is based on the member mortality assumption while the member is alive and the Pub-2010 Contingent Survivor Amount-Weighted Tables with a 106.0% adjustment for males and a 116.2% adjustment for females after the member's death. Mortality improvements for each table are based on the ██████ Modified MP-2020 scale, projected generationally.

For the Health Care Premium Assistance valuation, ██████ recommended the use of headcount-weighted mortality assumptions since the benefits are not pay related.

Mortality assumptions are typically developed separately by gender. Unlike most of the other demographic assumptions that rely exclusively on the experience of the plan, for mortality, standard mortality tables and projection scales serve as the primary basis for the assumption which is then modified to better reflect a system's experience.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

The Society of Actuaries (SOA) completed an extensive mortality study of public pension plan experience and issued a set of mortality tables named the Pub-2010 mortality tables which provide insights into the composition of gender-specific pension mortality by factors such as job category (e.g., General Employees, Teachers, Public Safety), salary/benefit amount, and health status (e.g., healthy or disabled). Mortality studies in the U.S. have also shown that individuals with higher salaries if active, or higher benefit income if retired, have longer life expectancies than individuals with lower income.

We find ██████'s post-retirement mortality assumptions reasonable.

2. *Pre-retirement Mortality*

Pre-retirement mortality is based on a blend of 50% of the PubT-2010 Employee and 50% of the PubG-2010 Employee Amount-Weighted Tables with a 99.0% adjustment for males and a 88.6% adjustment for females. Mortality improvements for each table are based on the ██████ Modified MP-2020 scale, projected generationally.

We find the pre-mortality assumptions reasonable.

3. *Deferred Retirement Age for Terminated Vested Participants*

This assumption was not analyzed in the June 30, 2020 Experience Review. ██████ should analyze the retirement age for terminated vested participants in the next Experience Review. ██████ as indicated that this assumption will be reviewed in the next Experience Review.

4. *Health insurance premium assistance election percentage and health insurance premium administrative expense assumption*

There is no analysis for either of these assumptions.

With the exception of the above comments, we have concluded that the following other demographic assumptions used in the valuation appear reasonable and meet the requirements of ASOP 35. These other demographic assumptions are as follows:

1. *Superannuation Retirement and Early Retirement*

Service retirement rates are based on age, gender, and tier.

2. *Withdrawal*

Withdrawal rates are based on age, service, gender and tier.

3. *Disability Retirement*

Disability rates are based on age and gender.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

4. *Withdrawal Annuity*

50% of members are assumed to commence payment immediately and 50% are assumed to defer payment to superannuation age.

5. *Optional Forms of Payment*

Members can elect from a Maximum Straight Annuity (45%), a straight life annuity with guaranteed payments equal to the present value of the Maximum Straight Life Annuity (25%), a 100% Joint and Survivor Annuity (20%) and a 50% Joint and Survivor Annuity (10%).

6. *Option 4 Lump Sum Elections*

75% of Class T-C and Class T-D members, and 50% of Class T-E, Class T-F, Class T-G and Class T-H members, are assumed to elect a refund of contributions and a reduced annuity.

Actuarial Methods

Actuarial methods typically consist of three components: (1) the funding method, which is the allocation of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e., asset smoothing); and (3) the amortization basis of the Unfunded Actuarial Liability.

Funding Method

The System uses the Entry Age Normal funding method. GASB 67 and 68 require the use of the individual entry age normal method. We find the Entry Age Normal funding method reasonable.

Amortization Method

The initial Unfunded Actuarial Liability as of June 30, 2010 is amortized over a closed 24 year amortization period beginning July 1, 2011, as a level percent of payroll. Each subsequent experience gains or losses and assumption changes are amortized over separate 24-year layers, level percent of payroll. Plan changes are amortized over separate 10-year layers, level percent of payroll. The final contribution rate cannot be less than the normal contribution rate. This amortization method is a reasonable amortization method. However, note that the recommended assumptions of a 7.00% investment rate of return and a 3.25% payroll growth results in a negative amortization. A shorter amortization period or a lower payroll growth assumption could avoid this negative amortization.

SECTION IV – AUDIT OF THE ACTUARIAL ASSUMPTIONS AND METHODS

Asset Smoothing Method

There are generally two types of asset values disclosed in an actuarial valuation, the market value of assets and the actuarial value of assets. The market value represents a “snap-shot” or “cash-out” value which 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. As a result, market values are usually not as suitable for long-range planning as are the actuarial value of assets which reflect smoothing of annual investment returns.

The actuarial value of assets is a ten-year smoothed market value. Unanticipated changes in market value are recognized over ten years in the actuarial value of assets. The resulting actuarial value of assets can be no less than 70% and no more than 130% of the market value of assets.

This smoothing method complies with ASOP 44 *Selection and Use of Asset Valuation Methods for Pension Valuation*. Smoothing the market gains and losses over a reasonable period of time to determine the actuarial value of assets is a generally accepted approach, and we concur with its use.

Actuarial Cost Method for the Health Insurance Premium Assistance Funding

The actuarial liability is set equal to the assets in the health insurance account. The results of any June 30 valuation determine the contribution rate for the second succeeding fiscal year. The rate determined is the rate necessary to establish reserves to cover administrative expenses and premium assistance payments for all eligible annuitants during the third fiscal year that follows the valuation date.

The funding for the Health Insurance Premium Assistance is essentially pay as you go.

APPENDIX A – FUNDING PROVISIONS OF GOVERNING LAW

FUNDING POLICY OF THE MEMBERS BOARD OF TRUSTEES

Reprinted from [REDACTED]'s June 30, 2020 Actuarial Valuation Report

The financing objective of the Retirement System is to:

- Fully fund all current costs based on the normal contribution rate determined under the funding method; and
- Liquidate the unfunded accrued liability based on level-percent-of-pay amortization schedules required by the Retirement Code as amended by Act 120-2010, i.e., a schedule of 24 years for the unfunded accrued liability as of June 30, 2010 and each change in the unfunded accrued liability due to actuarial experience after the June 30, 2010 valuation. Any legislation after June 30, 2010 that increases the liability due to benefit enhancements will be funded over 10 years based on level-percent-of-pay amortization.
- As directed by Act 120-2010, the minimum employer pension contribution rate will be the normal cost rate.
- Fully fund the employer contribution to the Defined Contribution Plan.

**THE ACTUARIAL AUDIT REPORT OF THE
██████████ EMPLOYEES' RETIREMENT SYSTEM**

APPENDIX B – INFORMATION RELIED UPON IN PREPARING THIS REPORT

- ██████████ Code:
 - Title 24
 - Active Member Handbook

- Files received from ██████ERS (either directly or from the website):
 - Actuarial Valuation Reports as of June 30, 2019 and June 30, 2020
 - Experience Review for the Period July 1, 2015 to June 30, 2020
 - June 30, 2021 GASB 67 and 74 Reports
 - June 30, 2021 Annual Comprehensive Financial Report
 - Valuation data for the June 30, 2020 Actuarial Valuation
 - Actuarial Equivalence Factors
 - Sample retirement calculations

- Files received from ██████:
 - Valuation data for the June 30, 2020 Actuarial Valuation
 - Assumptions used in the June 30, 2020 Actuarial Valuation

- Other:
 - February 2022 *National Conference on Public Employees Retirement Systems* (NCPERS) Public Retirement Systems Study
 - March 2022 Survey published by the National Association of State Retirement Agencies (NASRA)
 - 2022 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

APPENDIX C – GLOSSARY OF TERMS

1. Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

2. Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a Normal Cost and an Actuarial Liability.

3. Actuarial Gain (Loss)

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

4. Actuarial Liability (also known as Actuarial Accrued Liability and Accrued Liability)

The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

5. Actuarial Present Value

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe \$100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you won't be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is:

$$\begin{array}{ccccccc} \frac{\text{Amount}}{\$100} & & \frac{\text{Probability of Payment}}{(1 - .01)} & & \frac{1}{(1+\text{Investment Return})} & & \\ & \times & & \times & & = & \\ & & & & & & \$90 \end{array}$$

6. Actuarial Valuation

The determination, as of a specified date, of the Normal Cost, Actuarial Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

APPENDIX C – GLOSSARY OF TERMS

7. Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan as used by the actuary for the purpose of an Actuarial Valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

8. Amortization Payment

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

9. Entry Age Normal Cost Method

A method under which the Actuarial Present Value of Future Benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this Present Value of Future Benefits allocated to a valuation year is called the Normal Cost. The portion of this Present Value of Future Benefits not provided for at a valuation date by the Present Value of Future Normal Costs is called the Actuarial Liability. This is the method used under GASB 67 and GASB 68.

10. Funded Ratio

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

11. Governmental Accounting Standards Board

The Governmental Accounting Standards Board (GASB) defines the accounting and financial reporting requirements for governmental entities. GASB Statement No. 67 defines the plan accounting and financial reporting for governmental pension plans, and GASB Statement No. 68 defines the employer accounting and financial reporting for participating in a governmental pension plan.

12. Market Value of Assets

The fair value of the Plan's assets assuming that all holdings are liquidated on the measurement date.

APPENDIX C – GLOSSARY OF TERMS

13. Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses, if applicable, which is allocated to a valuation year by the Actuarial Cost Method.

14. Projected Benefits

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

15. Unfunded Actuarial Liability (UAL)

The excess of the Actuarial Liability over the Actuarial Value of Assets.

SAMPLE