

# Ohio State Highway Patrol Retirement System

## RFP for Actuarial Audit Services

**Produced by Cheiron, Inc.**

**June 17, 2021**

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## **Appendices**

**Appendix A – Sample Actuarial Audit Report**

June 17, 2021

Ms. Bethany Rhodes, Director  
Ohio Retirement Study Council  
30 East Broad Street, 2<sup>nd</sup> Floor  
Columbus, Ohio 43215

***Re: Request for Proposals for Actuarial Audit***

Dear Ms. Rhodes:

Cheiron is pleased to present its qualifications to provide an actuarial audit of the Ohio State Highway Patrol Retirement System, hereinafter referred to as “HPRS.”

Cheiron is an independent, employee-owned, pension and healthcare actuarial consulting firm advising public pension plans, Taft-Hartley pension funds, nonprofit organizations, and corporations. We would like to highlight the following:

- **Extensive Public Sector Experience:** Our consultants have decades of experience advising some of the nation’s largest public pension plans, especially cost-sharing, multiple employer, contributory defined benefit public pension systems, making us particularly qualified to perform this work.
- **Innovative:** Our interactive modeling skills set us apart from other actuarial firms.

Our models are flexible, easy to understand, and can analyze the impact of changes in benefits, assumed rates of return, discount rates, contribution levels, life expectancies, amortization policy, and dozens of other variables. Our models also project future costs, liabilities, assets, and funded ratios.

Working with our proprietary projection models allows us to provide additional checks regarding the results, as well as allow us to demonstrate the efficacy of the current funding policy.. These exercises are useful to further improve your understanding of the risks associated with your plan and make prudent and informed decisions. Our hands-on approach means all our actuaries create their own tools and are adept at modeling.

- **Independent and Objective:** We are passionate about the quality of our work, and several actuaries are involved in every step of the audit. Unlike nearly all large and midsize consulting firms, we are completely independent from brokers, investment firms, healthcare providers and administrators in that we do not accept assignments or commissions from brokers, investment or insurance companies. Through our ardent dedication to objectivity in advising Board members, we have earned a strong reputation for unbiased consulting that best serves our clients and their employees/retirees.

Ms. Bethany Rhodes

June 17, 2021

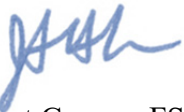
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- **Highly Qualified:** Our talented actuaries back our commitment to quality. More than 40 percent of all our employees are Fellows of the Society of Actuaries or FSAs, the highest professional designation. We have a higher percentage of FSAs with public sector expertise than most other firms.

Our actuaries are very active in leadership positions in professional organizations such as the American Academy of Actuaries and the Public Plan Steering Committee of the Conference of Consulting Actuaries. They also serve on the Pension Committee of the Actuarial Standards Board, the rule-making body for the actuarial profession. Because of our expertise, we've been asked to testify before Congress on pension issues.

Thank you for considering Cheiron. We are confident we can provide the best actuarial auditing services for HPRS, and we look forward to answering any questions you may have.

Sincerely,  
Cheiron



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



Margaret Tempkin, FSA, MAAA, EA  
Principal Consulting Actuary



## **4.1. PROPOSAL SUMMARY**

## 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) requests a proposal to perform an actuarial audit for the primary purpose of independent verification and analysis of the assumptions, procedures, results and methods used and reported on by the consulting actuary Foster & Foster of the HPRS for the:

- HPRS annual pension actuarial valuation as of January 1, 2020;
- The five-year experience review for the period December 31, 2013 to December 31, 2018; and
- HPRS annual retiree health care actuarial valuation as of January 1, 2020, including GASB Statement 43 disclosures.

We will perform parallel valuations of pension benefits as of January 1, 2020 as well as of retiree health care benefits as of January 1, 2020. We will make recommendations as needed of assumption adjustments to more accurately reflect present and future assets, liabilities and costs of HPRS and assess whether HPRS appropriately and consistently determines retiree contributions to health care and whether the implementation of HPRS's health care policies differ from those determinations. We will also review the approach, conclusions, and communications of the experience review.

**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 HPRS staff use during the audit, including the contact's address, telephone and e-mail address;**

The primary contacts for this engagement are:

Janet Cranna, FSA, FCA, MAAA, EA, Principal Consulting Actuary  
64 US Hwy 46  
Pine Brook, NJ 07058  
877-243-4766, ext. 1145 / [jcranna@cheiron.us](mailto:jcranna@cheiron.us)

Margaret Tempkin, FSA, MAAA, EA, Principal Consulting Actuary  
8300 Greensboro Drive, Suite 800  
McLean, VA 22102  
877-243-4766, ext. 1103 / [mtempkin@cheiron.us](mailto:mtempkin@cheiron.us)

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

Cheiron, Inc. is an employee-owned C-corporation with no subsidiaries, affiliated companies, or joint venture relationships.

- **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 experienced any material changes in organizational structure or ownership in the last 18 months and there are no changes under review.

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

Cheiron monitors client satisfaction through open lines of communication. We establish relationships with people at various levels of our clients' organization. We constantly seek feedback from our clients to address issues while they are small, before becoming significant. Cheiron's CEO, Gene Kalwarski, as part of his responsibilities, periodically calls or visits all our major clients to discuss on-going relationships and explore areas where we can continuously improve our service and service offerings.

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

Cheiron has not been threatened with nor is currently a party to any material litigation.

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

In the last five years, no litigation has been brought against Cheiron by existing or former clients.

- **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. is the current provider of actuarial consulting services to the State Teachers

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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 in terms of our ability to do the requested work for HPRS and further have confirmed with STRS that they have no concerns with us providing these services to HPRS.





## **4.2. CAPABILITIES AND EXPERIENCE**

## 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 HPRS. 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 OPEB consulting services to national and regional public pension and OPEB systems. We provide on the following pages detailed information about the types and sizes of public plans for which we have performed actuarial audits.

Representative clients for whom we have performed actuarial audits of defined benefit plans in the last five years include the following systems:

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Client	Type of Plan and Number of Employers	Participants	Assets	Audit Performed
• Alameda County Employees' Retirement Association	Cost-sharing, defined benefit; 7 employers	23,249	\$6,900,000,000	2017-2018; full replication
• California Public Employees' Retirement System (CalPERS)	Agency and cost-sharing multiple employer plans, both defined benefit and defined contribution; 2,892 employers	1,925,459	\$326,400,000,000	2008 - 2013-full replication audits, review of the 1997-2011 experience study, replication of the 1997-2015 experience study
• 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 of 2015-2018 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 and June 30, 2019 Benefit Maintenance Program.
• District of Columbia Retirement Board	Two defined benefit, single employer plans	16,000	\$5,790,833,000	2015; limited scope
• Educational Employees' Supplementary Retirement System of Fairfax County	Single employer plan	38,329	\$2,279,741,119	2018; limited scope
• Fresno County Employees' Retirement Association	Cost-sharing, defined benefit plan; 5 employers	17,964	\$4,400,000,000	2014-2015; full replication
• Illinois Office of the Auditor General	Cost-sharing and single employer plans	906,000	\$100,200,000,000	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
• Imperial County Employees' Retirement System	Cost-sharing, defined benefit; 5 employers	3,488	\$700,800,000	2014-2015; full replication
• Los Angeles City Employees	Cost-sharing, defined benefit	45,421	\$16,989,616,344	2019; full replication

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Client	Type of Plan and Number of Employers	Participants	Assets	Audit Performed
Retirement System	and retiree health; 3 employers			
• Los Angeles Department of Water and Power	Single employer	20,000	\$8,310,729,662	2015; full replication
• Maryland-National Capital Park & Planning Commission Employees' Retirement System	Single employer	4,202	\$893,000,000	2018; full replication
• Massachusetts Bay Transportation Authority	Defined benefit, single employer	12,700	\$1,450,000,000	2017; full replication
• Mendocino County Employees' Retirement Association	Cost-sharing defined benefit; 3 employers	2,737	\$484,000,000	2017-2018; full replication
• Municipal Employees' Retirement System of Michigan (MERS)	Agent multiple employer plan	88,000	\$3,500,000,000	2015; limited scope 2019; full replication for selected agencies
• New York State Teachers' Retirement System	Cost-sharing employer plan	427,000	\$119,000,000,000	2017; limited scope 2019; full replication
• Orange County Employees' Retirement System	Cost-sharing defined benefit plan; 18 employers	43,485	\$12,600,000,000	2017; full replication
• Retirement Systems of Alabama	3 defined benefit plans: 2 cost-sharing (278 employers) and 1 agent plan with 874 employers	358,000	\$44,782,611,644	2016; limited scope
• Sacramento County Employees' Retirement System	Cost-sharing defined benefit plan; 10 employers	25,115	\$8,500,000,000	2017; full replication
• San Bernardino County Employees' Retirement Association	Cost-sharing defined benefit plan; 21 employers	38,836	\$9,200,000,000	2018; full replication
• Sonoma County Employees' Retirement Association	Cost-sharing defined benefit plan; 6 employers	10,227	\$2,760,000,000	2013-2014; full replication
• Texas State Auditor's Office	Single employer and Cost-sharing employer plans	1,369,640	\$117,388,000,000	2014; limited scope GASB Audit of Texas Employees' Retirement System and Texas Teachers Retirement System

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<b>Client</b>	<b>Type of Plan and Number of Employers</b>	<b>Participants</b>	<b>Assets</b>	<b>Audit Performed</b>
<ul style="list-style-type: none"><li>University of California Retirement System</li></ul>	Defined benefit, defined contribution and cost sharing plan; 4 employers	262,988	\$52,700,000,000	2015-ongoing; full replication
<ul style="list-style-type: none"><li>West Virginia Municipal Pensions Oversight Board</li></ul>	53 separate defined benefit single employer plans	3,850	\$307,953,940	2017; full replication

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In addition, we have also performed in effect, audit functions on all of the pension plans for which we now serve as the consulting actuary since forming Cheiron in 2002.

Actuarial Valuation Services

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

Client	Type of Plan and Number of Employers	Participants	Assets	Client Since
• Alameda-Contra Costa Transit District Employees Retirement Plan	Single employer	4,514	\$641,535,000	1/1/2013
• Amalgamated Transit Union Local 900 Pension Plan	Single employer	145	\$5,373,088	1/1/2007
• Arlington County Retirement System	Single employer	8,299	\$2,413,300,000	4/3/2003
• Beverly Hills Police Officers Association Supplemental Benefit Trust	Single employer	205	\$12,658,994	2/5/2013
• Cincinnati Retirement System Pension	Single employer	7,473	\$1,834,979,000	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 Firefighters and Police Officers Pension Plan	Single employer	882	\$296,948,047	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	10,317	\$2,750,275,383	3/30/2012
• City of Falls Church Pension Plans	Single employer	667	\$130,408,152	10/4/2013
• City of Kansas City, Missouri Employees Retirement System	Single employer	6,15	\$1,169,271,585	1/1/2007
• City of Kansas City, Missouri Firefighters Pension System	Single employer	1,941	\$552,265,610	1/1/2007
• City of Norfolk Employees Retirement System	Single employer	5,095	\$1,084,248,000	6/1/2005
• City of Philadelphia Municipal Retirement System	Single employer	66,321	\$4,872,977,000	8/7/2007
• City of San Jose Federated City Employees Retirement System	Single employer	9,213	\$2,069,332,000	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

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Client	Type of Plan and Number of Employers	Participants	Assets	Client Since
• DART Contributory Pension Plan	Single employer	933	\$50,556,919	5/7/2007
• Delaware Public Employees Retirement System	Cost-sharing multiple employer: 123 employers	72,767	\$9,696,899,100	6/1/2006
• Denver Employees Retirement Plan	Single employer	25,273	\$2,062,680,000	11/7/2018
• Employees Retirement System of the City of Baltimore	Single employer	18,292	\$1,740,450,176	5/5/2005
• Employees Retirement System of the City of St. Louis	Cost-sharing: 13 employers	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	691	\$98,574,091	4/1/2013
• Greater Palm Springs Convention & Visitors Bureau	Single employer	46	\$5,570,730	7/15/2014
• Hampton Employees Retirement System	Single employer	1,130	\$141,924,882	8/27/2009
• Jackson County Revised Pension Plan	Single employer	3,816	\$301,760,724	5/1/2016
• Knoxville Utilities Board Pension Plan	Single employer	1,210	\$225,067,132	11/15/2011
• Maine Public Employees Retirement System	Cost-sharing and Agent: 555 employers	155,822	\$15,075,604,606	3/1/2005
• Marin County Employees Retirement Association	Cost-Sharing; 9 employers	6,670	\$2,480,900,000	1/1/2013
• Maryland National Park and Planning Commission	Single employer	3,823	\$892,978,117	3/7/2019
• Merced County Employees Retirement Association	Cost-sharing	5,492	\$8,665,000,000	1/1/2013
• Metropolitan Relief Association Death Benefit Plan	Single employer	771	\$12,344,910	1/6/2015
• Metropolitan Washington Council of Governments	Single employer	191	\$57,363,817	4/1/2003
• Newport News Employees Retirement Fund	Single employer	12,476	\$957,478,462	6/3/2010
• Oakland Police and Fire Retirement System	Single employer	798	\$384,711,000	9/18/2013
• Pennsylvania Municipal Retirement System	Agency multiple employer plan~1000	15,908	\$2,151,378,000	10/1/2006

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Client	Type of Plan and Number of Employers	Participants	Assets	Client Since
<ul style="list-style-type: none"> <li>Port Authority of Allegheny County Retirement and Disability Allowance Plan for Employees Represented by Local 85 of the Amalgamated Transit Union</li> </ul>	Single employer	5,173	\$661,231,493	1/1/2007
<ul style="list-style-type: none"> <li>Retirement Plan for Pace West Division Employees</li> </ul>	Single employer	442	\$19,574,522	1/1/2007
<ul style="list-style-type: none"> <li>Riverside Sheriffs Association</li> </ul>	Single employer	2,924	\$17,900,000	6/8/2015
<ul style="list-style-type: none"> <li>Sacramento Regional Transit District</li> </ul>	Single employer	2,134	\$297,384,910	1/1/2013
<ul style="list-style-type: none"> <li>San Diego City Employees Retirement System</li> </ul>	Agent; 3 employers	20,771	\$8,447,780,696	6/14/2006
<ul style="list-style-type: none"> <li>San Diego Transit Corporation Pension Plan</li> </ul>	Single employer	1,653	\$170,139,617	1/1/2013
<ul style="list-style-type: none"> <li>San Joaquin County Employees Retirement System</li> </ul>	Cost-sharing: 10 employers	14,108	\$2,841,042,076	1/1/2013
<ul style="list-style-type: none"> <li>Santa Barbara County Employees Retirement System</li> </ul>	Cost-sharing: 11 employers	10,547	\$3,198,134,000	1/1/2013
<ul style="list-style-type: none"> <li>Santa Clara Valley Transportation Authority ATU Pension Plan</li> </ul>	Single employer	3,266	\$527,668,913	1/1/2013
<ul style="list-style-type: none"> <li>Stanislaus County Employees Retirement Association</li> </ul>	Cost-sharing	9,627	\$2,184,800,000	1/1/2013
<ul style="list-style-type: none"> <li>State of New Jersey Division of Pensions and Benefits</li> </ul>	Single and cost-sharing plans: 2,563 employers	456,000	\$76,924,788,947	8/1/2018
<ul style="list-style-type: none"> <li>State Teachers Retirement System of Ohio</li> </ul>	Cost-sharing	515,960	\$74,916,301,830	5/29/2018
<ul style="list-style-type: none"> <li>Sussex County Employee Pension Plan</li> </ul>	Single employer	810	\$82,759,578	2/1/2016
<ul style="list-style-type: none"> <li>The Police Retirement System of St. Louis</li> </ul>	Single employer	3,203	\$784,752,472	6/1/2012
<ul style="list-style-type: none"> <li>Tulare County Employees</li> </ul>	Cost-sharing: 4 employers	9,805	\$1,587,476,000	5/6/2015
<ul style="list-style-type: none"> <li>U.S. Court of Appeals for Veterans Claims</li> </ul>	Single employer	16	\$39,893,231	4/1/2003
<ul style="list-style-type: none"> <li>United States Army Nonappropriated Fund Employee Retirement Plan</li> </ul>	Single employer	28,808	\$1,820,908,696	8/1/2003
<ul style="list-style-type: none"> <li>Washington Metropolitan Area Transit Authority Retirement Plan</li> </ul>	Single employer	1,763	\$3,721,736,057	7/1/2009
<ul style="list-style-type: none"> <li>Washington Metropolitan Area Transit Authority, Local 2 Retirement Plan</li> </ul>	Single employer	425	\$148,050,475	7/1/2009



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• Washington Metropolitan Area Transit Authority, Local 922 Retirement Plan	Single employer	738	\$209,442,697	6/1/2004
• Washington State Council of Fire Fighters Employee Benefit Trust	Single employer	9,081	\$10,310,000	5/22/2014

OPEB Services

Below is a list of Cheiron’s clients for whom we presently provide OPEB consulting services.

Client	Participants	Assets	Client Since
Arkansas Employee Benefits Division	46,895	N/A	7/1/2009
Arkansas Tech University	983	N/A	2/22/2019
Arlington County Government	4,690	N/A	11/7/2017
Arlington County Government	6,365	N/A	12/11/2017
Cincinnati Retirement System Health	8,299	\$457,249,000	8/8/2018
City and County of San Francisco	57,763	\$104,337	1/1/2012
City of Alexandria OPEB Trust	3,795	\$64,007,042	11/30/2010
City of Alexandria Schools Health Plan	2,786	\$18,009,914	12/1/2010
City of Oakland	7,232	N/A	11/10/2015
City of Philadelphia Board of Pensions and Retirement	56,044	N/A	9/29/2009
City of San Jose Federated City Employees Retirement System	7,231	\$277,256	8/12/2010
City of Wilmington Pension System	1,339	\$16,588,861	12/28/2011
Delaware State Retirement System Post Retirement Health Plan	61,360	N/A	6/1/2006
District of Columbia, Office of the Chief Financial Officer	28,481	\$1,509,102,271	8/8/2018
Knoxville Utilities Board Post-Retirement Benefit Plan	1,431	\$50,791,010	1/1/2012
Long Island Power Authority	100	N/A	7/17/2012
Maine Municipal Employees Health Trust	9,559	N/A	7/5/2012
Multnomah County Postretirement Medical and Life Insurance Plan	7,144	N/A	12/1/2012
Nassau Health Care Corporation	3,874	N/A	7/17/2012
New Jersey Economic Development Authority (NJEDA)	N/A	N/A	1/16/2020

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Client	Participants	Assets	Client Since
New York State Teachers Retirement System	N/A	N/A	10/1/2018
Newport News / Williamsburg International Airport Postretirement Benefit Plan	69	N/A	12/1/2010
Newport News Employees Health Plan	3,375	N/A	5/1/2010
Norfolk Public Schools	10,036	N/A	6/1/2005
State Teachers Retirement System of Ohio OPEB	309,720	N/A	5/29/2018
Sussex County Postretirement Employee Benefit Plan	673	N/A	2/1/2016
The City of San Jose Police and Fire Department Plan	3,763	\$162,519	5/5/2011
Tri-County Metropolitan Transportation District of Oregon (TriMET)	4,033	\$403,340	3/1/2018
University of Arkansas System Employee Benefits Program	19,240	N/A	10/5/2015
West Virginia Housing Development Fund Retiree Healthcare Benefit Plan	115	\$5,449,303	2/22/2013
Westchester County Health Care Corporation	3,313	\$343,307,000	8/1/2011



## **4.3. STAFF QUALIFICATIONS**

### 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.

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 HPRS. You may reference, rather than repeat, duplicative information provided in Paragraph 4.2 Capabilities and Experience. The experience summaries also 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

The Cheiron team proposed for this engagement includes:

- **Janet Cranna, FSA, FCA, MAAA, EA**, 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.

- 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.

In addition, Janet has 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

Contact

64 US Hwy 46

Pine Brook, NJ 07058

877-243-4766 x1145 / [jcranna@cheiron.us](mailto:jcranna@cheiron.us)

- **Margaret Tempkin, FSA, MAAA, EA**, Principal Consulting Actuary is the proposed co-lead actuary for this engagement.

Experience Summary of Significant Public Sector Engagements includes:

- State of Delaware Postretirement Health Plan - Responsible for annual OPEB actuarial valuations, GASB 74/75 reporting, and additional special projects as needed.
- State Teachers Retirement System of Ohio - Responsible for annual OPEB actuarial valuations, GASB 74/75 reporting, and additional special projects as needed.
- TriMet Other Postemployment Benefit Plan - Responsible for annual OPEB actuarial valuations, GASB 74/75 reporting, and additional special projects as needed.

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- City of Cincinnati Other Postemployment Benefits - Responsible for annual OPEB actuarial valuations, GASB 74/75 reporting, and additional special projects as needed.
- WMATA Local 2, Retirement and Local 922 Pension Plans - Responsible for annual pension actuarial valuations, GASB 67/68 reporting, and additional special projects as needed.
- City of Newport News Employees' Retirement Fund and City of Newport News Postretirement Benefits - Responsible for annual pension and OPEB actuarial valuations, GASB 67/68 and 74/75 reporting, and additional special projects as needed.
- Maine Municipal Health Trust - Responsible for over 400 GASB 74/75 reporting reports and SOP valuation.
- City of Oakland, CA - Responsible for annual OPEB actuarial valuations, GASB 74/75 reporting, and additional special projects as needed.

Contact

8300 Greensboro Dr., Suite 800

McLean, VA 22102

877-243-4766 x1103 / [mtempkin@cheiron.us](mailto:mtempkin@cheiron.us)

- **Jacqueline King, FSA, MAAA, EA**, Associate Actuary, is the proposed project manager for this engagement.

Experience Summary of Significant Public Sector Engagements includes:

- San Diego City Employees Retiree Medical Trust - Responsible for reviewing setup and completion of initial benefit multiplier study
- San Diego County Public Safety Retiree Medical Trust - Responsible for reviewing setup and completion of initial benefit multiplier study
- San Diego City Employees' Retirement System - Responsible for preparing/checking annual 415(b) benefit valuation and projections and GASB 73 reporting.
- City of Kansas City, Missouri Employees Retirement System - Responsible for annual reviewing actuarial valuation, GASB 67/68 reporting, and additional special projects
- City of Kansas City, Missouri Firefighters Pension System - Responsible for annual reviewing actuarial valuations, GASB 67/68 reporting, and additional special projects
- Jackson County Missouri Revised Pension Plan - Responsible for annual actuarial checking valuation, GASB 67/68 reporting, and additional special projects

## Ohio State Highway Patrol Retirement System

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- City of San Jose Federated City Employees Retirement System - Responsible for annual checking actuarial valuation for pension and retiree medical plans, GASB 67/68 reporting, and additional special projects
- The City of San Jose Police and Fire Department Plan - Responsible for checking annual actuarial valuation retiree medical plan, and additional special projects
- Merced County Employees' Retirement Association - Responsible for checking annual actuarial valuations, GASB 67/68 reporting, and additional special projects
- **Michael Moehle, FSA, FCA, MAAA, EA**, Public Pension Oversight, is the proposed audit specialist for this engagement.

Experience Summary of Significant Public Sector Engagements includes:

- State Teachers Retirement System of Ohio - Responsible for 2018 conversion to Cheiron valuation system on takeover from prior actuary.
- University of California Retirement System - Responsible for system setup for full-scale audits of the Retirement and 415(m) Plan valuations.
- California State Teachers' Retirement System - Responsible for system setup for audits of the CalSTRS' Defined Benefit Program, Cash Balance, Defined Benefit Supplemental and Medical Premium Payment Plans.
- New York State Teachers Retirement System - Responsible for system setup, full replication and audit of the Teachers Retirement System.

#### Contact

3685 Mount Diablo Blvd., Suite 250

Lafayette, CA 94549

877-243-4766 x1123 / [mmoehle@cheiron.us](mailto:mmoehle@cheiron.us)

#### Management Plan

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

The audit project will be managed by Jacqui King, who will supervise a team of actuarial analysts as well as coordinate with Michael Moehle who will serve as the audit specialist for this project. Jacqui King will also be available as a day-to-day contact regarding issues such as data collection and processing questions.

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

- Janet Cranna 22.5%
- Margaret Tempkin 22.5%
- Jacqui King 10.0%
- Mike Moehle 25.0%
- Actuarial analysts: 15.0%
- Administrative staff: 5.0%

Resumes for the proposed Cheiron team are found on the following pages.



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

**Janet Cranna** joined Cheiron in May 2013 and has more than 30 years of retirement consulting and actuarial experience with public sector and corporate clients. Janet previously worked with Buck Consultants for 24 years where she completed her tenure as a Principal, Consulting Actuary, and a member of the Public Plan Practice Leadership Group.



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

She supervises, reviews, and certifies actuarial valuations and studies for retirement plans, including GASB disclosures for public plans. She performs experience studies and recommends changes to actuarial assumptions as needed, consults on design and interpretation of plan provisions and their relationship to ERISA, IRS regulations, and state statutes. Janet presents and testifies before boards and legislative committees regarding plan design and funding strategies.

She also has performed actuarial audits for the Retirement Systems of Alabama, the Illinois Office of the Auditor General, the West Virginia Municipal Pensions and Oversight Board, New York State Teachers' Retirement System, the Texas State Auditor's Office, Maryland-National Capital Park & Planning Commission Employees' Retirement System and the District of Columbia Retirement Board.

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

**Margaret Tempkin, FSA, MAAA, EA**  
**Principal Consulting Actuary**

**Margaret Tempkin** is one of Cheiron's founders and has 26 years of actuarial experience. For the past 21 years, she has worked in employee benefit consulting, concentrating in health and welfare valuations. Margaret joined Cheiron in November 2002. Previously, she worked for nearly five years at Milliman, two years at Watson Wyatt Worldwide, and two years at Banner Life Insurance Company.



Margaret excels at finding efficient and creative solutions to actuarial problems. She likes meeting her clients to get to know them and to better understand their positions.

Current public sector clients include serving as lead consultant for the WMATA Local 922 Retirement plan, WMATA Local 2 Retirement Plan, City of Oakland (OPEB), the Delaware Retirement System (OPEB), the City of Alexandria VA (OPEB), Alexandria VA Schools (OPEB), City of Norfolk VA Employees City and Schools (OPEB), the City of Newport News City and Schools (Pension & OPEB), Sussex County DE (OPEB), State Teachers Retirement System of Ohio Retiree Health Care Benefits Plan, City of Cincinnati (OPEB), and Maine Municipal Employees Health Trust (OPEB).

Her most recent projects include:

- Assisted clients in the development of RFPs
- Transition OPEB clients to GASB 74/75 reporting
- Analyzed cost-containment strategies; analyzed legislative reform proposals; compliance with Other Post Employment Benefit disclosures
- Assisting in analyzing the retiree medical liabilities for the U.S. Department of Defense, including such items as population projections, claim development, and funding options
- Assisting in developing interactive medical models for the State of Delaware, City of Annapolis, Maryland, City of Oakland and the District of Columbia
- Calculating FAS106/158, SOP 92-6 (as amended), GASB 43/45 (GASB 74/75) figures
- Designing interactive models for individual participants relating to proposed plan changes and/or enhancement for the State Retirement and Pension System of Maryland, Fairfax County, Virginia, and the City of Annapolis, Maryland

Margaret graduated from Rutgers, the State University of New Jersey, with a Bachelor's degree in Statistics. She is a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries.

**Jacqueline King, FSA, EA, MAAA**  
**Associate Actuary**

**Jacqueline King, FSA, EA, MAAA**, Associate Actuary, joined Cheiron in August 2010 and has 15 years of actuarial consulting experience. Prior to joining Cheiron, Jacqui worked for Towers Watson for six years, where she was an actuarial analyst and project manager for defined benefit pension plans and retiree medical plans.



Jacqui currently works on retiree medical trusts, public sector pension plans, multiemployer plans, and single employer plans. Her experience includes preparing and reviewing:

- Funding valuations and projections
- GASB disclosures for public plans
- Government filings
- Experience studies
- Plan design studies
- Analysis of proposed legislations
- 415(b) valuations and calculations
- Individual benefit calculations and benefit statements
- Non-discrimination testing

Current public sector clients serving as co-lead consultant or project manager include San Diego City Employees Retiree Medical Trust, San Diego County Public Safety Retiree Medical Trust, San Diego City Employees' Retirement System (Pension), City of Kansas City, Missouri Employees Retirement System (Pension), City of Kansas City, Missouri Firefighters Pension System (Pension), Jackson County Missouri Revised Pension Plan (Pension), City of San Jose Federated City Employees Retirement System (Pension & OPEB), The City of San Jose Police and Fire Department Plan (OPEB), and Merced County Employees' Retirement Association (OPEB).

Jacqui is an Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries and an Enrolled Actuary under ERISA. She graduated from Purdue University with a Bachelors of Science in Actuarial Science and Statistics, in 2004.

**Michael Moehle, FSA, FCA, MAAA, EA**  
**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 previously worked at the City of San Jose Retirement Services in California as the retirement investment officer and in-house actuary and consultant. Before joining the City of San José, he was a principal and senior consultant with a large national benefits consulting firm in California, where he served as consultant with several California 1937 Act County Retirement Systems and multiple statewide public employees retirement systems in Nevada, North Dakota, Minnesota and Washington, where he provided funding valuations and GASB 25, 27, 43 and 45 valuations and disclosures, as well as analysis and consulting regarding plan changes and plan alternatives.

He joined Cheiron in July 2011.

He is a Fellow of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, a Member of the American Academy of Actuaries, and an Enrolled Actuary under ERISA.

He graduated with a B.S. with a double major in Mathematics and Economics from Southern Illinois University.

**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. is the current provider of 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 in terms of our ability to do the requested work for HPRS and further have confirmed with STRS that they have no concerns with us providing these services to HPRS.



## 4.4. REFERENCES

#### 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 your 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 and address of client;
- Name and telephone number of individual in the client organization who is familiar with the work; and
- Description of the work performed.

<b>Client:</b>	<b>State Teachers Retirement System of Ohio</b>
<b>Service Dates:</b>	2018 – present
<b>Contact:</b>	Brian Grinnell, Chief Actuary 275 East Broad Street Columbus, OH 43215 614-227-4025
<b>Description of Work:</b>	Ongoing pension and OPEB actuarial services, and special studies as requested

<b>Client:</b>	<b>California State Teachers’ Retirement System (CalSTRS)</b>
<b>Service Dates:</b>	2016 – present
<b>Contact:</b>	David Lamoureux, Deputy System Actuary 100 Waterfront Place West Sacramento, CA 95605 916-414-1303
<b>Description of Work:</b>	Full replication of 2015-2018 experience study; full replication of the Defined Benefit Program, CB Benefit, MPP and DBS valuations as of June 30, 2019; full replication of the Supplemental Benefit Maintenance valuation as of June 30, 2014

<b>Client:</b>	<b>Illinois Office of the Auditor General</b>
<b>Service Dates:</b>	2012 – present
<b>Contact:</b>	Joe Butcher, Audit Manager Iles Park Plaza, 740 East Ash Street Springfield, IL 62703 217-785-1502
<b>Description of Work:</b>	Review the valuation reporting, compliance with State minimum funding, conformance to actuarial standards or practice, appropriate application of assumptions and methods employed by the five statewide systems in support of the Auditor Generals annual report to the State Legislature

**Ohio State Highway Patrol Retirement System**

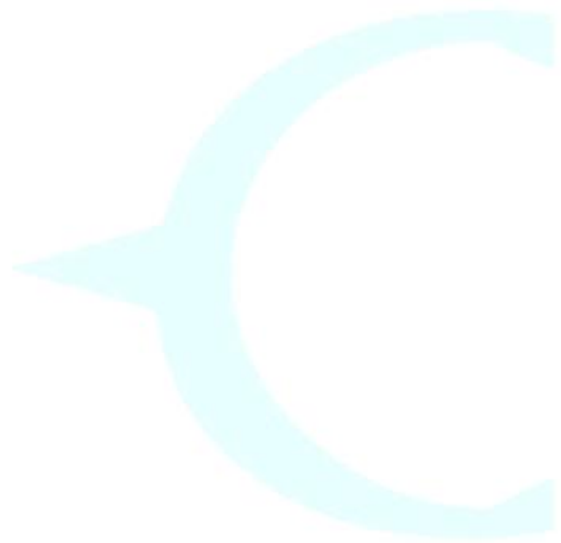
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<b>Client:</b>	<b>New York State Teachers Retirement System</b>
<b>Service Dates:</b>	2018 – present
<b>Contact:</b>	Mr. Richard Young, Actuary 10 Corporate Woods Drive Albany, NY 12211 518-447-2692
<b>Description of Work:</b>	Full replication and Level One audit of the June 30, 2018 NYSTRS Valuation Report. Included a review of assumptions (but not a replication) and methods.





## **4.5. METHODOLOGY, WORK PRODUCT, AND TIMELINE**

## 4.5 METHODOLOGY, WORK PRODUCT, AND TIMELINE

Each proposal shall describe the proposed methodology for each element of the components listed in Section II, 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.

In describing the proposed methodology, also identify the type and level of assistance that you anticipate will be needed from the staff of HPRS and the consulting actuary, including: assistance to understand the operations and records of HPRS; 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 HPRS 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.

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

Cheiron will request the original census data from HPRS that was provided to Foster & Foster. Cheiron will also request from Foster & Foster 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 Foster & Foster 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 HPRS. 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*.

2. ***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 HPRS's 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 specified above and will consider all of the following:

- Relevant Actuarial Standards of Practice (ASOPs): These include primarily, ASOP No. 4 (*Measuring Pension Obligations*), 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 Actuarial Asset Methods for Pension Valuations*).
- GASB Statements No. 74 and 75 (formerly known as 43, 45), 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 HPRS 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 Foster & Foster 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 HPRS. These projections are useful to further improve your understanding of the risks associated with your plan and make prudent and informed decisions. For this purpose we will request a full payout projection of the current participants of HPRS from Foster & Foster to allow us to reflect projected benefit cash flow.

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*

*P-Scan* is our proprietary software that provides long-term pension plan forecasting of assets and liabilities based on any user selected economic scenario. In addition we can enhance our standard product to include any other projections required, for example, GASB figures and model 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.

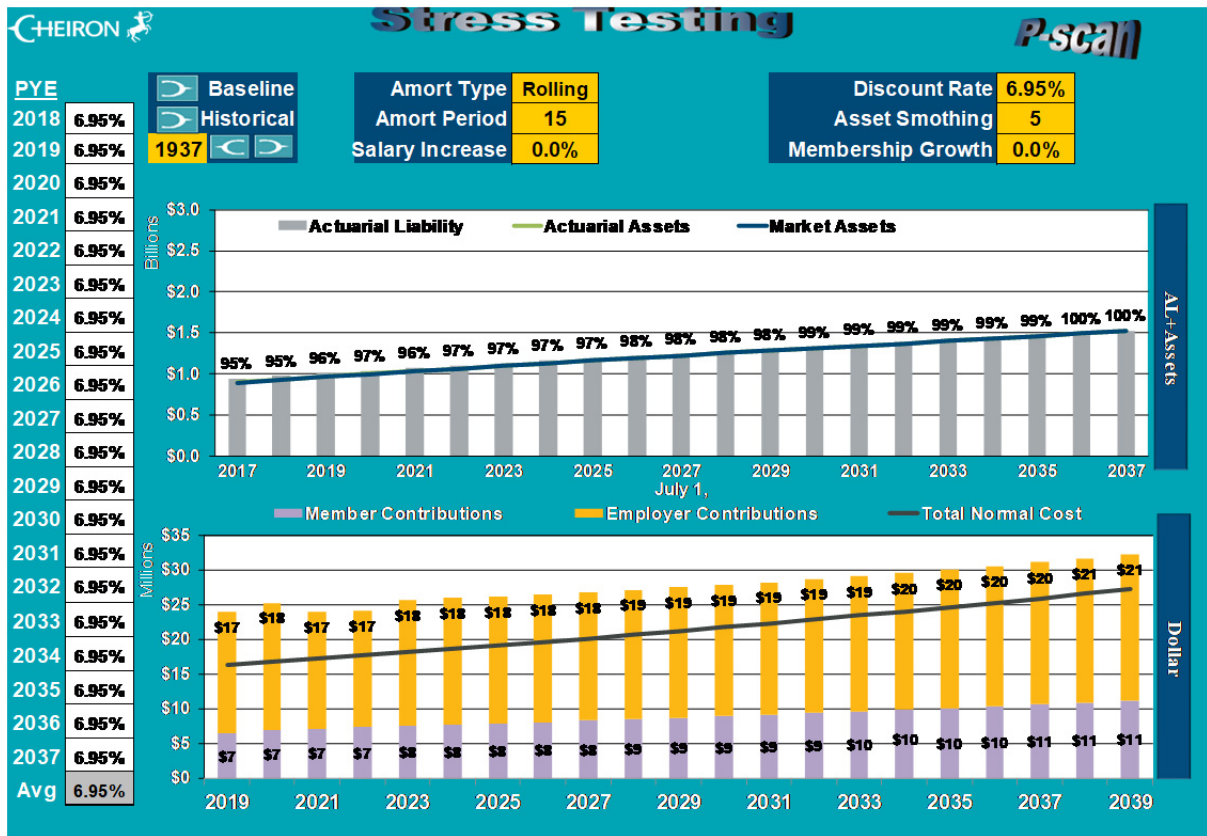
For plan reviews, audits and replications the *P-Scan* modeling can demonstrate the effectiveness of the funding methods and assumptions in meeting explicit or implicit funding policies of the system. The modeling can also easily demonstrate the long-term implications in changing such policies or responding 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.

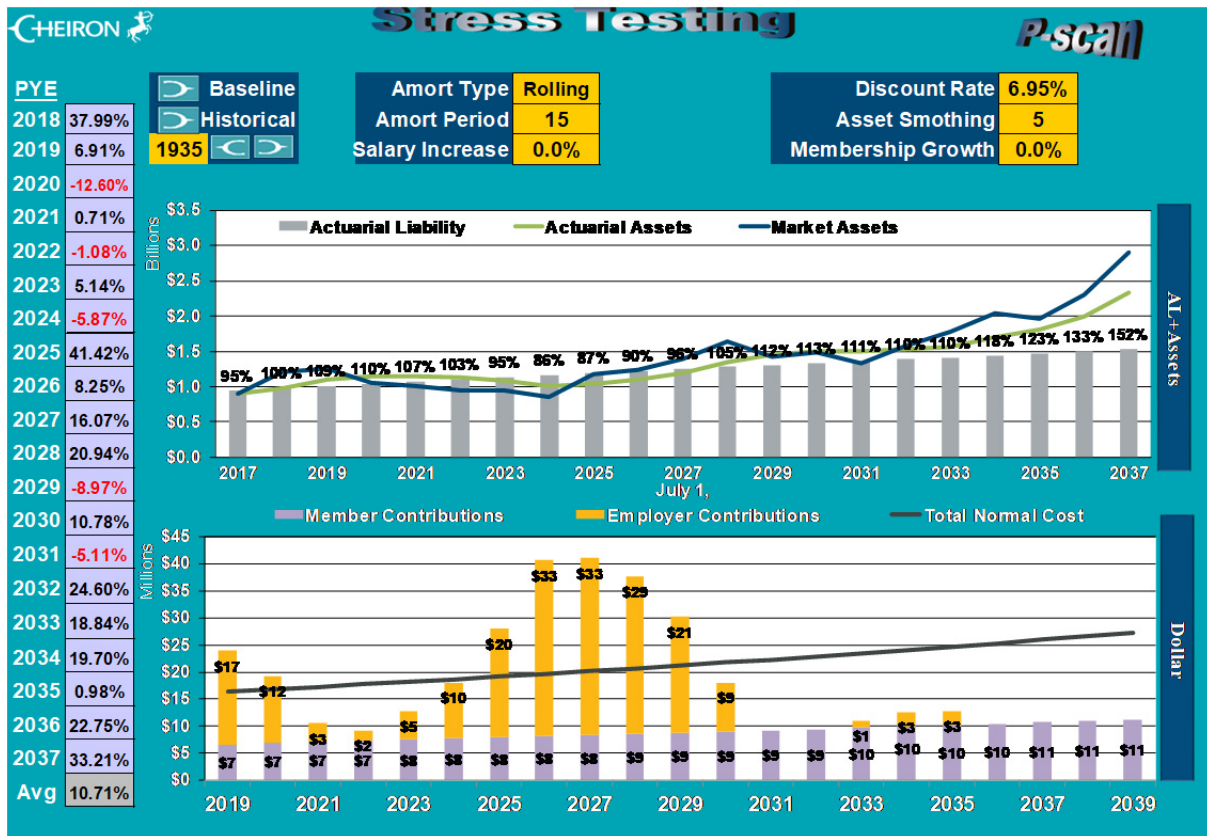
The boxes across the top represent variables tailored for the retirement system or benefit plan and programmed into the model that we update based on suggestions from members of the ORSC or Staff during the presentation. For example, we can program discount rate changes, salary scale changes, or benefit changes for current and/or future members. In this particular example, the variables available include the amortization methodology, the discount rate, asset smoothing method, and changes in expected membership growth.

The top graph shows the projected actuarial liability (the gray bars) and the actuarial and market value of assets (green and blue lines). The numbers at the top of the bars represent the projected funded status. The bottom graph shows the projected contributions for both the members and the employer. The line on this graph represents the contribution attributable to the normal cost of the System compared to the bars representing the actuarially determined contribution in total.

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 6.95%.



We believe that communicating the potential risks in a system is fundamental to our work. This includes demonstrating the sensitivity to investment returns. The screenshot that follows shows the same Stress Test but using historical investment returns beginning in 1935. In other words, the investment return shown for FYE 2018 is actually the historical investment return for 1935 for a portfolio invested 70% in equities and 30% in bonds. This graphically demonstrates the sensitivity of both funded status and contribution benchmarks to varying return scenarios.



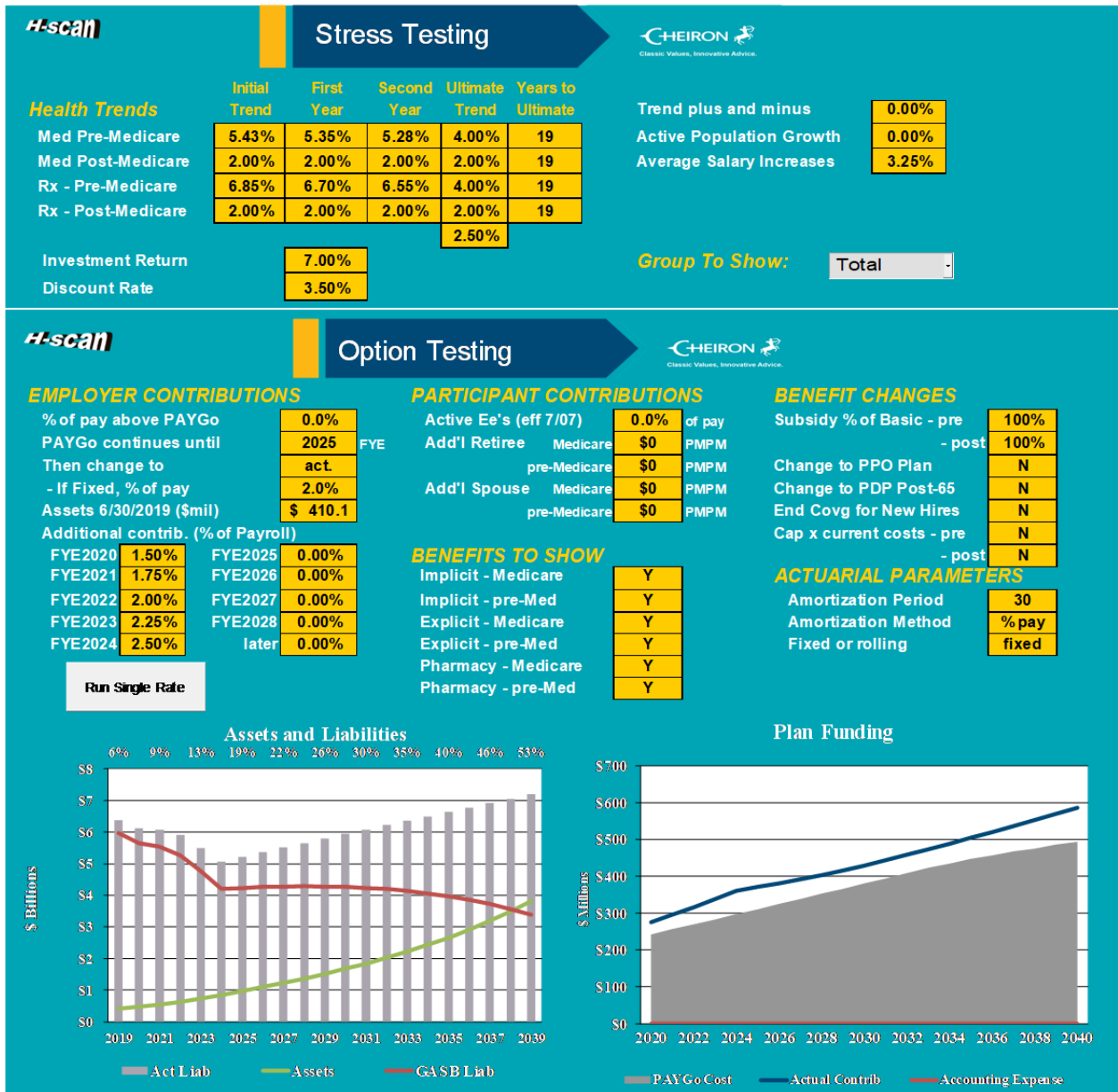
**Our H-Scan Interactive Model**

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

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.





3. **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 HPRS's experience; and are appropriate for HPRS's 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 HPRS 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.

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*), and 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.



4. ***Parallel Valuation*** - Perform parallel valuations of pension benefits as of January 1, 2020, and of retiree health care benefits as of January 1, 2020, 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 Foster & Foster and the final census data used in the valuations. We will review the procedures used by Foster & Foster 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 Foster & Foster. 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 Foster & Foster 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 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 Foster & Foster. We will then compare our calculated liabilities, including present value of future benefits, actuarial liability and normal cost, with the liabilities calculated by Foster & Foster. 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 Foster & Foster to provide full sample life output from their valuation systems on those individual test cases.

Some additional pension test cases will be selected for members who commenced benefits after the valuation date. For these test cases, we will request the sample life output from Foster & Foster and the final benefit calculation. By comparing the actual benefit calculation to the benefits valued, we can ensure that Foster & Foster's valuation is consistent with the manner in which the plan operates.

**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** – Given the actuarial liabilities and normal costs calculated by Foster & Foster and the market value of assets (including historical data for the past five years), we 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, must meet all applicable Actuarial Standards of 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 HPRS 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 HPRS 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.

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

If in our review we identify any actuarial assumptions where we would recommend the OSRC 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.

- 6. Review of Health Care** - *Assessment of whether the system appropriately and consistently determines retiree contributions to health care and whether the implementation of the HPRS's 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.)

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 would report the potential impact of making changes on both the retirees and on the system.

Please see Appendix A 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. In many of our actuarial audits, the time line is more compressed than for this audit, so some of the steps could be shortened. Please refer to Section 4.6 following this section regarding our general philosophy in conducting an actuarial audit. The date at which the work will start will be based on when the contract is awarded and finalized.

1. Initial planning meeting, request data from HPRS and 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. Presentation of draft Results – Week 11
7. Presentation of final results – Week 12
8. Various educational briefings – as scheduled



## 4.6. ADDITIONAL INFORMATION

#### 4.6 ADDITIONAL INFORMATION

**Each proposal shall include any additional information that might be helpful to gain an understanding of the proposal. This may include diagrams, excerpts from reports, or other explanatory documentation that would clarify and/or substantiate the proposal. Any material included here should be specifically referenced elsewhere in the proposal.**

The typical actuarial valuation process contains elements that are very objective and analytical as well as elements which are subjective and require a great degree of judgment. For the former, the actuarial audit approach is fairly straightforward – that is, we need to numerically check the results. This includes the data checks and review of test lives.

For the judgmental portion of the valuation, such as review of methods and assumptions, our objective will be to determine whether the consulting actuary used a reasonable approach in developing such methods and assumptions. There may be instances where we might have reached a different conclusion and made a different recommendation, but we will not attempt to substitute our judgment for the judgment of the consulting actuary. However, there may be areas where we believe a fresh look is appropriate and we will cover these within our report as suggestions for improvement.

We believe that communication between the parties is essential to a successful actuarial audit. Within our typical audit process, we will schedule periodic conference calls between the ORSC, HPRS, and the consulting actuary. This way concerns can be handled early on in the process rather than after the issuance of a draft or final audit report.



## 4.7. GLOSSARY

## 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.**

**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.

**Actuarial Assumptions** - Assumptions with regard to the occurrence of future events. Actuarial assumptions are normally classified as demographic assumptions (such as turnover, retirement or mortality) or economic assumptions (such as investment return, inflation or salary growth).

**Actuarial Cost Method** - The procedure for allocating actuarial present values to time periods and to determine current year required contributions or expense.

**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.

**Actuarial Valuation Method** - The general procedures of allocating cost within an actuarial valuation. The actuarial valuation method includes the actuarial cost method and the actuarial asset method.

**GASB** - Governmental Accounting Standards Board which issues statements regarding accounting standards for state and local governments.

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

**P-Scan** - Cheiron's proprietary projection software for pension plans. *P-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.

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





## 4.8. COST INFORMATION

#### 4.8 COST INFORMATION

The pricing summary should include a breakdown of costs per element listed in Section II, 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 conduct the audit and must include a “not to exceed” figure.

The following is our best estimate and not to exceed fee and includes all expenses.

- Full Scope Actuarial Audit:

	<u>Actuarial Valuation</u>							Review of Health Care	Est. Hours	Total
	Est. Hourly Rate	Data Validity	Methods & Procedures	Assumptions	Parallel Valuation	Recommendations				
Principal Consulting Actuaries	\$ 400	-	10	15	10	25	5	65	\$ 26,000	
Consulting Actuaries	\$ 375	5	5	10	40	-	25	85	\$ 31,875	
Associate Actuaries	\$ 245	5	10	20	25	-	-	60	\$ 14,700	
Senior Actuarial Analysts	\$ 205	-	-	10	10	-	-	20	\$ 4,100	
Actuarial Analysts	\$ 175	10	-	-	5	-	-	15	\$ 2,625	
Administrative Staff	\$ 111	-	---	-	10	-	-	10	\$ 1,110	
		20	25	55	100	25	30	255	\$ 80,410	

Includes travel, data processing costs and materials.

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.

**Ohio State Highway Patrol Retirement System**

**RFP for Actuarial Audit Services**

**June 17, 2021**

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2021 hourly rates:

<b>Category/Consultant</b>	<b>2021 Hourly Rate*</b>
Principal Consulting Actuaries	\$377 – \$515
Consulting Actuaries	\$285 – \$450
Associate Actuaries	\$191 – \$295
Senior Actuarial Analysts	\$180 – \$225
Actuarial Analysts	\$152 – \$196
Administrative Staff	\$107 – \$118

\* Hourly billing rates are expected to increase annually based on CPI-U, to cover the increase in inflation.

*Appendix A*

*Sample Actuarial Audit Report*

# **Los Angeles City Employees' Retirement System**

**Audit of the June 30, 2019  
Actuarial Valuation, and  
Review of the Experience Study  
(July 1, 2014 through June 30, 2017)**

**Produced by Cheiron**

**April 2020**

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***Via Electronic Mail***

April 8, 2020

The Audit Committee and the Board of Administration  
Los Angeles City Employees' Retirement System  
202 W. First Street, Suite 500  
Los Angeles, CA 90012-4401

Members of the Committee and the Board:

Cheiron is pleased to present the results of our actuarial audit of the June 30, 2019 Actuarial Valuation and Review of the Los Angeles City Employees' Retirement System (LACERS) and the July 1, 2014 through June 30, 2017 Experience Study performed by Segal Consulting (Segal). We would like to thank Segal for providing us with information and explanations that facilitated the actuarial audit process and ensured that our findings are accurate and benefit LACERS.

We direct your attention to the executive summary section of our report that highlights the key findings of our review. The balance of the report provides details in support of these findings along with supplemental data, background information, and discussion of the process used in the evaluation of the work performed by Segal.

In preparing our report, we relied on information (some oral and some written) supplied by LACERS and Segal. This information includes, but is not limited to, actuarial assumptions and methods adopted by LACERS, the plan provisions, employee data, and financial information.

We performed an informal examination of the obvious characteristics of the data for reasonableness in accordance with Actuarial Standard of Practice No. 23. A detailed description of all information provided for this review is provided in the body of our report.

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.

Members of the Board  
Los Angeles City Employees' Retirement System  
April 8, 2020  
Page ii

This report was prepared exclusively for the Los Angeles City Employees' Retirement System for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other users.

Sincerely,  
Cheiron

Anne D. Harper, FSA, MAAA, EA  
Principal Consulting Actuary

Graham A. Schmidt, ASA, FCA, MAAA, EA  
Consulting Actuary

James A. Summers, FSA, MAAA  
Consulting Actuary



**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION I – EXECUTIVE SUMMARY**

**Scope of Assignment**

Cheiron performed a complete independent replication of the LACERS June 30, 2019 Actuarial Valuations for the Retirement Plan and the Other Postemployment Benefits. We reviewed the census data provided by LACERS staff, and compared it to the information used by Segal in their valuations. We then performed a full parallel valuation, including the calculation of the projected benefits, Actuarial Liability, and normal cost for all LACERS members, and compared the results to those shown in Segal's actuarial valuation report.

Additionally, Cheiron performed a review of the assumptions and actuarial methods recommended by Segal in the Actuarial Experience Study covering the period from July 1, 2014 to June 30, 2017.

The basic objectives of our review are to answer three questions:

1. Given the assumptions applied, are the valuation results (benefit flows, liabilities, and actuarial costs) accurate?
2. Are the valuation results based upon reasonable actuarial assumptions and methods, and are they in full compliance with Actuarial Standards of Practice (ASOPs)?
3. Is the actuarial information being provided to LACERS comprehensive? Does the LACERS Board have the information required to assess the present and future financial status of the Plans?

Our review included an analysis of each of the following:

- We collected both raw member data from LACERS and edited data from Segal. We performed an independent analysis on the raw data to confirm the member information used in the actuarial valuations.
- We reviewed and evaluated the actuarial methods and assumptions displayed in the valuation reports, and reviewed the results and recommendations made in the last experience study.
- We independently determined plan liabilities, assets and costs, and compared them to those presented in the valuation reports and in separate detailed results provided to us by Segal.
- In addition to the assets, liabilities, and costs shown in the valuation reports, we also reviewed the content of the reports for completeness and compliance with Actuarial Standards of Practice.

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION I – EXECUTIVE SUMMARY**

This audit provides LACERS confirmation that:

- The results reported by Segal can be relied upon,
- Segal's actuarial valuation report, assumptions and methods comply with Actuarial Standards of Practice (ASOP), and
- The communication of the actuarial valuation results is complete and reasonable.

**Key Findings and Recommendations**

The main findings of our review are as follows:

1. As a result of our efforts, we are able to confirm that the liabilities and costs computed in the valuations as of June 30, 2019 are materially accurate and were computed in accordance with generally accepted actuarial principles. For the scope of this audit, materiality means the results in the aggregate are within industry standards of plus or minus 5%.
2. We have reviewed the economic and demographic assumptions recommended in the most recent Actuarial Experience Study presented by Segal. We have found them to be reasonable and in accordance with generally accepted actuarial principles. In particular, we support Segal's recommendation to reduce the inflation assumption from 3.00% to 2.75% and the discount rate from 7.25% to 7.00%. We also support their recommendation of a change to use generational mortality assumptions. However, we strongly suggest Segal review the methodology used to analyze the mortality assumption for the base tables.

Our primary recommendations are related to the assumptions, and are summarized as follows:

- Cheiron determined the demographic assumptions proposed in Segal's Experience Study to be generally reasonable and in compliance with acceptable standards of actuarial practice. However, we have a few recommendations Segal should consider at the time of the next experience study:
  - We strongly suggest, similar to our recommendation in the June 30, 2012 actuarial audit, that Segal use a benefit-weighted approach to developing LACERS' mortality assumption.
  - Review the rates of vested terminated members retiring from reciprocal and non-reciprocal status when determining the likelihood of future terminating members establishing reciprocity and the newly terminated employees during the experience study period, rather than just basing the assumption on the percentage of all terminated members reporting reciprocity.
  - Disclose the number of exposures, actual and expected decrements, and the actual-to-expected ratios for each of the demographic assumptions. Providing this information will also allow better assessment of what credibility to give the observed experience versus the rates developed based on the historical experience.

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION I – EXECUTIVE SUMMARY**

- Overall, the economic assumptions proposed in Segal’s review represent a reasonable set of assumptions. However, we have two comments – explained in detail later in our report – related to the “risk adjustment” and active management expense methodologies that Segal employs in developing their recommendations for the assumed rate of return. We note that accounting for these two issues will tend to push the recommended rate in opposite directions, and will thus offset each other. Accordingly, we still consider the rate recommended by Segal (7.0%) to be a reasonable assumption.
- We commend Segal for including projections of the outstanding balance of the Unfunded Actuarial Liability (UAL) and UAL payment projections on pages 54-55 of the valuation report. However, we suggest that Segal also include projections of the employer contribution rate and funded status in their report to help the LACERS Board and stakeholders understand the dynamics of their actuarial funding policies and the impact of the new benefit tiers on the future costs of the system.
- We recommend a longer grading period for the medical trends to reach the ultimate level such as what can be developed using the Getzen Model of Long-Run Medical Cost Trends published by the Society of Actuaries. Additional details supporting this change in health trend setting methodology are provided in Section V, Review of Actuarial Methods.

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION II – REVIEW OF RETIREMENT VALUATION RESULTS**

**Valuation Procedures**

Overall, we find that the June 30, 2019 actuarial valuation procedures applied in the reporting of the funded status and the determination of the funding requirements based on the current funding policies and adopted assumptions are technically reasonable and conform to the ASOPs. Using the same actuarial assumptions and methods, census data, and plan provisions from the June 30, 2019 valuation report, we independently calculated the valuation results below:

- Present value for future benefits
- Actuarial Liability
- Unfunded Actuarial Liability
- Normal cost
- Contributions as a dollar amount and as a percentage of payroll

**Valuation Results**

Our independent replication of the June 30, 2019 actuarial valuation found no material difference in calculations of plan liabilities, normal costs, Actuarial Value of Assets, and overall contribution rates from the amounts calculated by Segal based on the adopted assumptions and methods. There is an industry standard when performing audits that results should be within 5.0% to allow for differences in valuation systems and differences in methodology approaches.

Our replication of the measures of retirement plan liabilities and costs is summarized in Table II-1 below. We note that all results are within 5% of Segal's calculation. Consequently, we conclude that the valuation prepared by Segal for LACERS as of June 30, 2019 is reasonable and can be relied on by the Board for its intended purpose.

<b>Table II-1 Retirement Plan Valuation Results as of June 30, 2019</b>			
	<b>Segal</b>	<b>Cheiron</b>	<b>Ratio</b>
Present Value of Future Benefits	\$ 23,735,641,420	\$ 23,733,525,494	100%
Actuarial Liability	\$ 20,793,421,143	\$ 20,779,001,429	100%
Valuation Value of Assets (VVA)	<u>14,818,564,427</u>	<u>14,818,564,427</u>	100%
Unfunded Actuarial Liability (UAL)	\$ 5,974,856,716	\$ 5,960,437,002	100%
Funded Ratio on VVA basis	71.3%	71.3%	100%
<b>Contribution Rate by Component (BOY)</b>			
Net Employer Normal Cost	6.23%	6.07%	97%
UAL Payment Rate	<u>18.33%</u>	<u>18.26%</u>	100%
Total Employer Contribution	24.56%	24.34%	99%

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION II – REVIEW OF RETIREMENT VALUATION RESULTS**

To confirm that the match is close across all Tiers, we show a comparison of the Retirement Plan liabilities for each Tier below in Tables II-2 and II-3. We note that all results are within the 5% threshold for the total Retirement Plan, Tier 1, and Tier 1 Enhanced Benefits for APO.

<b>Table II-2</b>						
<b>Retirement Plan Liabilities as of June 30, 2019</b>						
(\$ in millions)						
	Tier 1			Tier 1 APO Enhanced Benefits		
	Segal	Cheiron	Ratio	Segal	Cheiron	Ratio
Present Value of Future Benefits						
Inactive members	\$ 12,061.5	\$ 12,054.9	100%	\$ 69.2	\$ 69.0	100%
Active members	<u>10,670.3</u>	<u>10,682.3</u>	100%	<u>321.4</u>	<u>322.7</u>	100%
Total	\$ 22,731.9	\$ 22,737.2	100%	\$ 390.6	\$ 391.7	100%
Actuarial Liability						
Inactive members	\$ 12,061.5	\$ 12,054.9	100%	\$ 69.2	\$ 69.0	100%
Active members	<u>8,338.5</u>	<u>8,343.9</u>	100%	<u>239.4</u>	<u>242.7</u>	101%
Total	\$ 20,400.0	\$ 20,398.8	100%	\$ 308.6	\$ 311.7	101%
Present Value of Future Normal Cost	\$ 2,331.9	\$ 2,338.4	100%	\$ 81.9	\$ 80.0	98%

<b>Table II-3</b>						
<b>Retirement Plan Liabilities as of June 30, 2019</b>						
(\$ in millions)						
	Tier 3			Total Retirement Plan		
	Segal	Cheiron	Ratio	Segal	Cheiron	Ratio
Present Value of Future Benefits						
Inactive members	\$ 6.0	\$ 6.0	100%	\$ 12,136.7	\$ 12,129.9	100%
Active members	<u>607.2</u>	<u>598.6</u>	99%	<u>11,598.9</u>	<u>11,603.6</u>	100%
Total	\$ 613.2	\$ 604.6	99%	\$ 23,735.6	\$ 23,733.5	100%
Actuarial Liability						
Inactive members	\$ 6.0	\$ 6.0	100%	\$ 12,136.7	\$ 12,129.9	100%
Active members	<u>78.8</u>	<u>62.5</u>	79%	<u>8,656.7</u>	<u>8,649.1</u>	100%
Total	\$ 84.8	\$ 68.5	81%	\$ 20,793.4	\$ 20,779.0	100%
Present Value of Future Normal Cost	\$ 528.4	\$ 536.1	101%	\$ 2,942.2	\$ 2,954.5	100%

We note that the calculation of the Tier 3 Actuarial Liability for active members is 21% lower than Segal's calculation. It is not unusual for there to be differences in the allocation of the total present value of benefits into past and future amounts (the Actuarial Liability and present value of future normal costs, respectively) due to the different valuation systems and minor differences

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION II – REVIEW OF RETIREMENT VALUATION RESULTS**

in programming, particularly for groups like Tier 3 where the members have low levels of service. We are not concerned with these differences if they offset each other (where Cheiron's present value of future normal cost for Tier 3 shown in Table II-3 above are higher than Segal's, but our Actuarial Liability for Tier 3 in Table II-3 are lower) and when the projected value of benefits match is so close (within 1%), as it is in our analysis.

Our replication of the employer contribution amounts and rates by Tier is shown below in Table II-4. All calculations are assuming contributions are payable at the beginning of the year. We note that the total employer rates by Tier are all within the 5% threshold.

<b>Table II-4 Retirement Plan Contribution Comparison as of June 30, 2019 (\$ in millions)</b>						
	<b>Segal</b>		<b>Cheiron</b>		<b>Ratio</b>	
	Amount	% of Payroll	Amount	% of Payroll	Amount	% of Payroll
<b>Total Retirement Plan</b>						
Total Normal Cost	\$ 375.0	16.85%	\$ 371.8	16.69%	99%	99%
Expected Employee Contributions	<u>236.3</u>	<u>10.62%</u>	<u>236.5</u>	<u>10.62%</u>	100%	100%
Employer Normal Cost	\$ 138.6	6.23%	\$ 135.2	6.07%	97%	97%
UAL Payment Rate	<u>407.9</u>	<u>18.33%</u>	<u>406.7</u>	<u>18.26%</u>	100%	100%
Total Employer Contribution	\$ 546.5	24.56%	\$ 542.0	24.34%	99%	99%
<b>Tier 1</b>						
Total Normal Cost	\$ 324.8	17.30%	\$ 320.6	17.07%	99%	99%
Expected Employee Contributions	<u>199.4</u>	<u>10.63%</u>	<u>199.6</u>	<u>10.62%</u>	100%	100%
Employer Normal Cost	\$ 125.4	6.67%	\$ 121.1	6.44%	97%	97%
UAL Payment Rate	<u>344.1</u>	<u>18.33%</u>	<u>343.2</u>	<u>18.26%</u>	100%	100%
Total Employer Contribution	\$ 469.5	25.00%	\$ 464.2	24.71%	99%	99%
<b>Tier 3</b>						
Total Normal Cost	\$ 50.2	14.42%	\$ 51.1	14.69%	102%	102%
Expected Employee Contributions	<u>36.9</u>	<u>10.62%</u>	<u>37.0</u>	<u>10.62%</u>	100%	100%
Employer Normal Cost	\$ 13.2	3.80%	\$ 14.2	4.07%	107%	107%
UAL Payment Rate	<u>63.8</u>	<u>18.33%</u>	<u>63.6</u>	<u>18.26%</u>	100%	100%
Total Employer Contribution	\$ 77.0	22.13%	\$ 77.8	22.34%	101%	101%

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION II – REVIEW OF RETIREMENT VALUATION RESULTS**

**Census Data**

The LACERS Staff and Segal provided us with the data that was used in the June 30, 2019 actuarial valuation. We reviewed the information in both files and find that the data used in the valuation is valid, complete, and contains the necessary data elements for purposes of performing the actuarial valuation of LACERS.

We also find that the methods and requirements provided in the Actuarial Standard of Practice No. 23 *Data Quality* have been adhered to, to the extent applicable for the valuation of pension plan obligations.

In Table II-5 below and Table II-6 on the following page, we compare the raw June 30, 2019 data file provided by LACERS to Segal's processed data file and found only very minor differences between the files.

<b>Table II-5 Retirement Plan Active Member Data as of June 30, 2019</b>			
	<b>Segal</b>	<b>Cheiron</b>	<b>Ratio</b>
<b>Tier 1 Active Members</b>			
Total Number	21,226	21,226	100.0%
Average Age	49.6	49.6	99.9%
Average Service	16.2	16.2	100.0%
Projected Compensation	\$1,877,504,719	\$1,878,856,066	100.1%
Average Compensation	\$88,453	\$88,517	100.1%
<b>Tier 3 Active Members</b>			
Total Number	5,406	5,406	100.0%
Average Age	37.0	37.0	100.1%
Average Service	1.6	1.6	101.3%
Projected Compensation	\$347,908,112	\$348,124,794	100.1%
Average Compensation	\$64,356	\$64,396	100.1%

**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION II – REVIEW OF RETIREMENT VALUATION RESULTS**

<b>Table II-6 Retirement Plan Data Summary as of June 30, 2019</b>			
	<b>Segal</b>	<b>Cheiron</b>	<b>Ratio</b>
<b>Active Members</b>			
Total Number	26,632	26,632	100.0%
Average Age	47.0	47.0	100.0%
Average Service	13.2	13.2	100.3%
Projected Compensation	\$2,225,412,831	\$2,226,980,860	100.1%
Average Compensation	\$83,562	\$83,620	100.1%
Account Balances	\$2,266,740,475	\$2,268,676,978	100.1%
<b>Service Retirees</b>			
Total Number	15,165	15,168	100.0%
Average Age	71.9	71.8	99.9%
Average Monthly Benefit	\$4,489	\$4,493	100.1%
<b>Disabled Retirees</b>			
Total Number	888	888	100.0%
Average Age	67.1	67.0	99.9%
Average Monthly Benefit	\$1,762	\$1,762	100.0%
<b>Beneficiaries</b>			
Total Number	3,981	3,980	100.0%
Average Age	76.3	76.3	100.0%
Average Monthly Benefit	\$2,342	\$2,341	100.0%
<b>Vested Terminated Members</b>			
Total Number	8,588	8,647	100.7%
Average Age	44.5	44.5	100.0%

### **Plan Provisions**

We compared the summary of plan provisions shown in Section 4, Exhibit II of Segal's June 30, 2019 Valuation Report to the benefits in Division 4, Chapter 10 of the Los Angeles City Administrative Code. In general, the plan provisions shown in Segal's exhibit match what is in the Administrative Code, and based on our close match of the Segal liabilities as part of our parallel valuation, we conclude that Segal has appropriately reflected these provisions in the actuarial valuation.



**ACTUARIAL AUDIT REPORT OF THE  
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM**

**SECTION III – REVIEW OF HEALTH VALUATION RESULTS**

**Valuation Procedures**

Overall, we find that the June 30, 2019 actuarial valuation procedures applied in the reporting of the funded status and the determination of the funding requirements based on the current funding policies and adopted assumptions are technically reasonable and conform to the ASOPs. This is based on our review of: the valuation report, the census data used in the valuation, and our parallel valuation using the information described above.

**Valuation Results**

Our independent replication of the June 30, 2019 actuarial valuation found no material difference in calculations of plan liabilities, normal costs, Actuarial Value of Assets, and overall contribution rates from the amounts calculated by Segal based on the adopted assumptions and methods. We note that all results are within 5% of Segal's calculation. See Table III-1 below. Consequently, we conclude that the valuation prepared by Segal for LACERS as of June 30, 2019 is reasonable and can be relied on by the Board for its intended purpose.

<b>Table III-1</b>			
<b>OPEB Plan Valuation Results as of June 30, 2019</b>			
	<b>Segal</b>	<b>Cheiron</b>	<b>Ratio</b>
Present Value of Future Benefits	\$ 3,981,517,502	\$ 3,988,484,334	100%
Actuarial Liability	\$ 3,334,298,549	\$ 3,342,852,146	100%
Valuation Value of Assets (VVA)	<u>2,812,661,894</u>	<u>2,812,661,894</u>	100%
Unfunded Actuarial Liability (UAL)	\$ 521,636,655	\$ 530,190,252	102%
Funded Ratio on VVA basis	84.4%	84.1%	100%
<b>Contribution by Component</b>			
<i>Dollar Amount (BOY)</i>			
Net Employer Normal Cost	\$ 76,422,769	\$ 77,742,638	102%
UAL Payment Rate	<u>23,236,922</u>	<u>23,236,922</u>	100%
Total Employer Contribution	\$ 99,659,691	\$ 100,979,560	101%
<i>Rate as % of Payroll (BOY)</i>			
Net Employer Normal Cost	3.43%	3.49%	102%
UAL Payment Rate	<u>1.04%</u>	<u>1.04%</u>	100%
Total Employer Contribution	4.47%	4.53%	101%

The OPEB plan benefits are the same for members in Tier 1 and Tier 3, and thus we have not shown the detail by Tier as was shown for the retirement plan benefits.

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**SECTION III – REVIEW OF HEALTH VALUATION RESULTS**

**Census Data**

The LACERS Staff and Segal provided us with the data that was used in the June 30, 2019 actuarial valuation. We reviewed the information in both files and find that the data used in the valuation is valid, complete, and contains the necessary data elements for purposes of performing the actuarial valuation of LACERS.

We also find that the methods and requirements provided in the Actuarial Standard of Practice No. 23 *Data Quality* have been adhered to, to the extent applicable for the valuation of other postemployment benefit obligations.

In Table III-5 below, we compare the raw June 30, 2019 inactive data file provided by LACERS to Segal’s processed data file and found only very minor differences between the files. The active member data is the same as the retirement plan data.

<b>Table III-2 OPEB Inactive Data Summary as of June 30, 2019</b>			
	<b>Segal</b>	<b>Cheiron</b>	<b>Ratio</b>
<b>Retirees</b>			
Number of Non-Disabled	13,609	13,546	99.5%
Number of Disabled	334	330	98.8%
Total Number	13,943	13,876	99.5%
Average Age	71.9	71.9	100.0%
<b>Beneficiaries</b>			
Total Number	1,848	1,809	97.9%
Average Age	79.6	79.6	99.9%
<b>Vested Terminated Members</b>			
Total Number	1,474	1,528	103.7%
Average Age	50.9	50.9	100.1%

Segal excludes 54 deferred disabled members from their inactive member count of 1,474 at June 30, 2019 on page 17 of the OPEB valuation report. Deferred disableds do not receive a retiree health subsidy until age 55. The 54 are identified when they reconcile to the pension data on page 20 of the report. Segal assured us that they include their deferred benefit in the valuation. We suggest Segal consider whether the counts on page 17 should be adjusted in future reports to reflect these deferred members if they are being included in the valuation liabilities.

Also on page 20 of the OPEB valuation report, there are members for each valuation status that are “eligible for future health benefits” that are subtracted from the pension valuation counts to arrive at the health valuation counts. We recommend that Segal make a similar consideration as to whether these members should be included in the status counts if a liability is valued for these members.

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**SECTION III – REVIEW OF HEALTH VALUATION RESULTS**

There are several footnotes in the OPEB and GASB 74 report documenting that “other losses include the recognition for the first time of the liability for about 250 retirees receiving a premium reimbursement for health plans not sponsored by LACERS. Data for those retirees are not included in the regular retiree membership data as members receiving a medical subsidy from LACERS, and were provided separately for the first time for this valuation.” We recommend Segal clarify whether this is specifically referring to the Medical Premium Reimbursement Program (MPRP), which does receive annual mention regarding Medicare Part B premium reimbursement. We also believe it would be helpful if Segal indicated how much of the Chart 2, row 8, \$38,443,686 in other losses is attributable to this first time update. Segal indicated the retiree counts in the current report included this group of about 250 members.

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SECTION IV – REVIEW OF ACTUARIAL ASSUMPTIONS

## Demographic Assumptions

The June 30, 2019 actuarial valuation was based on the assumptions adopted by the LACERS Board, based on recommendations made by Segal in the actuarial experience study covering the three-year period ending June 30, 2017.

### *Mortality*

Segal recommended that LACERS adopt a new approach for developing mortality assumptions based on the generational projection of mortality improvements, which is step #4 in the building blocks for developing mortality assumptions typically used by most actuaries.

1. Select a standard mortality table based on experience most closely matching the anticipated experience of the System.
2. Compare the actual experience of the System to that predicted by the selected standard table for the period of the experience study.
3. Adjust the standard table, either fully or partially, depending on the level of credibility for the System's experience. This adjusted table is called the base table.
4. Select an appropriate standard mortality improvement projection scale and apply it to the base table.

We strongly support the recommended change to the generational mortality approach. However, we have issues with the application of steps #1-3 in Segal's experience study.

### *Benefit vs. Headcount-Weighted*

Our issues with steps #1 and #2 are related, and have to do with the fact that mortality studies in the U.S. have consistently shown that higher income individuals have longer life expectancies than lower income individuals. Because higher income individuals also typically have higher pension benefit amounts, it is important for a pension plan to use assumptions that are weighted to reflect the impact on liability. Otherwise, the mortality assumptions could accurately predict the number of deaths at each age, but still underestimate the liabilities, if the higher-benefit members are outliving the lower-benefit members.

Segal briefly mentioned the benefit-weighted approach in their experience study report and stated that the "RP-2014 benefit-weighted mortality tables were prepared without any data from public and multi-employer pension plans" as their justification for not using the standard RP-2014 Tables, which are benefit-weighted. However, the headcount-weighted RP-2014 Tables were also developed without any data from public and multi-employer pension plans.

The report published by the Retirement Plans Experience Committee (RPEC) that accompanied the release of the RP-2014 tables clearly states, "*For the measurement of most pension obligations, tables weighted by benefit amount generally produce the most appropriate results.*"

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The report also describes a number of applications in which headcount-weighted tables may produce more accurate results, including estimates of average age at death, projections of retirement populations, and the measurement of OPEB plan obligations; the list of exceptions did not include the measurement of liabilities in traditional pay-related defined benefit plans.

One reason that RPEC recommends the use of the benefit-weighted tables for pension applications is that the behavior of the two tables are quite different: the mortality rates for the headcount-weighted tables are considerably higher at earlier ages, but gradually converge with the benefit-weighted rates at the highest ages. Using a headcount-weighted table will tend to overstate mortality rates in the early years of retirement, and understate it in later years, assuming the overall actual-to-expected ratio is close to 100% based on the number of deaths. Unless Segal has sufficient evidence to indicate that the pattern of mortality for LACERS looks closer to the headcount-weighted tables (measured on a liability-weighted basis), we believe the default should be to use a benefit-weighted table when a choice between such tables is available. Furthermore, in our audit of Segal's 2011 Experience Study, we had made the recommendation to consider examining the mortality experience weighted by benefit amounts rather than just participant counts for future studies.

The impact of using the standard benefit-weighted RP-2014 Annuitant and Employee Mortality Tables projected generationally with the MP-2017 improvement scale on the retirement plan would increase the Actuarial Liability by about \$254 million, and the funded ratio would decrease from 71.3% to 70.5%. In addition, the employer contribution rate for the retirement plan would increase by approximately 1.0% of payroll.

We commend Segal for highlighting longevity risk as a primary risk in their new Risk Assessment section of their June 30, 2019 actuarial valuation report. They recognized that longevity risk “can be reduced by using tables appropriate for the Plan (public experience tables) that are weighted by benefit levels...” But subsequently, in their Risk Assessment report published in February 2020, they say that “it is premature to estimate the impact of applying these new mortality tables (SOA's Pub-2010) on employer contribution rates until we perform the next triennial experience study.” The new Actuarial Standard of Practice (ASOP) No. 51 specifically addresses sensitivity testing, a process for measuring the impact of a change in an actuarial assumption, as a method for assessing risk. We note that Segal themselves included a sensitivity test related to the use of benefit-weighted mortality tables in their experience study report.

We disagree that providing a cost estimate of the impact of the newly released Society of Actuaries' public retirement plan mortality tables (Pub-2010) requires a full experience analysis, especially within the context of ASOP No. 51 and Segal's stand-alone Risk Assessment report. The SOA developed separate mortality tables based on whether the members were classified as general, safety, or teachers and are income-dependent (median income levels for general males and females are \$21,239 and \$11,872, respectively) and gender-based. In our professional judgment, using the General Above-Median mortality tables as a proxy for sensitivity testing is reasonable, given the nature of the System's participants and the average annual pension benefit for healthy annuitants is \$48,500 (more than double the median for male retirees only).

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The impact of using Pub-2010 General Above-Median group of mortality tables, projected generationally with the MP-2019 improvement scale (the most recent projection scale, released in the fall of 2019) would increase the Actuarial Liability by approximately \$519 million, and the funded ratio would decrease from 71.3% to 69.6%. In addition, the employer contribution rate for the retirement plan would increase by approximately 2.0% of payroll from the June 30, 2019 valuation results.

Based on the results under these two different sets of mortality tables – one correlated to LACERS' current headcount-weighted tables, and one based on public sector pension plan data for General members with a similar income profile – it is reasonable to conclude that a 1.0% to 2.0% of pay increase in the LACERS' employer contribution rate could result from moving from headcount-weighted to benefit-weighted mortality tables. The actual impact on the retirement plan will depend on LACERS' own mortality experience during the next experience study period.

***Credibility***

Very few pension plans have sufficient experience to develop their own mortality tables. Most plans instead adjust a standard table (step #3) to provide a reasonable match their own experience. However, with approximately 1000 deaths necessary for full credibility (defined by a 90% probability that the observed rate is within 5% of the true rate) and actual mortality rates quite low at most ages, many plans lack sufficient data to perform even a full adjustment to a standard table (i.e., adjust the tables so the actual-to-expected ratio based on the plan's data is close or equal to 100%).

For the pre-retirement mortality assumption, Segal recommended a 90% adjustment to the Headcount-Weighted RP-2014 Employee Mortality Table without showing any experience data and without substantiating the credibility needed to perform that adjustment. Typically, when there is very little actual experience, which is usually the case with active member mortality experience, significant adjustments to the standard table are not made. For future reports, we suggest that Segal provide the active mortality experience data and consider the credibility of the data before making any adjustments to the standard table.

***Optional Forms***

Segal provided a letter on July 17, 2019 with their recommendation for determining actuarial assumptions for optional forms and annuity benefits and we concur that their approach is reasonable. Their recommendation is to use a static table with projected mortality improvement for 15 years, representing the approximate duration for active members expected to retire in the next three years based on the 2018 valuation data.

Another option is to develop factors using the full generationally-projected mortality tables, based on those computed for a member expected to retire at the mid-point of the time period to which the factors are expected to be used. This option is sometimes limited, however, by the constraints of the Plan's benefit administration software.



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***Rates of Reciprocity***

As part of their last experience review, Segal recommended maintaining the assumption that 5% of inactive vested members will go on to be covered by a reciprocal retirement system. These assumptions are somewhat lower than the rates of reciprocity we have seen at other California systems.

Segal noted that they reviewed all the inactive member data and that approximately 4% were reported as being covered by a reciprocal system.

However, for many plans we work with, members do not report that they have established reciprocity with another system until just prior to retirement. Therefore, we generally request that the system provide us with the new retirees who have retired from inactive vested status during the study period, and determine what percentage of those individuals retired from a reciprocal system, rather than just looking at the percentage of current inactive vested members with reciprocity. In addition, we suggest that Segal review the members who terminated more recently (i.e., during the last two previous experience study period) to see if the experience differs from that of the entire inactive vested population.

We recommend at the time of the next experience study that Segal analyze the reciprocity assumption based on new retirements and recent terminations, instead of basing the assumption on the total inactive vested cohort.

***Other Demographic Assumptions***

We believe the analysis and assumptions proposed by Segal for the other demographic assumptions – including retirement and termination rates, merit and promotional pay increases, retirement age for inactive vested members, percentage married/domestic partner, and assumed spouse age differences – are reasonable based on the information presented, and consistent with the methods and assumptions we have seen used at other systems.

Similar to our recommendation in the June 30, 2012 actuarial valuation audit, we maintain that Segal should disclose the number of exposures, actual and expected decrements, and the actual-to-expected (A/E) ratios for each of the demographic assumptions. In addition to giving a reviewer the information necessary to evaluate the proposed assumptions, providing this information will also allow better assessment of what credibility to give the observed experience versus the rates developed based on the historical experience.

On the next page, we show an example of a chart that illustrates the results of a demographic assumption analysis. In this example, the actual retirement experience for general members who are eligible to retire with between 20 to 29 years of service is shown. Generally, the closer the actual-to-expected ratio is to 100%, the closer the assumptions align with the experience of the plan and are better predictors of future behavior.

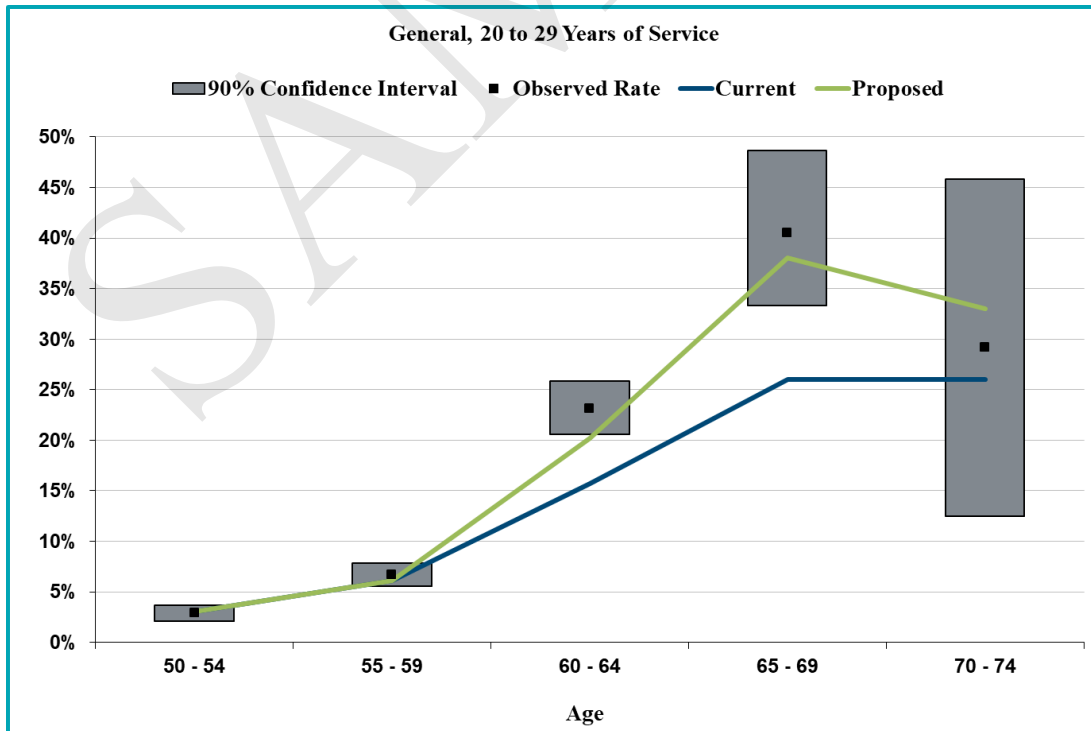
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With the proposed assumption change, the number of assumed retirements increased from 268 to 315, closer to the actual number of retirements that was 343. The proposed assumption changes resulted in decreasing the A/E ratio for this group from 128% to 109%.

General, 20 to 29 Years of Service						
Age	Exposures	Retirements			Actual to Expected Ratios	
		Actual	Current	Proposed	Current	Proposed
50 - 54	1,316	38	39	40	96%	95%
55 - 59	1,329	89	82	82	109%	109%
60 - 64	709	164	111	143	147%	115%
65 - 69	111	45	29	42	156%	107%
70 - 74	24	7	6	8	112%	88%
<b>Total</b>	<b>3,489</b>	<b>343</b>	<b>268</b>	<b>315</b>	<b>128%</b>	<b>109%</b>
<b>R-squared</b>			<b>93%</b>	<b>98%</b>		

We also suggest performing a more in-depth analysis of retirement, termination, mortality, and disability incidence by developing confidence intervals for age or service ranges. In the example below, 90% confidence intervals are calculated, which represents the range within which the true decrement rate during an experience study period falls with 90% confidence. (If there is insufficient data to calculate a confidence interval, the confidence interval is shown as the entire range of the graph.) If the current assumption is outside the 90% confidence interval of the observed experience, it is a generally a good indicator that a change to the assumption should be considered (i.e. increasing the retirement rates for ages 60-69).





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### Economic Assumptions

Overall, the economic assumptions proposed in Segal's review represent a reasonable set of assumptions. In particular, we agree with Segal's recommendation to reduce the assumed rate of price inflation from 3.00% to 2.75%, and to reduce the investment return assumption from 7.25% to 7.00%, net of investment and administrative expenses. However, the decision to maintain the 7.25% assumed rate of return and 3.00% inflation rate are also reasonable. We encourage the Board and Segal to continue to monitor these assumptions since the current market environment and peer group comparisons with other California systems show support for lowering these assumptions.

We have comments, however, on the "risk adjustment" that Segal used in developing their return recommendation, as well as several other aspects of the economic assumptions.

### Risk Adjustment

In their experience study report, Segal spends a significant amount of time discussing the concept of a "risk adjustment" – also referred to as a margin for adverse deviation. The following language is from their experience study report (page 16):

*In our model, the confidence level associated with a particular risk adjustment represents the relative likelihood that future investment earnings would equal or exceed the assumed earnings over a 15-year period on an expected value basis.*

In a footnote, they explain that the expected value basis means that:

*If a retirement system uses the expected **arithmetic** average return as the discount rate in the funding valuation, that retirement system is expected to have no surplus or asset shortfall relative to its expected obligations assuming all actuarial assumptions are met in the future.*

Another approach actuaries use in defining a "confidence level" answers the question: what is the likelihood the investment return will exceed the assumed return, when compounded over a given period of time? This approach is related to the average **geometric** return (rather than the average **arithmetic** return), which will always be lower than the arithmetic average. Both approaches are discussed in the applicable Actuarial Standards of Practice.

In the most recent experience study, Segal's "confidence level" model provided LACERS with a 58% likelihood that the arithmetic average investment return will exceed the recommended assumption of 7.00% over a 15-year period. We performed our own modeling of the confidence level using the geometric return approach and the sample of investment consultants that Segal used in developing their recommendations. We measured a 49% likelihood of achieving the 7.00% return after adjusting these returns for the 2.75% inflation assumption recommended by Segal and if the returns were reduced by 0.40% for the investment and administrative expenses identified by Segal.

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To update this analysis, we modeled the confidence level based on NEPC's 2019 capital market assumptions, the target asset allocation adopted on April 10, 2018, and LACERS' assumed rate of return of 7.25% and 3.00% inflation assumption. We measured a 50% likelihood of achieving the current assumed return of 7.25%, net of administrative and investment expenses.

**Investment Expenses**

A frequent assumption used in setting return assumptions is that the additional returns earned due to active management will offset the higher level of expenses associated with active management. Instead of this approach, Segal assumes that additional expenses for active management simply reduce the return, which is a more conservative assumption but implies that – all other things being equal – Segal's model would result in a higher recommended return assumption if the Board were invested passively instead of using active managers. While there is much debate about this question among investment professionals, we prefer to remain neutral, assuming no advantage or disadvantage to active management.

Segal did note that only 1/3 of the investment expenses, approximately eight basis points, in 2017 were paid for expenses associated with active management. We note that the slight conservatism included in this approach may enhance the likelihood that the investment return assumption could be achieved on a compound basis, yet not enough to offset the impact from the risk adjustment issue identified above.

**Inflation**

We believe that both Segal's recommendation to move to a 2.75% inflation assumption and the Board's decision to maintain a 3.00% assumption represent a reasonable long-term assumption. However, we note that NEPC's inflation assumption for both the short-term (2.25%) and long-term (2.75%), as well as the inflation forecasts used by Social Security in their 2019 report (2.60%) and derived from 30-year Treasury bonds as of February 2020 (1.68%) are all still below the current inflation assumption of 3.00%.

While we understand that large and sudden changes in long-term assumptions can be disruptive to the employers and members, and we acknowledge that a 3.00% inflation assumption still represents a reasonable long-term expectation given historical rates, we recommend that Segal and the Board continue to monitor this assumption and consider further reductions if market-based inflation expectations remain low.

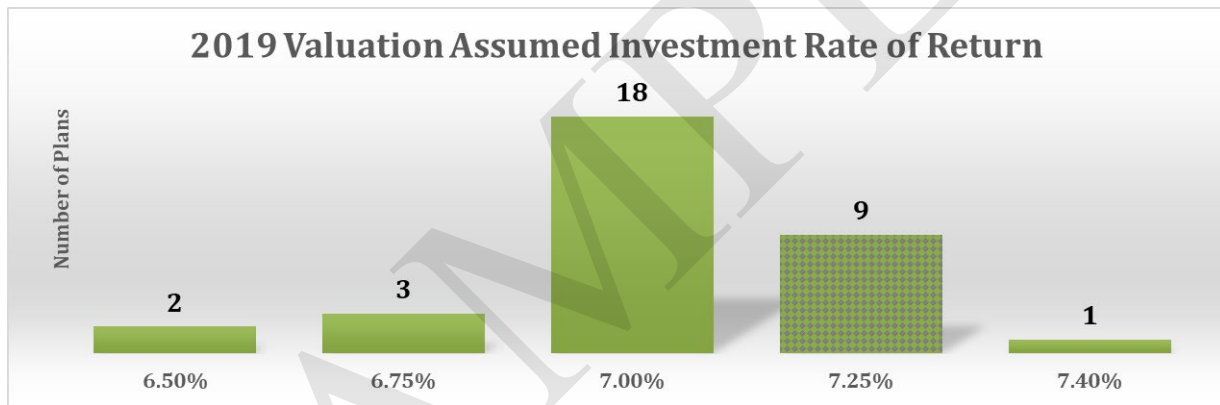
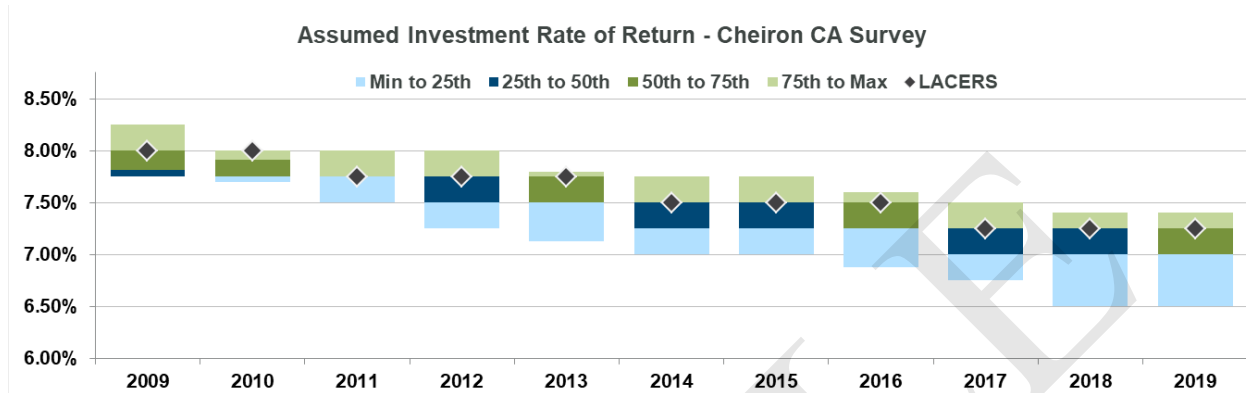
**Comparison with Other California Public Retirement Systems**

Each System has a unique asset allocation, which is the main driver in determining the portfolio's expected rate of investment return, along with the investment consultants' capital market assumptions for the respective asset classes. However, we would like to point out that there has been a significant trend over the last decade of public pension systems lowering their investment rate of return.

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The graphs below show distribution of assumed investment rate of return for a sample of California public pension systems and the trend of lowering the assumed rate of return.



The median investment rate of return for most of the California pension systems is now 7.00%.

***Other Economic Assumptions***

We believe the analysis and assumptions proposed by Segal for the other economic assumptions – including “across the board” real pay increases, amortization payment growth, COLA growth, and crediting rate for employee contributions – are reasonable based on the information presented, and consistent with the methods and assumptions we have seen used at other systems.

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**SECTION V – REVIEW OF ACTUARIAL METHODS**

## **Actuarial Methods**

Actuarial methods relate to the application of actuarial assumptions in the determination of Plan liabilities and contributions. These methods include the actuarial cost method, amortization policy, actuarial asset smoothing, and cost-sharing methodologies. The questions guiding our review of the actuarial methods were the following:

- Are the methods acceptable and appropriate for the intended purpose?
- Do the methods comply with relevant accounting and actuarial standards?

### ***Actuarial Cost Method***

The individual Entry Age Actuarial Cost Method is used in the June 30, 2019 actuarial valuation. Under this method, the expected cost of benefits for each individual member is allocated over that member's career as a level percentage of that member's expected salary. The normal cost for the plan is the sum of the individual normal costs calculated for each member. We concur with this methodology and note that it is a "Model Practice" based on the guidance issued by the California Actuarial Advisory Panel (CAAP), and a "Best Practice" based on guidance issued by the Government Finance Officers Association. Segal has also applied this method in a manner that complies with the disclosure requirements under GASB Statements 67 and 68.

### ***Asset Smoothing Method***

The Actuarial (or smoothed) Value of Assets is determined using a seven-year period, for investment gains and losses. The Actuarial Value of Assets is limited by a 40% corridor around the Market Value of Assets and we have confirmed that the Segal report applies the actuarial smoothing method as described.

Most other public plans we serve use a five-year smoothing period and incorporate either a 20% corridor below and above the Market Value of Assets or do not apply a corridor. We performed stochastic projections of funded ratios and employer contribution rates using both LACERS asset smoothing method and a five-year smoothing period with a 20% corridor. There was no measurable difference in the results between the two asset smoothing methods.

In our opinion, the method used by LACERS satisfies the Actuarial Standard of Practice, which governs asset valuation methods (ASOP No. 44), which requires that the actuarial asset value should fall within a "reasonable range around the corresponding market value" and that differences between the actuarial and the market value should be "recognized within a reasonable period of time." In fact, the Market Value and Actuarial Value of Assets were within 0.02% as of June 30, 2019.

We commend Segal for including the funded ratio and unfunded liability using both the market value and smoothed value of assets in their report. These disclosures are included in the "Model Disclosure Elements for Actuarial Valuation Reports" adopted by the CAAP.

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**SECTION V – REVIEW OF ACTUARIAL METHODS**

***Amortization Policy***

The current Amortization Policy for LACERS is a layered amortization policy, with the balance of the unfunded liability as of June 30, 2012 (with the exception of the 2009 ERIP and the two GASB 25/27 layers) amortized as a level percentage of payroll over a closed 30-year period (23 years remaining as of June 30, 2019). On or after June 30, 2004 each subsequent year's unfunded liability attributable to experience gains or losses is amortized as a level percentage of payroll over a new closed 15-year period, while assumption or method changes are amortized over separate 20-year periods. Plan amendments are amortized over closed 15-year periods and future early retirement incentive programs will be amortized over a period of up to five years.

We have confirmed that the Segal report applies the amortization method as described. This amortization method is in accordance with funding policy guidance issued by the CAAP, GFOA, and the Conference of Consulting Actuaries Public Plans Community.

We commend Segal for calculating and disclosing what is known as the “single equivalent amortization period” for the amortization schedule (about 20 years as of June 30, 2019). This provides the reader with an estimate of the “average” amortization period, and represents the length of time that would be required to amortize the overall UAL if the current UAL payment rate were held constant.

***Medical Trends***

We recommend a longer grading period for the medical trends to reach the ultimate level such as those that can be developed using the Getzen Model of Long-Run Medical Cost Trends published by the Society of Actuaries. A parameterized model where initial trends reflect short-term plan specific expectations and longer-term trends are based on economic assumptions provides a more dynamic assessment than survey data. The actuary provides input on the long-term model parameters including inflation, real per capita GDP growth, excess medical cost growth, and capacity constraints on health costs with respect to GDP. Longer grading periods would most likely increase the accrued liability and normal costs.

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SECTION VI – CONTENTS OF REPORTS

### Contents of the Actuarial Valuation Reports

As noted in the Executive Summary, one of the objectives of the audit is to determine whether the information being provided to LACERS is comprehensive, and includes the information required to assess the present and future financial status of the Plans.

We find the actuarial valuation report is comprehensive and provides the information required to assess the present financial status of the Plan. In particular, the report is in compliance with Actuarial Standards of Practice with respect to the disclosures required under the relevant standards, including ASOP 4 (Measuring Pension Obligations), ASOP 6 (Measuring Retiree Group Benefits Obligations), ASOP 27 (Selection of Economic Assumptions), ASOP 35 (Selection of Demographic and Other Noneconomic Assumptions), ASOP 41 (Actuarial Communications), and ASOP 44 (Selection and Use of Asset Valuation Methods).

However, we have some recommendations with respect to additional disclosures that could be included which we believe would add value to the valuation report and related documents, in particular in areas that would assist the trustees and other stakeholders in their ability to assess the *future* financial status of the Plan.

#### *Projections*

We commend Segal for including projections of the outstanding balance of the Unfunded Actuarial Liability (UAL) and UAL payment projections in the actuarial valuation report. However, under LACERS's asset smoothing method there are gains and losses to be realized over the next six years, even if the investment returns actually achieve the 7.25% target each year, that are not included in Segal's projections.

We believe that the report would be significantly improved and more useful to readers if it contained projections of future employer contributions, the projected UAL (including the phasing-in of deferred gains and losses), and funded ratios. Also, the dynamics of Tier 3 in reducing the employer contribution rate should be of interest to stakeholders. At a minimum, these projections should be based on all assumptions being met.

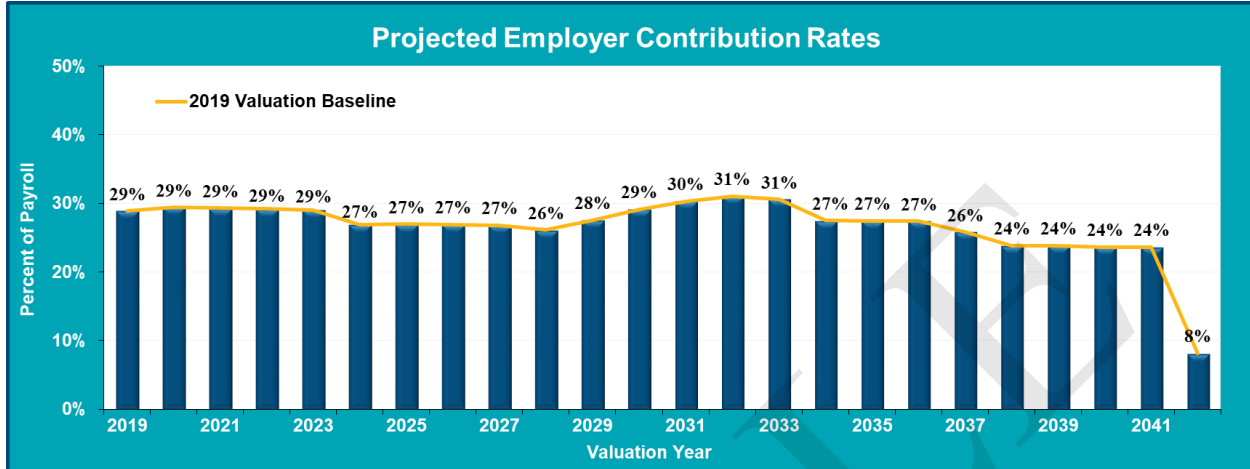
We note that including deterministic projections directly in the valuation report is a common approach by other firms as well, as can be seen in the valuation reports performed by Milliman for LACERA ([https://www.lacera.com/investments/actuarial\\_reports/actuarial\\_valuation.pdf](https://www.lacera.com/investments/actuarial_reports/actuarial_valuation.pdf)), by Gabriel Roeder Smith for the Employees Retirement System of Texas (<https://ers.texas.gov/About-ERS/Reports-and-Studies/ERS-Actuarial-Valuation-Reports/2017-ERS-Pension-Valuation-Reports-December-2017.pdf>), as well as by Segal for some of their other clients ([https://www.trsil.org/sites/default/files/documents/TRS\\_Annual-Actuarial-Valuation\\_Final.pdf](https://www.trsil.org/sites/default/files/documents/TRS_Annual-Actuarial-Valuation_Final.pdf)). We note that these types of projections are included in LACERS's Risk Assessment report dated February 19, 2020, but we suggest that including these types of projections in the valuation report would provide a benefit to the reader by enabling them to have complete information without having to review a second report.



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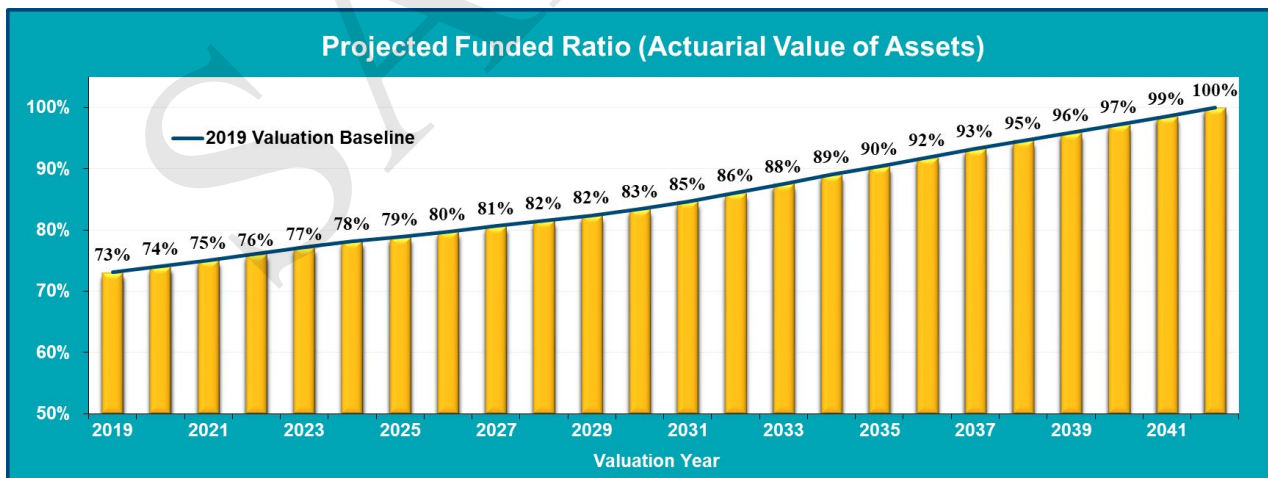
**SECTION VI – CONTENTS OF REPORTS**

Below we have provided projections for LACERS combined retirement and health plans, based on an assumption that the Plan will earn 7.25% each on the assets.



The contribution projections show the total employer contribution rate over a 23-year period. The employer contribution rate is expected to gradually decrease over the next five years due to net deferred assets gains. The rate decreases in 2024 and 2028 are a result of the 2009 ERIP amendment and 2013 actuarial loss, respectively, being fully paid. The contribution rate begins to increase from 2029 to 2032 due to past actuarial gains for FYE 2014-2017 becoming fully amortized. Starting in 2032, several amortization payments will be fully paid including the 2014, 2017, and 2018 assumption changes and the \$4.2 billion UAL as of June 30, 2012 with the 2042 valuation.

The next graph shows a projection of the funded ratio based on the Actuarial Value of Assets.



The projections show gradual funding progress each year and LACERS is expected to be fully funded in 2042, if all actuarial assumptions are met in each future year, including an investment return of 7.25% each year.

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**SECTION VI – CONTENTS OF REPORTS**

***Health Valuation Reports***

In accordance with ASOP No. 6, the age and gender specific factors provided on page 35 of the OPEB report are used to adjust premiums to develop graded per-capita claim costs. It may be more appropriate to provide the resulting age banded and gender dollar costs by carrier and tier to illustrate the resulting per capita claim cost assumptions made on page 34, instead of providing the average of the calendar 2019 and 2020 premium rates and referring to those as per capita costs. Rather than as an assumption, the actual premium rates for both 2019 and 2020 could be provided elsewhere such as under Summary of Plan to document the source data used from the annual Health Benefits Guides. This would have no impact on the valuation cost results.

With respect to Health Care reform, it is noted on page 38 that the anticipated future excise tax on high cost plans was reflected in the current valuation. We believe it would have been helpful to the readers to have known the dollar impact of this “Cadillac tax” on the current valuation result and when it would first impact LACERS. However, since this tax – as well as the Medical Device and Health Insurance Tax (HIT) – were subsequently repealed in December of 2019, the issue is now moot.

***Risk Disclosures***

In order to comply with ASOP No. 51, actuaries must both identify and assess risks that “may reasonably be anticipated to significantly affect the plan’s future financial condition” (Section 3.2). The identification and measurement of risk can be done in either the valuation report or a separate document, as Segal has done in the Risk Assessment Report, and we commend Segal in their identification of specific risk factors on page 16-17 of this report.

However, in Section 3.4 of ASOP No. 51, several methods – including scenario testing, stress testing, sensitivity testing, and stochastic modeling – are suggested for the actuary to use for assessing risks that have been identified. We note that Segal’s Risk Assessment Report only includes two scenario projections, reflecting scenarios where FYE 2020 investment returns are 0% or 14.50%, instead of the assumed 7.25%. Many firms frequently provide assessments using the other suggested methods, including sensitivity testing and stochastic modeling, and we note that Segal also included several of these assessments in their Risk Analysis presentation from 2017. We suggest that Segal consider expanding the disclosures included in their Risk Assessment Report, and have provided some suggested examples in a supplementary document provided to Staff.



**ACTUARIAL AUDIT REPORT OF THE  
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**APPENDIX A – GLOSSARY OF TERMS**

**1. Actuarial Assumptions**

Estimates of future experience with respect to 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, 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.

**2. Actuarial Gain (Loss)**

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

**3. 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.”

**4. 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.

**5. 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 in order to stabilize contribution rates and the funded status.

**6. Actuarial Cost Method**

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

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**APPENDIX A – GLOSSARY OF TERMS**

**7. 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.

**8. 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. GASB Statement No. 74 defines the plan accounting and financial reporting for governmental OPEB plans, and GASB Statement No. 75 defines the employer accounting and financial reporting for participating in a governmental OPEB plan.

**9. Market Value of Assets**

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

**10. 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.

**11. Present Value of Projected Benefits**

The estimated amount of assets needed today to pay for all benefits promised in the future to current members of the Plan, assuming all actuarial assumptions are met.

**12. Present Value of Future Normal Costs**

The actuarial present value of retirement association benefits allocated to future years of service.

**13. 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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