Seattle City Employees' Retirement System

January 1, 2020 Actuarial Valuation

Prepared by:

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Retirement Board
Seattle City Employees' Retirement System
720 Third Avenue, Suite 900
Seattle, WA 98104

Dear Members of the Board:

As requested, we have prepared an actuarial valuation of the Seattle City Employees' Retirement System (SCERS) as of January 1, 2020. This report reflects the benefit provisions and calculated contribution rates in effect as of January 1, 2020.

Actuarial Certification

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by SCERS staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for the System have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations), and which, in combination, offer a reasonable estimate of anticipated experience affecting the System. Further, in our opinion, each actuarial assumption used is reasonably related to the experience of the Plan and to reasonable expectations which, in combination, represent a reasonable estimate of anticipated experience under the System.

This valuation report is only an estimate of the System's financial condition as of a single date. It can neither predict the System's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of System benefits, only the timing of System contributions. While the valuation is based on an array of individually reasonable assumptions, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions is outside the scope of our engagement.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. The Retirement Board has the final decision regarding the

appropriateness of the assumptions and adopted them as indicated in Appendix A at the July 12, 2018 Board meeting.

Actuarial computations presented in this report are for purposes of determining the recommended funding amounts for SCERS. Actuarial computations presented for financial reporting in a separate report under GASB Statements No. 67 and 68 are for purposes of assisting SCERS and participating employers in fulfilling their financial accounting requirements. The computations prepared for these two purposes may differ as disclosed in our report. The calculations in the enclosed report have been made on a basis consistent with our understanding of SCERS' funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes.

Milliman's work is prepared solely for the internal business use of SCERS. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exception(s):

a) SCERS may provide a copy of Milliman's work, in its entirety, to the System's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the System.

b) SCERS may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are retirement actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

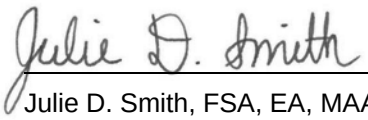
The signing actuaries are independent of the City of Seattle. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report, along with the information contained in the Comprehensive Annual Financial Report, is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices, which are consistent with the principles prescribed by the Actuarial Standards Board and the Code of Professional Conduct and Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States of the American Academy of Actuaries. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

We would like to express our appreciation to the system staff who gave substantial assistance in supplying the data on which this report is based.

Sincerely,

Nick J. Collier, ASA, EA, MAAA
Consulting Actuary



Julie D. Smith, FSA, EA, MAAA
Consulting Actuary

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1. Summary of the Findings

Overview

	January 1, 2020	January 1, 2019
Total Actuarial Contribution Rate	25.56%	25.79%
Employer Actuarial Contribution Rate	16.10%	16.14%
Funding Ratio	68.9%	68.2%

The January 1, 2020 actuarial valuation determines the minimum actuarially required employer contribution rate (referred to as the employer actuarial contribution rate) payable beginning January 1, 2021 based on the Board's funding policy. Several key points of the valuation are summarized as follows:

- **Investment Returns**: For the year ending December 31, 2019, the SCERS assets returned an estimated 17.2% on a market value basis (net of investment expenses), which was greater than the assumed rate of 7.25% for 2019. The result is an actuarial investment gain for the 2019 year. Combined with prior years' asset gains and losses under the asset smoothing method, the return was a positive 6.9% on the Actuarial Value of Assets (AVA). See Section 3 of this report for additional details.
- **Employer Contribution Rate**: The employer actuarial contribution rate has decreased from the prior valuation, from 16.14% to 16.10% of payroll. The strong return for 2019 approximately offset deferred asset losses from prior years under the asset smoothing method. Therefore, the return on actuarial assets had only a small impact on the employer contribution rate. Other factors had a similarly small impact, resulting in a small overall change from last year. See the section following titled "Analysis of Change" for additional details
- **Funding Progress**: The Funding Ratio (which is measured as the AVA divided by the Actuarial Accrued Liability) increased from 68.2% to 68.9%.
- **Investment Market Update:** Investment markets generally have been down in the first half of 2020. Consequently, the 2020 return will likely be below the actuarial assumption of 7.25%, possibly significantly. As this valuation is as of January 1, 2020, any investment experience after that date is not included in the results shown in this report. The 2020 return will first be reflected in the January 1, 2021 actuarial valuation and the employer contribution rate for 2022.

Funding Progress

On the basis of the January 1, 2019 actuarial valuation, the Funding Ratio (which is measured as the AVA divided by the Actuarial Accrued liability) was 68.2%. Based on the January 1, 2020 valuation, the Funding Ratio has increased to 68.9%. The increase was primarily due to contributions made in 2019 in excess of the Normal Cost rate. Note that the Funding Ratio is calculated using the AVA; Funding Ratio results based on the Market Value of Assets (MVA) are shown in Table 1 at the end of this section.

Details of the changes in the Funding Ratio are shown in the following table.

Analysis of Change

The table shows the sources of change in the employer actuarial contribution rate and the Funding Ratio between the prior and current actuarial valuations.

Sources of Change	Employer Actuarial Contrib. Rate	Funding Ratio
January 1, 2019 Actuarial Valuation	**16.14 %**	**68.2 %**
Expected Valuation-to-Valuation Change	-	1.3
Asset Gain/Loss on Actuarial Value	0.08	(0.2)
Salary/Membership Growth Different Than Expected	(0.03)	(0.2)
Demographic Experience	0.13	(0.3)
Lower Normal Cost Rate for Plan 2 Members	(0.05)	-
Changes in Data	(0.12)	0.2
Other	(0.05)	(0.1)
Total Change	(0.04)	0.7
January 1, 2020 Actuarial Valuation	**16.10 %**	**68.9 %**

The Changes in Data item reflects improvements SCERS has made in the data provided to Milliman for actuarial valuation purposes. The census data provided this year included some refinements as to how credited service for active members and COLAs for Option F retiree benefits are provided. Overall, these changes caused a net gain.

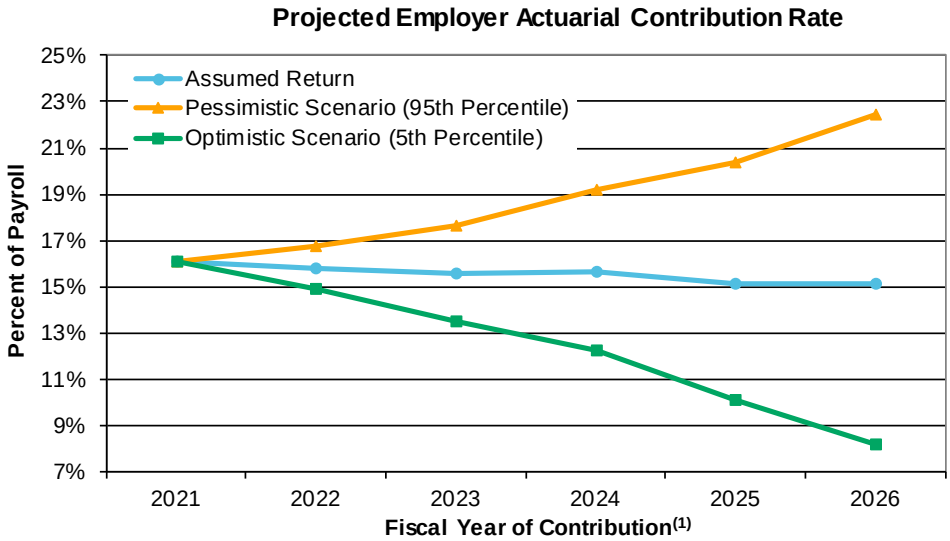
Employer Actuarial Contribution Rate

Based on the actuarial valuation of the benefits in effect under the SCERS as of January 1, 2020, the total actuarially required contribution rate decreased from 25.79% to 25.56% for the year beginning January 1, 2021. Reducing by the average 2020 member contribution rate of 9.46% (a blend of the 10.03% for Plan 1 members and 7.00% for Plan 2 members), the employer actuarial contribution rate is calculated to be 16.10% of pay effective January 1, 2021 under the funding policy, a small decrease from the prior valuation's rate of 16.14%. This reflects the City's commitment to fund at least the actuarially determined contribution rate, which is based on a 23-year amortization of the Unfunded Actuarial Accrued Liability (UAAL) beginning January 1, 2020.

The current contribution rates for the death benefit program are projected to be sufficient to finance the $2,000 death benefit.

We have performed a five-year projection of the employer actuarial contribution rates if a 7.25% return is earned on the Market Value of Assets in each future year (and assuming that no other actuarial gains or losses occur and there are no other changes to assumptions or benefit provisions). This projection shows the expected impact of recognizing the currently deferred asset gains and losses over time. The result is a small decrease in the employer contribution rate over the next several years, although that decrease assumes all assumptions are met.

It is likely that the Market Value of Assets will not return an annual average of exactly 7.25% over all future years. To show the potential impact of volatility in asset returns on the employer actuarial contribution rate, we have performed a projection of the contribution rates at the 5th and 95th percentile expected returns (thereby yielding a 90% asset-return-based confidence interval for the specified rates). These projections are shown in the graph and table on the following page.



Projected Employer Actuarial Contribution Rate

Contribution Year(1)	Assuming 7.25% Future Returns	90% Asset Return Confidence Interval
2021	16.10%	16.10% - 16.10%
2022	15.83%	14.88% - 16.77%
2023	15.57%	13.53% - 17.65%
2024	15.66%	12.28% - 19.19%
2025	15.13%	10.14% - 20.41%
2026	15.13%	8.20% - 22.48%

1. Contribution year lags valuation year by one year. For example: Contribution Year 2021 is based on the 2020 valuation results, amortized over 23 years beginning in 2020, if the increase takes place in 2021.

Compounded Average Return for Period

	Percentile	
	95th	*5th*
1-Year Period	*-11.8%*	*26.5%*
2-Year Period	*-7.0%*	*20.0%*
3-Year Period	*-4.8%*	*17.2%*
4-Year Period	*-3.4%*	*15.6%*
5-Year Period	*-2.5%*	*14.5%*

The 90% confidence interval results are based on the 5th and 95th percentile compounded returns for one-, two-, three-, four-, and five-year periods. Since actuarial assets are used to calculate contribution rates, deferred gains or losses would continue to decrease or increase the actuarially required employer contribution rate after these dates.

See Section 8 of this report for a detailed discussion of the projected contribution rates.

Funding Valuation

This report provides information relevant to the funding of SCERS. Information for financial reporting purposes was provided in a separate GASB 67 and 68 Disclosure report earlier this year.

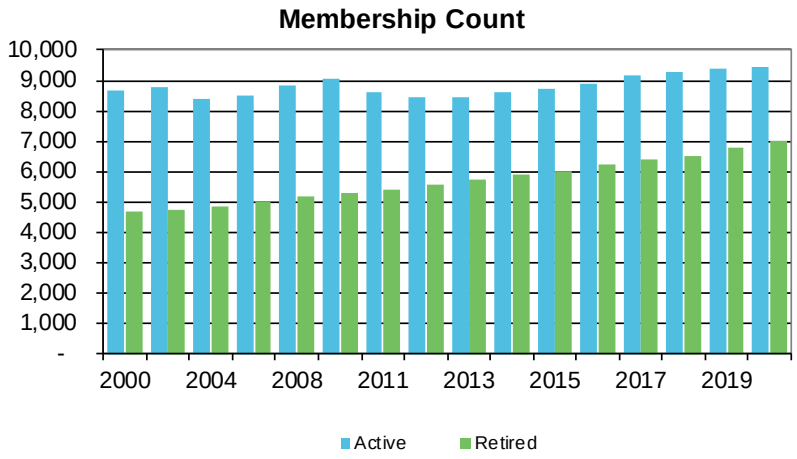
Contingent COLA Benefits

The Seattle Municipal Code allows for an increase in the cost-of-living adjustment (COLA) available to current and future retired members. Currently, the Floor COLA (also referred to as a Restoration of Purchasing Power COLA) is at the 65% level. The enhanced COLA benefit (70% Floor COLA) does not become effective until the System attains at least a 100% funding level.

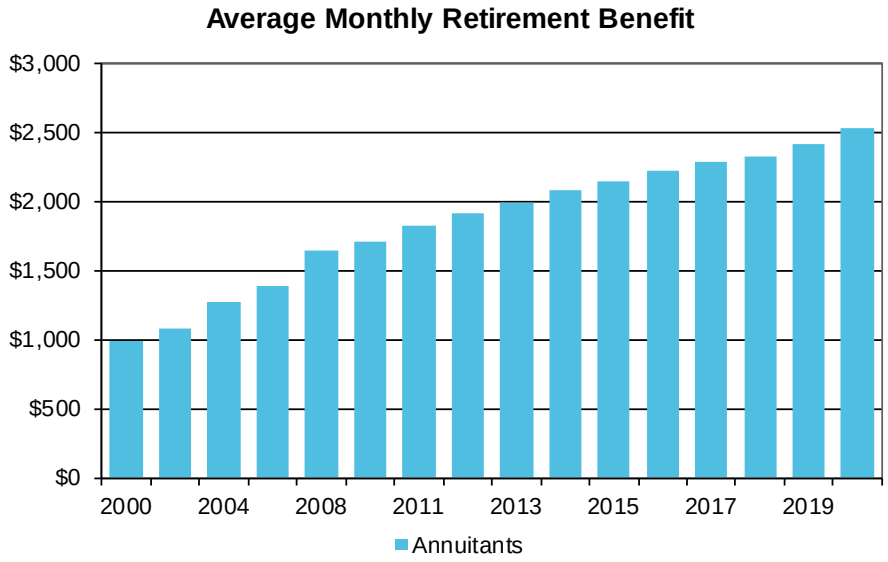
Since it is unknown when this benefit will become effective, especially given the current funded status of the System, we have not included the valuation of these potential benefit changes (i.e., the increase in the ROPP COLA to the 70% level) in this valuation. See Appendix A of this report for further details**.**

Membership Information

Total valuation payroll has increased by 5.4% since the 2019 valuation, and active membership has increased by 0.6% during this same period. As of January 1, 2020, the annualized payroll is $820 million for 9,440 active members.



Retired member counts and average retirement benefit amounts continue to increase steadily. As of January 1, 2020, there were 7,029 retired members and beneficiaries with an average benefit of $2,540 per month. This represents a 3.5% increase in count and a 4.9% increase in average benefit amount.



Analysis of Change in Member Population

The following table summarizes the year-to-year change in member population.

	Actives	Deferred Members[1]	Retirees/ Beneficiaries
January 1, 2019 Valuation	9,388	2,635	6,792
Termination with Refund / Death	(137)	(135)	(260)
Termination without Refund	(361)	361	-
Service Retirement	(322)	(62)	384
Disability Retirement	(1)	-	1
Rehires	33	(33)	-
New Entrants / Beneficiaries	840	46	112
Data Corrections	-	-	-
January 1, 2020 Valuation	9,440	2,812	7,029

1. Counts include non-vested terminated members whose contributions are still on deposit with SCERS as of the valuation date.

Summary Exhibit

A summary of the key results of this valuation, along with a comparison to the January 1, 2019 valuation, is shown in Table 1.

Note that the valuation measures are based on the Actuarial Value of Assets, which recognizes asset gains and losses over a five-year period; however, we have also shown key measures using the Market Value of Assets.

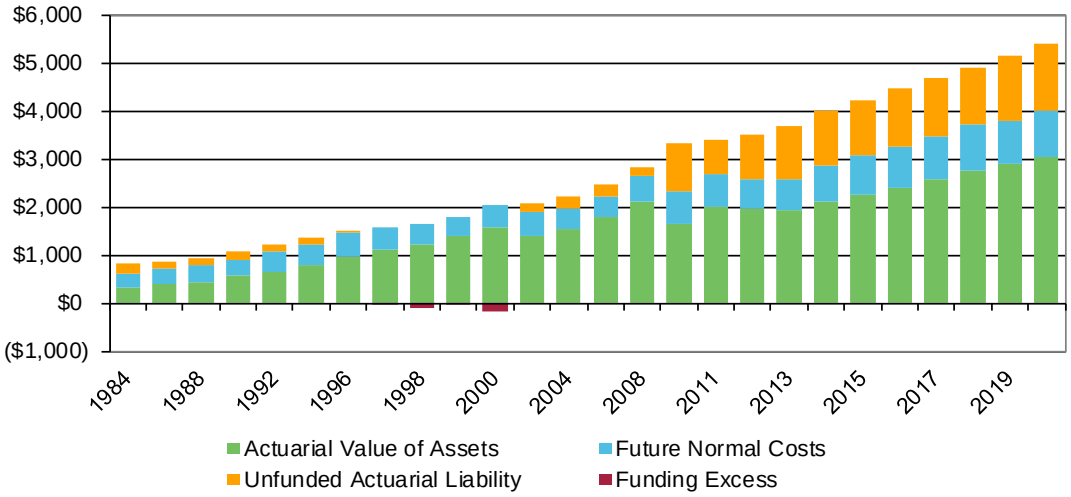
Graphs 1 and 2 and the associated data table show historical asset and liability information, including the Present Value of Future Benefits (PVFB) and Present Value of Future Normal Costs (PVFNC), at previous valuation dates.

Table 1
Summary of Results

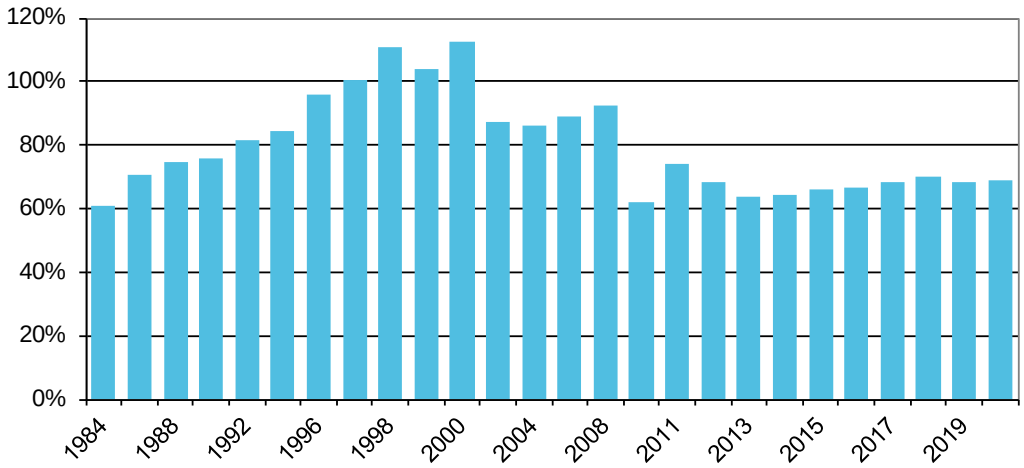
	Valuation January 1, 2020	Valuation January 1, 2019	Percentage Change
Total membership			
Active members	9,440	9,388	0.6%
Retired members & beneficiaries	7,029	6,792	3.5%
Vested terminated members[1]	2,812	2,635	6.7%
Total	19,281	18,815	2.5%
Pay as of Valuation Date			
Annual total ($millions)	$ 819.7	$ 777.6	5.4%
Annual average	86,833	82,829	4.8%
Average monthly benefit paid to current retirees and beneficiaries			
Service retirement	2,655	2,526	5.1%
Disability retirement	1,478	1,407	5.0%
Surviving spouse and dependents	1,711	1,670	2.4%
Total	2,540	2,421	4.9%
Actuarial Accrued Liability ($millions)			
Active members	1,856.5	1,867.4	(0.6)%
Retired members & beneficiaries	2,321.8	2,125.6	9.2%
Vested terminated members[1]	232.9	223.7	4.1%
Total	4,411.1	4,216.7	4.6%
Assets			
Actuarial Value of Assets ($millions)	3,040.7	2,877.4	5.7%
Unfunded Actuarial Accrued Liability or Surplus Funding ($millions)	1,370.4	1,339.3	2.3%
Normal Cost Rate plus amortization of UAAL			
Total Contribution Rate needed for 23-Year[2] amortization (as a % of Payroll)	25.56%	25.79%	(0.9)%
Employer Actuarial Contribution Rate	16.10%	16.14%	
Funding Ratio	68.9%	68.2%	1.0%
Normal Cost as a percent of salary	15.25%	15.42%	(1.1)%
Market Value of Assets (MVA) — for informational purposes only			
Assets based on MVA			
Market Value of Assets ($millions)	$ 3,149.9	$ 2,717.4	15.9%
Amortization of UAAL based on MVA			
Total Contribution Rate needed for 23-Year[2] amortization (as a % of Payroll)	24.67%	26.99%	(8.6)%
Funding Ratio based on MVA	71.4%	64.4%	10.8%

1. Includes non-vested terminated members whose contributions are still on deposit with SCERS as of the valuation date
2. Amortization method is closed 30-year beginning with the January 1, 2013 valuation. 2019 values shown are over 24 years.

Graph 1 Historical Asset and Liability Comparison



Graph 2 Historical Funding Ratios



Year	(in $Millions) PVFB	Assets	PVFNC	UAAL	Funding Ratio
2011	3,379.6	2,013.7	670.6	695.4	74.3%
2012	3,494.1	1,954.3	634.8	905.0	68.3%
2013	3,679.8	1,920.1	654.5	1,105.2	63.5%
2014	4,007.3	2,094.3	747.2	1,165.8	64.2%
2015	4,231.3	2,266.7	798.7	1,165.9	66.0%
2016	4,458.1	2,397.1	853.0	1,208.0	66.5%
2017	4,672.6	2,564.1	906.2	1,202.3	68.1%
2018	4,885.2	2,755.2	943.4	1,186.6	69.9%
2019	5,136.8	2,877.4	920.1	1,339.3	68.2%
2020	5,378.0	3,040.7	966.9	1,370.4	68.9%

2. Scope of the Report

This report presents the actuarial valuation of the Seattle City Employees' Retirement System as of January 1, 2020.

A summary of the findings resulting from this valuation is presented in the previous section. Section 3 describes the assets of the System. A summary of the assets is set forth in Table 2. Sections 3, 4, and 5 describe how the obligations of the System are to be met under the actuarial cost method in use.

Section 6 discloses additional historical information.

Section 7 sets forth estimated actuarial gains or losses from the various sources. Section 8 shows projections of the System's funding under both optimistic and pessimistic scenarios. Section 9 shows projections of SCERS benefit payments and dollar contributions over a 10-year period following the actuarial valuation. Section 10 provides a general discussion of potential risks to SCERS' future funding levels.

Appendix A is a summary of the actuarial procedures and assumptions used to compute the liabilities and contributions shown in this report.

The current benefit structure, as determined by the provisions of the governing law on January 1, 2020, is summarized in Appendix B. Schedules of valuation data classifying the data used in the valuation by various categories of contributing members, former contributing members, and beneficiaries make up Appendix C. Appendix D is a glossary of actuarial terms used in this report.

3. Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is January 1, 2020. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities, which are generally well in excess of the assets. The actuarial process thus leads to a method of determining what contributions by members and their employers, combined with the current assets, are needed to pay the expected benefits.

This section of the report deals with the asset determination. In the next section, the actuarial liabilities will be discussed. Section 5 will deal with the process for determining required contributions, based on the relationship between the assets and the actuarial liabilities.

Financial Exhibits

Table 2 shows the calculation of the Actuarial Value of Assets as of January 1, 2020. Note that a net gain is currently being deferred. This means that, if the system earns 7.25% in 2020 and beyond, the AVA will experience an actuarial gain over upcoming years as the remaining portions of deferred asset gains are recognized. In both the Executive Summary and Section 8 of this report, we discuss projections of the minimum actuarially required contribution rates resulting from this projected actuarial gain on the AVA.

Tables 3 and 4 summarize the financial resources of the System on January 1, 2020 on a market-value basis. Table 3 shows the Market Value of Assets at January 1, 2020 and January 1, 2019. Table 4 shows the changes in Market Value of Assets during the year ending January 1, 2019 and the year ending January 1, 2020.

Tables 3 and 4 are taken directly from data furnished to us by SCERS staff. We have accepted these tables for use in this report without audit, but we have reviewed them for reasonableness and consistency with previous reports.

Actuarial Asset Method

SCERS uses five-year asset smoothing, which recognizes the asset gain or loss occurring in each year evenly over a five-year period. The following graph shows a historical comparison of the actuarial and market assets used for valuation purposes. Note that prior to 2011 the AVA was equal to the MVA.

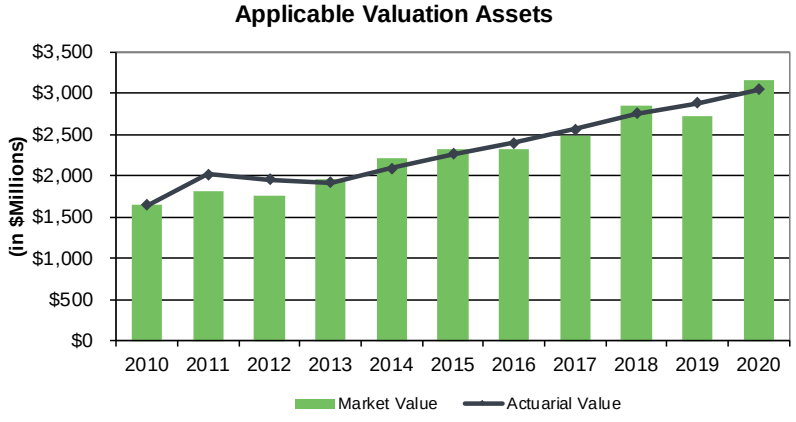


Table 2
Calculation of Actuarial Value of Assets at January 1, 2020

(All dollar amounts in millions)

Five-Year Asset Smoothing

Year Ended	Market Value at Beginning of Year	Total Contributions	Benefit Payments Plus Admin. Expenses	Expected Investment Return	Market Value of Assets: Expected[1]	Market Value of Assets: Actual	Asset Gain/(Loss)	Current Phase Out	Deferred Amount
December 31, 2015	$ 2,322.7	$ 166.9	$ 183.7	$ 173.6	$ 2,479.5	$ 2,313.0	$ (166.5)	0%	$ -
December 31, 2016	2,313.0	180.2	194.7	172.9	2,471.4	2,488.5	17.1	20%	3.4
December 31, 2017	2,488.5	185.8	210.5	185.7	2,649.5	2,852.9	203.4	40%	81.4
December 31, 2018	2,852.9	194.1	223.0	212.9	3,036.9	2,717.4	(319.5)	60%	(191.7)
December 31, 2019	2,717.4	194.4	227.8	195.8	2,879.8	3,149.9	270.1	80%	216.1
								Total Deferred at Jan. 1, 2020:	109.2
								Market Value of Assets at Jan. 1, 2020:	3,149.9
								Less Total Deferred at Jan. 1, 2020:	109.2
								Actuarial Value of Assets at Jan. 1, 2020:	**$ 3,040.7**

1. Expected Market Value of Assets based on the actuarial investment return assumption for the prior year, taking into account actual cash flows during year.

Table 3
Summary of Plan Net Assets (at Market Value)

	January 1, 2020		January 1, 2019	
	Market Value	Distribution	Market Value	Distribution
Assets				
Cash and cash equivalents	$ 52,035,749	1.7%	$ 61,830,698	2.3%
Receivables				
Members	4,790,433	0.2%	4,688,580	0.2%
Employer	7,158,461	0.2%	6,298,927	0.2%
Interest and Dividends	4,482,427	0.1%	4,602,263	0.2%
Sales Proceeds Receivable	157,095,659	5.0%	78,453,081	2.9%
Total Receivables	173,526,980	5.5%	94,042,852	3.5%
Investments at fair value				
Diversifying Strategies	-	0.0%	54,122,799	2.0%
Fixed Income	832,701,137	26.4%	795,613,929	29.3%
Infrastructure	38,828,658	1.2%	24,192,126	0.9%
Private Equity	268,080,078	8.5%	224,541,605	8.3%
Public Equity	1,657,843,434	52.6%	1,344,942,198	49.5%
Real Estate	326,817,803	10.4%	312,205,987	11.5%
Total investments	3,124,271,110	99.2%	2,755,618,644	101.4%
Securities lending collateral	7,022,619	0.2%	4,834,509	0.2%
Prepaid Expenses	781,900	0.0%	-	0.0%
Total assets	3,357,638,358	106.6%	2,916,326,703	107.3%
Liabilities				
Pensions payable and other	4,011,690	-0.1%	4,434,144	-0.2%
Obligations under securities lending	7,013,115	-0.2%	4,820,034	-0.2%
Investment commitments payable	196,749,697	-6.2%	189,635,707	-7.0%
Total Liabilities	207,774,502	-6.6%	198,889,885	-7.3%
Fiduciary Net Position Held in Trust For Pension Benefits	**$ 3,149,863,856**	**100.0%**	**$ 2,717,436,818**	**100.0%**

Note: Numbers shown may not sum to totals due to rounding.

Table 4
Summary of Changes in Plan Net Assets (at Market Value)

	January 1, 2020 Market Value	January 1, 2019 Market Value
Additions		
Contributions		
Employer	$ 119,171,072	$ 117,816,201
Member	75,260,573	76,285,206
Total contributions	194,431,645	194,101,407
Investment activities		
Investment income		
Net change in fair value of investments	426,968,406	(143,412,968)
Interest	17,410,165	17,458,002
Dividends	20,646,715	20,629,056
Other investment income	14,565,733	11,095,325
Net investment income	479,591,019	(94,230,585)
Securities lending activities		
Securities lending income	199,639	205,134
Borrowing rebates	(2,623)	(127,203)
Total securities lending income	197,016	77,931
Securities lending management fees	(49,245)	(17,936)
Net income from securities lending	147,771	59,995
Investment activity expenses	(13,974,207)	(12,398,684)
Total additions	660,196,228	87,532,133
Deductions		
Benefits	203,413,178	190,475,464
Refunds of contributions	15,188,644	20,287,842
Administrative expenses	9,167,368	12,204,574
Total deductions	227,769,190	222,967,880
Net Increase/(Decrease)	432,427,038	(135,435,747)
Fiduciary Net Position held in trust for pension benefits		
Beginning of Year	2,717,436,818	2,852,872,565
End of Year	**$ 3,149,863,856**	**$ 2,717,436,818**

4. Actuarial Liabilities

Actuarial Present Value of Future Benefits

In the previous section, an actuarial valuation was related to an inventory process and an analysis was given of the inventory of assets of the System as of the valuation date, January 1, 2020. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities (or actuarial value of future benefits).

In an active system, the present value of future actuarial liabilities will almost always exceed the actuarial assets. This is usually expected in all but a fully closed down fund, where no further contributions of any sort are anticipated. This shortfall has to be provided for by future contributions. The funding method for the system sets out a schedule of future contributions that will deal with any deficiency in an orderly fashion. The determination of the level of future contributions needed is discussed in the next section (Section 5) of this report.

Table 5 contains an analysis of the actuarial present value of all future benefits for contributing members, former contributing members, and beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 5 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all current members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial assumptions used to determine the liabilities for the January 1, 2020 funding valuation are based on the results of the 2018 Investigation of Experience Report. These assumptions were adopted by the Board effective with the January 1, 2019 actuarial valuation. See Appendix A of this report for details.

Actuarial Cost Method

The method used to determine how the actuarial cost for an individual (or for the System as a whole) is allocated to past and future years is referred to as the actuarial cost method. For this valuation, the individual entry age normal cost (EANC) method has been used.

Under this method, the actuarial liabilities discussed above are allocated into two primary calculation components:

1. A normal cost
2. An actuarial accrued liability

The normal cost under the EANC method is developed so that benefits are allocated as a level percentage of payroll for each member, from the member's membership date to the member's termination date. One key feature of the EANC method is that normal cost rates for a plan tend to be stable from year to year (assuming no change in assumptions or benefit provisions) because most members' entry age cost percentages do not change materially from year to year, and because the population typically does not change considerably from year to year.

In the case of SCERS, we project the normal cost rate to gradually decrease over time as Plan 2 members with lower benefit levels than Plan 1 members (and therefore lower normal cost rates) become a greater portion of the population. The normal cost rates as a percentage of payroll for the current and prior valuation are shown by benefit type and SCERS plan in Table 6. These normal cost contribution rates are intended to be contributed in each year in order to fund the ongoing cost of benefit accruals.

The annual normal cost rate may be considered the ongoing cost of benefit accruals for any given plan year. When the present value of all future normal costs is subtracted from the present value of total benefits, the result is the actuarial accrued liability (AAL). This can be thought of as the current value of all past normal costs, or the amount that would be in the fund if all prior actuarial assumptions had been exactly met. The AAL represents the portion of the present value of total benefits that the cost method allocates to past service.

To the extent that this AAL exceeds plan assets, an Unfunded Actuarial Accrued Liability (UAAL) exists. Table 7 calculates the UAAL, if any, for the current and prior valuations. Note that currently, a UAAL exists for SCERS; the payoff of this UAAL is discussed in more detail in Section 5 (Employer Contributions) of this report.

Table 5
Actuarial Present Value of Future Benefits (PVFB)

(All dollar amounts in millions)

	January 1, 2020 Plan 1	January 1, 2020 Plan 2	January 1, 2020 Total	January 1, 2019 Total
A. Active Members				
Service Retirement	$ 2,474.4	$ 188.1	$ 2,662.5	$ 2,636.1
Vested Retirement	67.8	9.3	77.1	71.9
Disability Retirement	7.2	1.3	8.5	8.2
Survivor Benefits	29.1	2.2	31.3	30.9
Refund of Member Contributions	31.4	12.6	44.0	40.4
Total	2,609.9	213.5	2,823.4	2,787.5
B. Inactive Members and Annuitants				
Service Retirement	2,180.6	-	2,180.6	1,987.5
Disability Retirement	9.5	-	9.5	9.8
Beneficiaries	131.6	-	131.6	128.3
Inactive Members	231.8	1.0	232.9	223.7
Total	2,553.6	1.0	2,554.6	2,349.3
C. Grand Total PVFB	**5,163.5**	**214.5**	**5,378.0**	**5,136.8**

Table 6
Normal Cost Contribution Rates as Percentages of Salary

	January 1, 2020			January 1, 2019
	Plan 1	Plan 2	Total	Total
Service Retirement	12.47	10.22	12.05 %	12.11 %
Vested Retirement	1.31	0.49	1.15	1.21
Disability Retirement	0.08	0.06	0.08	0.08
Survivor Benefits	0.20	0.12	0.18	0.19
Refund of Member Contributions	1.06	0.72	0.99	1.03
Administrative Expenses	0.80	0.80	0.80	0.80
Total	**15.92**	**12.41**	**15.25 %**	**15.42 %**

Table 7
Unfunded Actuarial Accrued Liability (UAAL)

(All dollar amounts in millions)

		January 1, 2020	January 1, 2019
A.	Actuarial present value of all future benefits for present and former members and their survivors (Table 3)	$ 5,378.0	$ 5,136.8
B.	Less actuarial present value of total future normal costs for present members	966.9	920.1
C.	Actuarial accrued liability[1] [A - B]	4,411.1	4,216.7
D.	Less actuarial value of assets available for benefits (Table 2)	3,040.7	2,877.4
E.	Unfunded actuarial accrued liability (Funding Excess, if negative) [C - D]	$ 1,370.4	$ 1,339.3
F.	Funding Ratio [D ÷ C]	68.9%	68.2%

1. The actuarial accrued liability as of January 1, 2021 is projected to be $4,615.8 million.

5. Employer Contributions

As shown in Table 7 in the previous section of this report, the AAL exceeds the current Actuarial Value of Assets. In other words, as of the January 1, 2020 valuation, a UAAL exists for SCERS.

Because a UAAL exists, the total (member + employer) actuarially required contribution rate will consist of two components:

1. The normal cost contribution rate as of January 1, 2020
2. An amortization payment intended to pay off the UAAL in accordance with the SCERS funding policy

Funding

The current SCERS funding policy was updated by a Seattle City Council resolution in August 2013. The funding policy specifies that the UAAL will be amortized as a level percentage of payroll over a closed 30-year period as of the January 1, 2013 actuarial valuation. This means that, for the January 1, 2020 valuation, the amortization contribution rate must pay off the current UAAL over a 23-year period.

Actuarial Gains and Losses

When experience is different from actuarial expectation, an actuarial gain or loss occurs. Ongoing actuarial gains and losses decrease and increase the UAAL. Section 7 of this report illustrates the historical actuarial gains and losses on the UAAL by source.

Amortization of UAAL

Table 8 details the components of the total actuarially required contribution rate of 25.56% by breaking it into the necessary funding components: normal cost and amortization of UAAL. It then illustrates the split between member and employer contribution rates, assuming that member contributions are allocated entirely toward paying the ongoing normal cost of benefits. Table 9 details the components of the total actuarially required contribution rate by Plan.

As of the January 1, 2020 valuation, the employer actuarial contribution rate has decreased to 16.10% beginning January 1, 2021.

The total contribution rate of 25.79% determined in the 2019 valuation was calculated in order to amortize the January 1, 2019 UAAL over a 24-year period; however, this rate is not projected to perfectly amortize the January 1, 2020 UAAL over 23 years due to gains that have occurred during 2019. Table 10 details the expected amortization of the UAAL over the 23-year closed period beginning January 1, 2020.

The total contribution rate can be immediately (i.e., as of the beginning of the next calendar year) decreased from 25.79% of pay to 25.56% of pay to be projected to amortize the UAAL over the scheduled 23 years from January 1, 2020. Because this figure is based on an Actuarial Value of Assets that is currently deferring a net gain, this 25.56% is projected to decrease over the next several years if no other actuarial asset gains or losses after January 1, 2020 were to occur.

In Section 8 of this report, we have included a five-year projection of the actuarial required contribution, including optimistic and pessimistic investment return scenarios.

Table 8
Contribution Rates as Percentages of Salary

		Actuarial Required Contribution Beginning	
		January 1, 2021	January 1, 2020
A.	Total normal cost rate	15.25 %	15.42 %
B.	UAAL amortization rate	10.31	10.37
C.	Actuarial required contribution rate	25.56 %	25.79 %
D.	Member contribution rate	9.46	9.65
E.	Allocation of employer contribution rate[1]		
	Normal cost	5.79 %	5.77 %
	Amortization payment	10.31	10.37
	Total employer contribution rate	16.10 %	16.14 %

1. If member contributions are all allocated to paying normal cost.

Table 9
Contribution Rates as Percentages of Salary by Plan

	Actuarial Required Contribution January 1, 2021		
	SCERS 1	SCERS 2	Total %
Total normal cost rate	15.92 %	12.41 %	15.25 %
UAAL amortization rate	10.31	10.31	10.31
Actuarial required contribution rate	26.23	22.72	25.56
Member contribution rate	10.03	7.00	9.46
Total employer contribution rate	16.20 %	15.72 %	16.10 %

Table 10
Amortization of Unfunded Actuarial Accrued Liability (UAAL)[1][2]

(All dollar amounts in millions)

Year	Payroll	Total Contribution Rate	Normal Cost Rate	UAAL Rate	UAAL Beginning Balance	UAAL Amortization Payment	UAAL Interest	UAAL Ending Balance
2020	$ 820	25.79%	15.25%	10.54%	$ 1,370.4	$ 86.4	$ 96.3	$ 1,380.3
2021	853	25.56%	15.25%	10.31%	1,380.3	87.9	96.9	1,389.3
2022	887	25.56%	15.25%	10.31%	1,389.3	91.4	97.5	1,395.3
2023	923	25.56%	15.25%	10.31%	1,395.3	95.1	97.8	1,398.0
2024	960	25.56%	15.25%	10.31%	1,398.0	99.0	97.8	1,396.9
2025	999	25.56%	15.25%	10.31%	1,396.9	103.0	97.6	1,391.5
2026	1,039	25.56%	15.25%	10.31%	1,391.5	107.1	97.1	1,381.5
2027	1,081	25.56%	15.25%	10.31%	1,381.5	111.4	96.2	1,366.2
2028	1,124	25.56%	15.25%	10.31%	1,366.2	115.9	94.9	1,345.3
2029	1,169	25.56%	15.25%	10.31%	1,345.3	120.5	93.2	1,318.1
2030	1,216	25.56%	15.25%	10.31%	1,318.1	125.3	91.1	1,283.8
2031	1,265	25.56%	15.25%	10.31%	1,283.8	130.4	88.4	1,241.9
2032	1,316	25.56%	15.25%	10.31%	1,241.9	135.6	85.2	1,191.4
2033	1,369	25.56%	15.25%	10.31%	1,191.4	141.1	81.4	1,131.7
2034	1,424	25.56%	15.25%	10.31%	1,131.7	146.8	76.8	1,061.7
2035	1,481	25.56%	15.25%	10.31%	1,061.7	152.7	71.5	980.6
2036	1,540	25.56%	15.25%	10.31%	980.6	158.7	65.4	887.3
2037	1,602	25.56%	15.25%	10.31%	887.3	165.1	58.4	780.6
2038	1,666	25.56%	15.25%	10.31%	780.6	171.7	50.5	659.4
2039	1,733	25.56%	15.25%	10.31%	659.4	178.6	41.4	522.2
2040	1,803	25.56%	15.25%	10.31%	522.2	185.8	31.2	367.6
2041	1,875	25.56%	15.25%	10.31%	367.6	193.3	19.8	194.1
2042	1,950	25.56%	15.25%	10.31%	194.1	201.0	6.9	(0.0)

1. Amortization shown does not include the projected impact of currently deferred asset gains and losses.
2. Does not reflect projected impact on normal cost and contribution rate of future Plan 2 members.

6. Additional Actuarial Information

The schedule of funding progress is shown in Table 11 and compares assets and liabilities over the years. Primarily due to the poor investment returns of 2000 through 2003, as well as the extreme market downturn of 2008, the Plan is not fully funded. Another material factor in the increase in liabilities is the benefit enhancements triggered in 2007 (i.e., 65% Floor COLA and the 1.5% COLA for all retirees).

Table 12 compares the Actuarial Value of Valuation Assets to the types of Actuarial Accrued Liabilities, applying them first to active member contributions, then to retirees and beneficiaries, and then the remaining amount to the active members benefits. This is referred to as the Solvency Test. Although not required under GASB, this test is part of the CAFR guidelines specified by the Government Finance Officers Association (GFOA).

Table 11
Schedule of Funding Progress

(All dollar amounts in millions)

Actuarial Valuation Date January 1	Actuarial Value of Assets	Actuarial Accrued Liabilities (AAL)	Unfunded Actuarial Accrued Liabilities (UAAL)	Funded Ratio	Covered Payroll[1]	UAAL as a Percentage of Covered Payroll
1988	$ 445.4	$ 595.3	$ 149.9	74.8%	$ 199.0	75.3%
1990	558.8	737.9	179.1	75.7	212.3	84.4
1992	660.0	810.5	150.5	81.4	239.4	62.9
1994	781.8	926.2	144.4	84.4	291.8	49.5
1996	980.2	1,019.7	39.5	96.1	310.6	12.7
1997	1,094.8	1,087.3	(7.5)	100.7	316.9	(2.4)
1998 [2]	1,224.6	1,266.7	42.1	96.7	341.5	12.3
1999	1,375.0	1,326.6	(48.4)	103.6	370.4	(13.1)
2000	1,582.7	1,403.1	(179.6)	112.8	383.6	(46.5)
2002	1,383.7	1,581.4	197.7	87.5	405.1	48.8
2004	1,527.5	1,778.9	251.4	85.9	424.7	59.2
2006	1,791.8	2,017.5	225.8	88.8	447.0	50.5
2008	2,119.4	2,294.6	175.2	92.4	501.9	34.9
2010	1,645.3	2,653.8	1,008.5	62.0	580.9	173.6
2011	2,013.7	2,709.0	695.4	74.3	563.2	123.5
2012	1,954.3	2,859.3	905.0	68.3	557.0	162.5
2013	1,920.1	3,025.3	1,105.2	63.5	567.8	194.6
2014	2,094.3	3,260.1	1,165.8	64.2	597.9	195.0
2015	2,266.7	3,432.6	1,165.9	66.0	630.9	184.8
2016	2,397.1	3,605.1	1,208.0	66.5	641.7	188.3
2017	2,564.1	3,766.4	1,202.3	68.1	708.6	169.7
2018	2,755.2	3,941.8	1,186.6	69.9	733.3	161.8
2019	2,877.4	4,216.7	1,339.3	68.2	779.1	171.9
2020	3,040.7	4,411.1	1,370.4	68.9	785.6	174.4

1. Covered Payroll includes compensation paid to all active employees on which contributions are calculated. Covered Payroll differs from the Active Member Valuation Payroll shown in Table 1, which is an annualized compensation of only those members who were active on the actuarial valuation date.

2. Reflects increased COLA benefits adopted by the City Council after the valuation was completed.

Table 12
Solvency Test

(All dollar amounts in millions)

Actuarial Valuation Date January 1	Actuarial Value of Valuation Assets	Actuarial Accrued Liabilities for (A) Active Member Contributions	(B) Inactives, Retirees and Beneficiaries	(C) Active Members (Employer Financed Portion)	(D) Total	Portion of Actuarial Accrued Liabilities Covered by Assets (A)	(B)	(C)	(D)
1988	$ 445.4	$ 136.0	$ 303.6	$ 155.7	$ 595.3	100.0%	100.0%	37.0%	74.8%
1990	558.8	164.0	332.8	241.1	737.9	100.0	100.0	25.7	75.7
1992	660.0	202.6	357.9	250.0	810.5	100.0	100.0	39.8	81.4
1994	781.8	248.4	383.1	294.7	926.2	100.0	100.0	51.0	84.4
1996	980.2	294.1	409.3	316.3	1,019.7	100.0	100.0	87.5	96.1
1997	1,094.8	313.1	449.8	324.4	1,087.3	100.0	100.0	100.0	100.7
1998 [1]	1,224.6	337.3	551.8	377.6	1,266.7	100.0	100.0	88.9	96.7
1999	1,375.0	358.4	577.6	390.6	1,326.6	100.0	100.0	100.0	103.6
2000	1,582.7	385.2	599.4	418.5	1,403.1	100.0	100.0	100.0	112.8
2002	1,383.7	434.3	675.6	471.5	1,581.4	100.0	100.0	58.1	87.5
2004	1,527.5	482.5	758.9	537.5	1,778.9	100.0	100.0	53.2	85.9
2006	1,791.8	539.7	902.2	575.6	2,017.5	100.0	100.0	60.8	88.8
2008	2,119.4	590.1	1,084.9	619.6	2,294.6	100.0	100.0	71.7	92.4
2010	1,645.3	684.7	1,176.4	792.7	2,653.8	100.0	81.7	0.0	62.0
2011	2,013.7	683.7	1,290.9	734.4	2,709.0	100.0	100.0	5.3	74.3
2012	1,954.3	730.9	1,393.7	734.7	2,859.3	100.0	87.8	0.0	68.3
2013	1,920.1	757.3	1,513.4	754.6	3,025.3	100.0	76.8	0.0	63.5
2014	2,094.3	792.4	1,657.0	810.7	3,260.1	100.0	78.6	0.0	64.2
2015	2,266.7	829.7	1,753.5	849.4	3,432.6	100.0	82.0	0.0	66.0
2016	2,397.1	851.2	1,875.1	878.8	3,605.1	100.0	82.4	0.0	66.5
2017	2,564.1	888.1	1,975.1	903.2	3,766.4	100.0	84.9	0.0	68.1
2018	2,755.2	911.0	2,106.4	924.4	3,941.8	100.0	87.6	0.0	69.9
2019	2,877.4	929.0	2,349.3	938.4	4,216.7	100.0	82.9	0.0	68.2
2020	3,040.7	939.9	2,554.6	916.6	4,411.1	100.0	82.2	0.0	68.9

1. Reflects increased COLA benefits adopted by the City Council after the valuation was completed.

7. Actuarial Gains or Losses

An analysis of actuarial gains or losses was performed in conjunction with the January 1, 2018, January 1, 2019, and January 1, 2020 actuarial valuations.

The results of our analysis of the financial experience of the System in the three most recent actuarial valuations are presented in Table 13. Each gain or loss shown represents our estimate of how much the given type of experience caused the UAAL to change in the period since the previous actuarial valuation.

Gains and losses due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic assumption studies.

Table 13
Analysis of Actuarial Gains or Losses[1]

(All dollar amounts in millions)

	Gain/(Loss) For Period		
	2019	2018	2017
Investment Income Investment income on AVA was greater (less) than assumed.	$ (10.7)	$ (54.4)	$ 24.5
Pay Increases Pay increases were less (greater) than expected.	(13.5)	21.5	4.9
Age and Service Retirements Members retired at older (younger) ages or with less (greater) final average pay than expected.	(4.6)	2.3	4.6
Disability Retirements Disability claims were less (greater) than expected.	0.2	2.8	(0.1)
Death-in-Service Benefits Survivor claims were less (greater) than expected.	3.1	(0.4)	(1.4)
Withdrawal from Employment More (less) reserves were released by withdrawals than expected.	(7.9)	(16.6)	(6.2)
Death after Retirement Retirees died younger (lived longer) than expected.	(2.0)	(7.1)	1.4
Total Gain or (Loss) during Period from Financial Experience	$ (35.4)	$ (51.9)	$ 27.7
Non-Recurring Items:			
Changes in actuarial assumptions and plan amendments caused a gain (loss).	-	(104.8)	
Data revisions	12.8	-	-
Change in actuarial asset valuation method caused a gain (loss).	N/A	N/A	N/A
Composite Gain (Loss) During Period	$ (22.6)	$ (156.7)	$ 27.7

1. Effects related to losses are shown in parentheses. Numerical results are expressed as a decrease (increase) in the UAAL

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8. Contribution Rate Projections and Increases

This section of the January 1, 2020 actuarial valuation is devoted to a detailed discussion of the contribution rates currently needed, and projected to be needed, in order to effectively fund the System.

This section illustrates two key points:

1. As mentioned throughout this report, the current AVA is deferring a net gain. As a result, if no actuarial asset gains or losses were to occur over the next several years (i.e., the market return equals the return assumption of 7.25%), the employer actuarial contribution rate would be projected to decrease as the remaining deferred gains are fully phased in. As previously noted, investment returns in the first half of 2020 have been materially less than the 7.25% assumption, so this decrease may not come to fruition.
2. Based on this valuation, the total (member and employer) actuarial contribution rate is calculated to be 25.56% of payroll beginning January 1, 2021. Of this, 16.10% is the employer portion. The actual contribution rate needed will vary in the future. We have shown projections to roughly quantify the potential impact of good and bad investment experience.

Projection of Actuarially Required Contribution Rate

We have performed a five-year projection of the employer actuarially required contribution rate under three different scenarios:

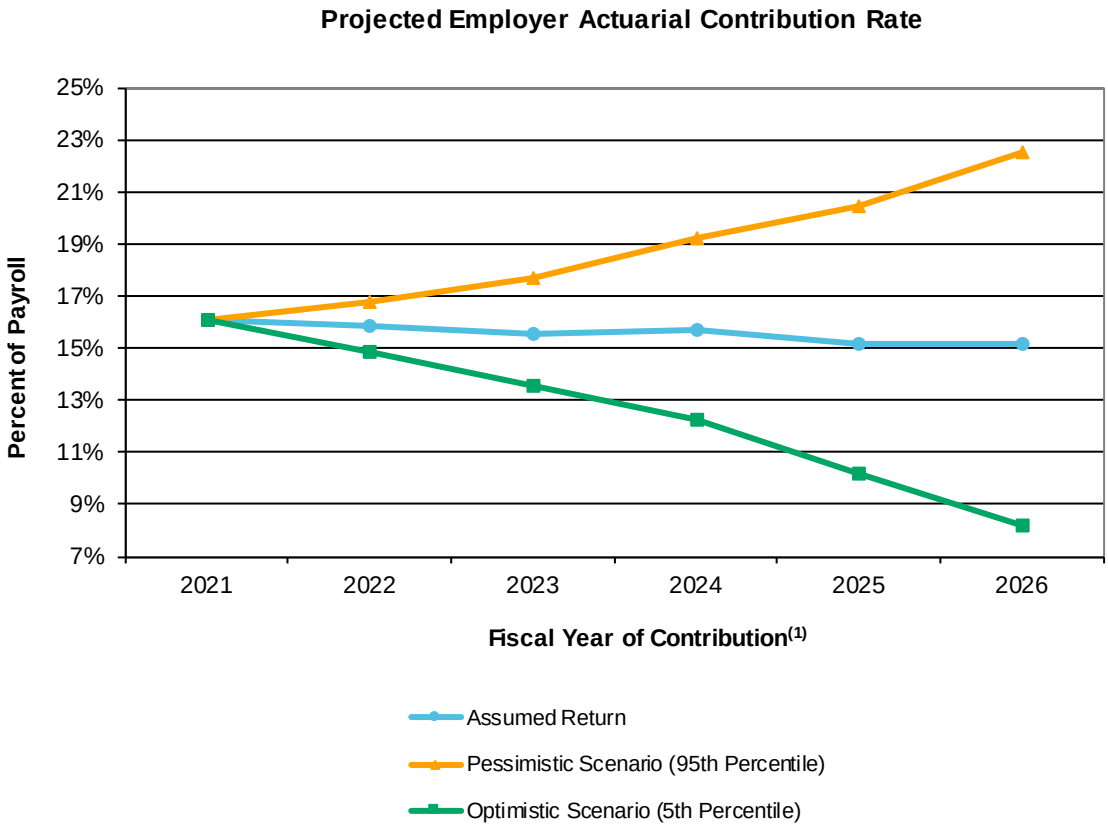
1. Assuming that the investment return assumption of 7.25% is met in each future year.
2. Assuming that the assets return at the 5th percentile.
3. Assuming that the assets return at the 95th percentile.

The result is effectively a 90% confidence interval (based on asset returns) of the projected employer contribution rates in these years. Note that in each scenario, all other actuarial assumptions are assumed to be met.

The projections assume the employer contributes the actuarially required contribution rate each year in the future. This rate is based on a 23-year closed amortization period as of January 1, 2020 and includes a 0.50% population growth assumption. Future returns at the 5th and 95th percentile are based on Milliman's capital market assumptions and SCERS's target asset allocation as of January 1, 2020.

Table 14 provides the results of these projections.

Table 14
Projected Total Contribution Rates



Projected Employer Actuarial Contribution Rate			
Contribution Year(1)	If Asset Return at 95th Percentile	Assuming 7.25% Future Returns	If Asset Return at 5th Percentile
2021	16.10%	16.10%	16.10%
2022	16.77%	15.83%	14.88%
2023	17.65%	15.57%	13.53%
2024	19.19%	15.66%	12.28%
2025	20.41%	15.13%	10.14%
2026	22.48%	15.13%	8.20%

1. Contribution year lags calculation year by one year. For example: Contribution Year 2021 is based on the 2020 valuation results, amortized over 23 years beginning in 2020, if the increase takes place in 2021.

Assumed Returns for Projection

The projection in Table 14 uses the 5th and 95th percentile returns based on SCERS' target asset allocation and Milliman's January 1, 2020 capital market assumptions. These percentile returns vary by the number of years of return; for example, the Contribution Year 2021 number assumes one year of return at the one-year 5th or 95th percentile rate; the Contribution Year 2022 number assumes two years of return at the two-year 5th or 95th percentile rate.

The percentile rates assumed for this analysis are shown in the table below:

Compounded Average Return for Period	Percentile	
	95th	*5th*
1-Year Period	*-11.8%*	*26.5%*
2-Year Period	*-7.0%*	*20.0%*
3-Year Period	*-4.8%*	*17.2%*
4-Year Period	*-3.4%*	*15.6%*
5-Year Period	*-2.5%*	*14.5%*

9. Projection of Benefit Payments and Contribution Dollars

Projection of Benefit Payments and Contribution Dollars

This section of the January 1, 2020 actuarial valuation illustrates projected SCERS benefit payments and dollar contributions over a 10-year period following the actuarial valuation.

These projections assume all actuarial assumptions, including 7.25% investment returns (on a market basis) in each future year, are met in the future.

The projection of contribution dollars makes the following three additional key assumptions:

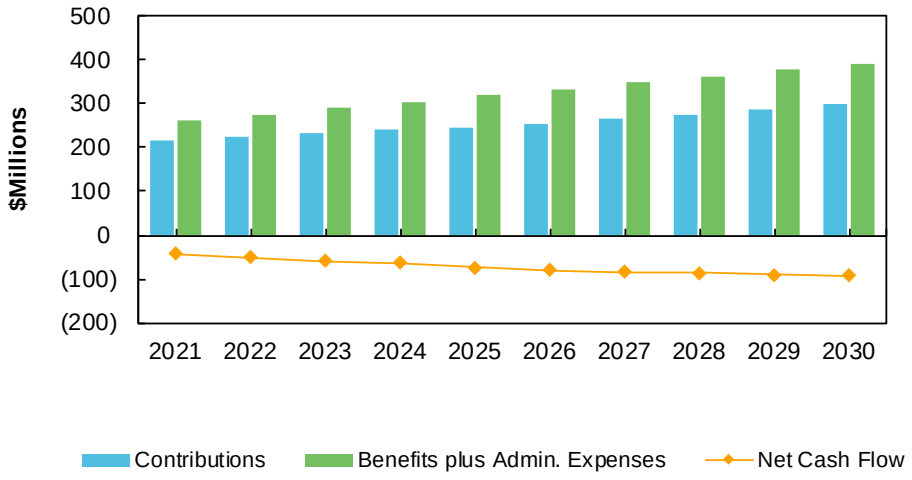
1. Valuation payroll is assumed to grow with both wage inflation of 3.50% and annual population growth of 0.50% (per current SCERS assumptions).
2. The City is assumed to make the employer actuarially required contribution rate calculated in each projection year.
3. Future recognition of currently deferred asset gains or losses is reflected in the projection.

Table 15 shows the results of these projections.

Table 15
10-Year Projection of Benefit Payments and Contributions[1]

Year	Projected Payroll	Projected Admin. Expenses	Projected Benefit Payments	Projected Total Cash Outflow	Projected Total Contributions	Projected Net Cash Flow
2021	$ 852.6	$ 6.8	$ 253.8	$ 260.6	$ 217.9	$ (42.7)
2022	886.9	7.1	269.1	276.2	224.3	(51.9)
2023	922.5	7.4	283.6	291.0	230.9	(60.1)
2024	959.6	7.7	297.7	305.4	241.0	(64.3)
2025	998.1	8.0	311.8	319.8	245.4	(74.3)
2026	1,038.2	8.3	326.3	334.6	255.3	(79.3)
2027	1,079.9	8.6	340.6	349.2	265.6	(83.7)
2028	1,123.3	9.0	354.4	363.4	276.2	(87.2)
2029	1,168.5	9.3	368.1	377.4	287.3	(90.1)
2030	1,215.4	9.7	381.6	391.3	298.9	(92.5)

Cash Flow Projections



1. Benefit payments do not include administrative expenses. Contributions include employer and member contributions.

10. Risk Disclosure

The purpose of this section is to identify, assess, and provide illustrations of risks that are significant to the System, and in some cases to the System's participants.

As plans mature, they accumulate larger pools of assets and liabilities. This increases the potential risk to plan funding and the finances of those who are responsible for plan funding. As shown by the Asset Volatility Ratio discussed later in this section, the System's assets are now much larger compared to payroll than in the past. The Asset Volatility Ratio example shows that because of this a 10% investment loss on assets today costs almost twice as much, when measured as a percent of payroll, than a 10% investment loss would have cost in 1986. Since pension plans make long-term promises and rely on long-term funding, it is important to consider how mature the plan is today, and how mature it may become in the future.

The results of any actuarial valuation are based on one set of assumptions. Although we believe the current assumptions for the System provide a reasonable estimate of future expectations, it is almost certain that future experience will differ from the assumptions to some extent. It is therefore important to consider the potential impacts of these potential differences between assumptions and experience when making decisions that may affect the future financial health of the System, or of the System's participants.

Actuarial Standard of Practice No. 51 (ASOP 51) addresses these issues by providing actuaries with guidance for assessing and disclosing the risk associated with measuring pension liabilities and the determination of pension plan contributions. Specifically, it directs the actuary to:

- Identify risks that may be significant to the plan.
- Assess the risks identified as significant to the plan. The assessment does not need to include numerical calculations.
- Disclose plan maturity measures and historical information that are significant to understanding the plan's risks.

This section uses the framework of ASOP 51 to communicate important information about significant risks to the System, the System's maturity, and relevant historical plan data.

Identification of Risks

There are a number of factors that affect future valuation results. To the extent actual experience for these factors varies from the assumptions, this will likely cause either increases or decreases in the plan's future funding level and calculated contribution rates. Examples of factors that can have a significant impact on valuation results are:

- Investment return, as this will impact the level of assets available to pay benefits
- Payroll variation, as this will impact the ability to finance unfunded amounts as a percent of future pay
- Salary variation, as this will impact the size of benefits members receive as a percent of final earnings
- Mortality, as this will impact how long retirees receive benefits
- Service retirement, as this will impact: how long retirees receive benefits, the size of retiree benefits, the amount of time to receive employer and employee contributions, and the amount of time for investment earnings to accumulate on those contributions
- Termination (members leaving active employment for reasons other than death, disability, or service retirement), as this will impact the size of those members benefits

Investment Return

Of the factors listed, we believe the factor with the greatest potential risk is future investment returns. For this reason, we studied this assumption in several scenarios in Section 8 of this report.

In Table 14, we performed a five-year projection of the employer actuarially required contribution rate under three different scenarios:

1. Assuming that the investment return assumption of 7.25% is met in each future year.
2. Assuming that the assets return at the 5th percentile.
3. Assuming that the assets return at the 95th percentile.

Demographic Experience

While future investment returns will likely cause the greatest deviation from expected experience, there are many other assumptions made in an actuarial valuation. For these assumptions, differences between actual and assumed experience will also result in actuarial gains and losses. Table 13 in Section 7 of this report provides a look at the impact in recent years of actual experience deviating from assumed.

Maturity Measures and Historical Information

The remainder of this section contains historical information concerning the System's Asset Volatility Ratio and Liability Volatility Ratio. Additional historical information can be found in Section 6 (Additional Actuarial Information). Some of the historical information in Section 6 also provides measures of the System's maturity including breakdowns of the System's liability and membership between active and inactive members.

Asset Volatility Ratios and Liability Volatility Ratios

The magnitude of any contribution rate increase or decrease is affected by the System's maturity level. As systems mature, they accumulate larger pools of assets. Gains and losses on these larger pools of assets create more volatility in the contributions needed to fund the system.

One indicator of this potential volatility is the Asset Volatility Ratio (AVR), which is equal to the Actuarial Value of Assets divided by total payroll. As assets grow compared to payroll, any percentage gain or loss on those assets will be larger compared to payroll. This causes any resulting changes in required contributions from those gains or losses to also be larger when measured as a percent of payroll. Therefore, plans with a high AVR will be subject to a greater level of volatility in required contributions. The AVR is a current measure since it is based on the current level of assets and will vary from year to year

The current AVR for SCERS is 3.9. The AVR grew from 2.2 in 1986 to a high of 4.2 in 2008. Although the AVR has somewhat leveled off recently, we expect the AVR will grow in future as contributions are made to pay off the UAAL that will increase asset growth. The following table provides an illustration of how increases in the AVR increase the volatility of contributions from asset gains and losses.

A return of negative 2.75% is a 10% loss for SCERS because it is 10% below the 7.25% investment return assumption. As shown in the table, if a return of negative 2.75% is not offset by future gains and the AVR is 2.2, the loss is expected to increase contributions by 1.3% of pay if amortized over 25 years and 1.9% of pay if the amortization period were 15 years. However, with the current AVR of 3.9, the same return is expected to increase contributions by 2.4% of payroll if amortized over 25 years and 3.4% of pay if the amortization period were 15 years.

Approximate eventual increases in contributions for an asset return 10% below the assumption if not offset by future gains

Asset Volatility Ratio = Assets / Payroll	25-Year Amortization	15-Year Amortization
2.2 (1986)	1.3% of payroll	1.9% of payroll
3.9 (current)	2.4% of payroll	3.4% of payroll

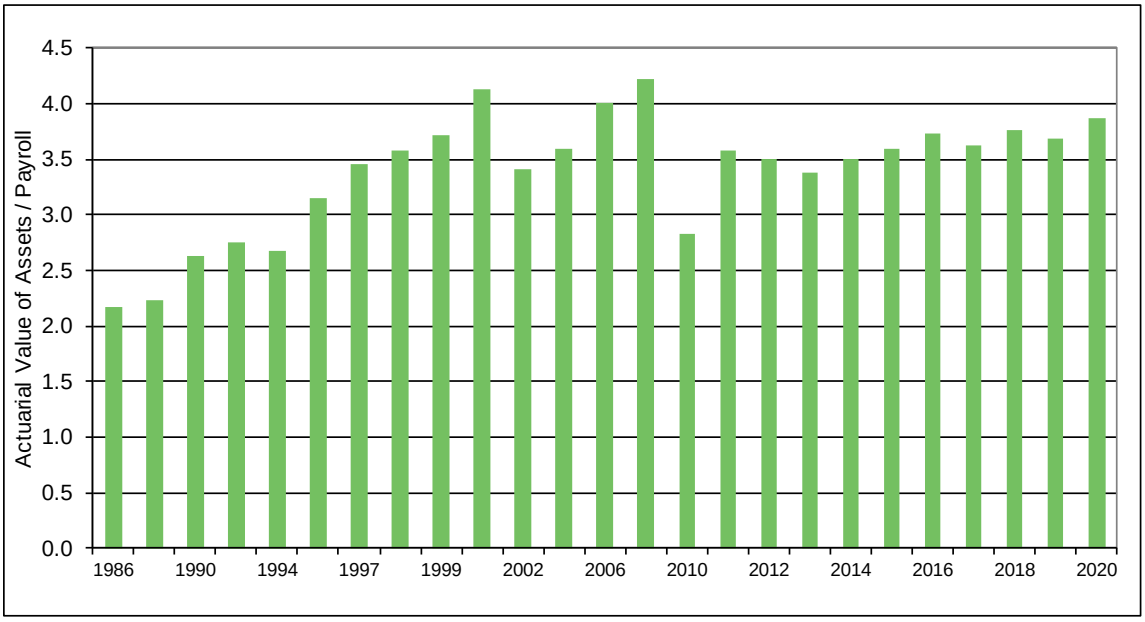
The graph at the top of Table 16 shows how the System matured during the last 30 years, as represented by the increasing AVR.

Another measure of a system's maturity is the Liability Volatility Ratio (LVR), which is equal to the AAL divided by the total payroll. This ratio provides an indication of the longer-term potential for contribution volatility for any given level of investment volatility. In addition, this ratio provides an indication of the potential contribution volatility due to liability experience (gains and losses) and liability re-measurements (assumption changes). For SCERS, the current LVR is 5.6.

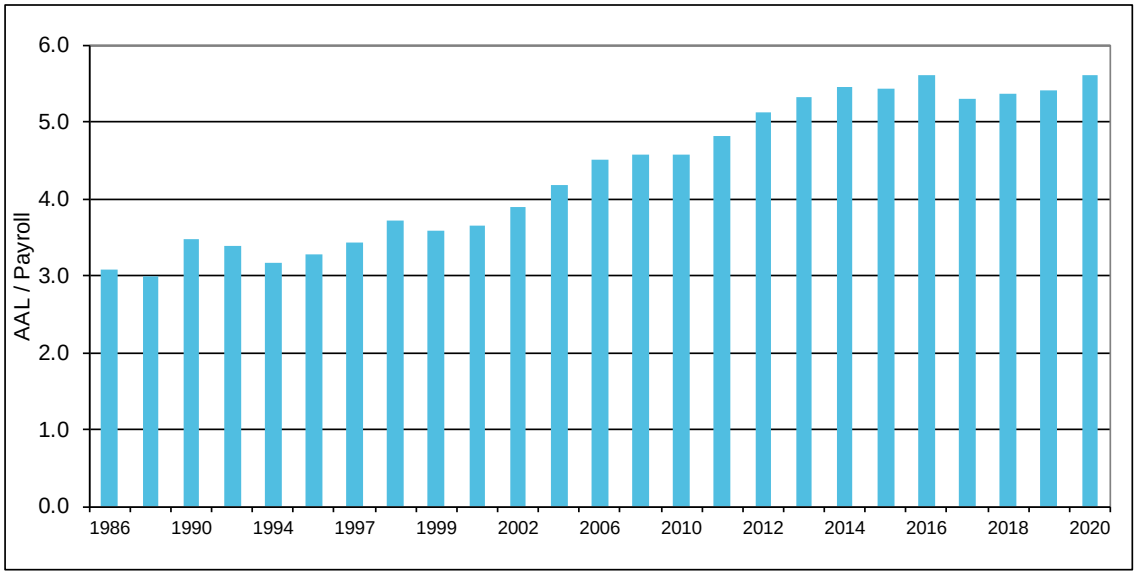
The graph at the bottom of Table 16 shows the historical LVR since 1986. It is a similar pattern to the Asset Volatility Ratio, except the increase is more gradual and the year-to-year variance is significantly less.

Table 16
Asset and Liability Volatility Ratios

Asset Volatility Ratios (Actuarial Value of Assets / Payroll)



Liability Volatility Ratios (Actuarial Accrued Liability / Payroll)



Appendix A Actuarial Procedures and Assumptions

This section of the report describes the actuarial procedures and assumptions used in this valuation. The assumptions used in this valuation were adopted by the SCERS Board at its July 2018 meeting. They are based on Milliman's Investigation of Experience for the period ending December 31, 2017. Further discussion and the rationale for the assumptions are shown in that report.

The actuarial assumptions used in the valuation are intended to estimate the future experience of the members of the System and of the System itself in areas that affect the projected benefit flow and anticipated investment earnings. Any variations in future experience from that expected from these assumptions will result in corresponding changes in the estimated costs of the System's benefits. Table A-1 summarizes the actuarial assumptions.

Table A-2 presents expected annual salary increases for various years of service. Tables A-3 through A-6 show rates of decrement for service retirement, disability, mortality, and other terminations of employment. Table A-7 shows probabilities of refund upon termination.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets, and (b) the actuarial present value of future normal costs is called the unfunded actuarial accrued liability or UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consist of financial information; records of age, sex, service, salary, contribution rates and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data were supplied by the System and are accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Employer Contributions

The employer actuarial contribution rate is determined as of the prior year's valuation such that the combined member and employer contribution rate is sufficient to amortize the UAAL over a closed 30-year period beginning January 1, 2013. The amortization payment is based on a level percent of pay.

Administrative Expense

The annual contribution assumed to be necessary to meet general administrative expenses of the system, excluding investment expenses, is 0.80% of members' salaries. This figure is included in the calculation of the normal cost rate.

Valuation of Assets

The assets are valued using a five-year smoothing method based on the difference between the expected market value and the actual market value of the assets in each year. The expected market value is the prior year's market value increased with the net increase in the cash flow, all increased with interest during the past fiscal year at the expected investment return rate assumption.

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 7.25%. This rate is compounded annually and is net of investment expenses.

Postretirement Benefit Increases

Postretirement benefit increases include:

- Automatic 1.5% Annual COLA – This benefit applies to all members.
- 65% Restoration of Purchasing Power (ROPP) – The member's benefit is the greater of 65% of the annual initial benefit adjusted for CPI or their applicable benefit. This minimum benefit is available to all retirees and beneficiaries. The financial impact of the ROPP benefit is valued assuming an annual price inflation rate of 2.75%.

Additional contingent COLA increases that were adopted in 2001, but not effective until the System reaches at least a 100% Funding Ratio, are not included in the valuation results.

Valuation Services

The projected salary for the valuation year is equal to the member's hourly pay rate multiplied by 2088 with the following adjustments:

- Annualized pay for members who entered in year preceding valuation year.
- Multiplied hourly pay rate by minimum of 1,040 and actual hours worked in prior year for part-time employees.

Future Salaries

Table A-2 illustrates the rates of future (after the valuation year) salary increases assumed for the purpose of the valuation. In addition to increases in salary due to promotions and longevity, this scale includes an assumed 3.50% per annum rate of increase in the general wage level of the membership.

Service Retirement

Table A-3 shows the annual assumed rates of retirement among members eligible for service retirement or reduced retirement. Separate rates are also used during the first year a member is eligible for service retirement.

Disability

The rates of disability used in this valuation are illustrated in Table A-4. It is assumed that one-third of all disabilities are duty related and two-thirds occur while off duty.

Mortality

The mortality rates used in this valuation are illustrated in Table A-5. A written description of each table used is included in Table A-1.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability, or retirement are shown for representative ages in Table A-6. Note that this assumption only applies to members who terminate and are not yet eligible for retirement.

Probability of Refund

Terminating members may forfeit a vested right to a deferred benefit if they elect a refund of their accumulated contributions. Table A-7 gives the assumed probability, at selected ages, that a terminating member will elect to receive a refund of accumulated contributions instead of a deferred benefit.

If a member terminates with more than 20 years of service, there is assumed to be a 20% probability that the member will elect a refund.

Note that the probability of refund assumption only applies to members who terminate with a vested benefit and are not yet eligible for retirement.

Interest on Member Contributions

Interest on member contributions made prior to January 1, 2012 is assumed to accrue at a rate of 5.75% per annum, compounded annually. Interest on member contributions made on or after January 1, 2012 is assumed to accrue at 4.00%.

Portability

The cost of portability with other public retirement systems is not included in this valuation.

Probability of Marriage

We assumed 60% of the active members are married or have a registered domestic partner.

Commencement for Terminated Vested Members

Vested members who terminate but elect to leave their contributions in the System are assumed to commence receiving benefits at age 62.

Table A-1
Summary of Valuation Assumptions

January 1, 2020

Economic assumptions	
A. Price inflation	2.75%
B. General wage increases	3.50
C. Investment return	7.25
D. Increase in membership	0.50
E. Interest on member accounts	5.75/4.00[1]
Demographic assumptions	
A. Salary increases due to promotion and longevity	Table A-2
B. Retirement	Tables A-3
C. Disability	Table A-4
D. Mortality[2] among contributing members	Table A-5
Males RP-2014 Employees Table for Males, adjusted by 60%.	
Females RP-2014 Employees Table for Females, adjusted by 95%.	
E. Mortality[2] among service retired members and beneficiaries	Table A-5
Males RP-2014 Healthy Annuitant Males, adjusted by 95%.	
Females RP-2014 Healthy Annuitant Females, adjusted by 95%.	
F. Mortality[2] among disabled members	Table A-5
Males RP-2014 Disabled Males, adjusted by 95%.	
Females RP-2014 Disabled Females, adjusted by 95%.	
G. Other terminations of employment	Table A-6
H. Probabilities of vesting on termination	Table A-7

1. Member contributions made prior to January 1, 2012 are assumed to accrue interest at 5.75%; contributions made on or after that date are assumed to accrue at 4.00%.

2. All mortality tables are generational using the MP-2014 Ultimate projection scale to reflect future mortality improvement.

Table A-2
Future Salaries – Plans 1 and 2

Years of Service	Annual Rate of Increase: Promotion and Longevity	Annual Rate of Increase: Total[1]
0 to 1	4.25%	7.90%
1 to 2	3.25	6.86
2 to 3	2.50	6.09
3 to 4	1.75	5.31
4 to 5	1.25	4.79
9 to 10	0.65	4.17
14 to 15	0.40	3.91
19 to 20	0.29	4.05
24 to 25	0.27	3.78
29 to 30	0.25	3.76
35 or more	0.25	3.76

1. Total rate shown reflects compounded effect of merit increase and assumed wage growth of 3.50%.

Table A-3
Retirement – Plan 1[1]

	Annual Probability			
	Male		Female	
Age	Eligible for Reduced Benefits	Eligible for Full Benefits	Eligible for Reduced Benefits	Eligible for Full Benefits
Less than 50	0.0%	8.0%	0.0%	10.0%
50	4.0	8.0	4.0	10.0
51	4.0	8.0	4.0	10.0
52	4.0	10.0	4.0	12.0
53	3.0	10.0	4.0	12.0
54	4.5	10.0	4.0	12.0
55	6.0	10.0	6.0	12.0
56	5.0	10.0	5.0	12.0
57	5.0	10.0	5.0	12.0
58	5.0	10.0	5.0	12.0
59	5.0	10.0	7.0	12.0
60	6.0	15.0	8.0	15.0
61	7.5	15.0	10.0	15.0
62	14.0	25.0	15.0	25.0
63	10.0	20.0	12.0	20.0
64	10.0	20.0	12.0	20.0
65		35.0		35.0
66		40.0		40.0
67		40.0		40.0
68		35.0		35.0
69-74		35.0		35.0
75		[2]		[2]

1. For Plan 2, 80% of the Plan 1 retirement rates are assumed at ages less than 62. The same retirement rates for ages 62 and later are assumed for Plan 1 and 2.
2. Immediate retirement is assumed for every person age 75 or over.

Table A-4
Disability – Plans 1 and 2[1]

Age	Annual Rates	
	Male	Female
20	.00%	.00%
25	.00	.00
30	.02	.02
35	.02	.02
40	.03	.03
45	.03	.03
50	.04	.04
55	.04	.04
60	.04	.04
65	.00	.00

1. It is assumed that one-third of all disabilities are duty related and two-thirds are non-duty related.

Table A-5
Mortality – Plans 1 and 2

	Annual Probability[1]					
	Contributing Members		Members Retired for Service and Beneficiaries of Members		Disabled Members	
Age	Males	Females	Males	Females	Males	Females
22	0.03 %	0.02 %	0.11 %	0.04 %	0.81 %	0.21 %
27	0.03	0.02	0.10	0.04	0.75	0.24
32	0.03	0.02	0.11	0.06	0.79	0.32
37	0.03	0.03	0.13	0.08	0.92	0.42
42	0.04	0.05	0.17	0.11	1.21	0.62
47	0.07	0.08	0.28	0.19	1.75	0.97
52	0.12	0.12	0.45	0.29	2.05	1.23
57	0.20	0.18	0.62	0.39	2.33	1.47
62	0.35	0.27	0.84	0.58	2.69	1.74
67	0.61	0.43	1.23	0.92	3.29	2.21
72	N/A	N/A	1.91	1.48	4.29	3.10
77	N/A	N/A	3.11	2.43	5.88	4.57
82	N/A	N/A	5.27	4.11	8.47	6.79
87	N/A	N/A	9.22	7.22	12.72	10.02
92	N/A	N/A	15.91	12.66	19.20	14.74

Annual Projected Mortality Improvement

Age	All Groups
67 & Less	1.00 %
72	1.00
77	1.00
82	1.00
87	0.97
92	0.90
97	0.77
102	0.55
107	0.34
112	0.13
115	-

1. Mortality rates are those applicable for the fiscal year beginning in 2014. Annual projected improvements are assumed in the following years under the schedule shown. For example, the annual mortality rate for an 82-year old male in fiscal year beginning in 2020 is 4.966% calculated as follows:

Age 82 rate in 2020 = Age 82 rate in 2014 with 6 years improvement

= 5.27497% x (100.0% - 1.0%) x (100.0% - 1.0%) x (100.0% - 1.0%) x (100.0% - 1.0%) x (100.0% - 1.0%) x (100.0% - 1.0%) = 4.966%

Table A-6
Other Terminations of Employment Among Members Not Eligible to Retire – Plans 1 and 2

Years of Service	Annual Rates for Males	Annual Rates for Females
0 to 1	6.5%	8.5%
1 to 2	5.8	8.3
2 to 3	5.3	8.0
3 to 4	4.8	7.8
4 to 5	4.4	7.5
5 to 6	4.1	7.0
6 to 7	3.8	6.3
7 to 8	3.5	5.7
8 to 9	3.2	5.1
9 to 10	2.9	4.5
10 to 11	2.6	4.1
11 to 12	2.3	3.8
12 to 13	2.1	3.4
13 to 14	1.9	3.1
14 to 15	1.7	2.7
15 to 16	1.5	2.4
16 to 17	1.4	2.0
17 to 18	1.2	1.7
18 to 19	1.1	1.4
19 to 20	1.0	1.2
20 to 21	0.9	1.1
21 to 22	0.8	1.0
22 to 23	0.8	0.9
23 to 24	0.7	0.8
24 to 25	0.7	0.8
25 to 26	0.6	0.7
26 to 27	0.6	0.7
27 to 28	0.5	0.6
28 to 29	0.5	0.6
29 to 30	0.4	0.5
30 or more	0.5	0.5

Table A-7
Probability of Refund – Plans 1 and 2

Age	Probabilities of Refund upon Termination[1]
25	70.0%
30	58.0
35	40.0
40	35.0
45	35.0
50	35.0
55	36.0
60	40.0

1. If service is 20 or more years at termination, probability of refund is equal to 20%.

Appendix B Provisions of Governing Law

All actuarial calculations are based upon our understanding of the provisions governing the Seattle City Employees' Retirement System, Chapter 4.36 of the Seattle City Code. The benefit and contribution provisions are summarized briefly below, along with corresponding references to the City code. This summary encompasses the major provisions of the System; it does not attempt to cover all of the detailed provisions.

Effective Date	The effective date of the retirement system was July 1, 1929. (Section 4.36.080)
Membership	
Plan 1	Employees whose membership date is prior to January 1, 2017. (Section 4.36.060)
Plan 2	Employees whose membership date is on or after January 1, 2017. (Section 4.36.060)
Members' Contribution Rate	
Plan 1	The members' contribution rate is 10.03% of salary as of January 2012. Certain members who were contributing at a lower rate on June 23, 1972 continue to contribute at a lower rate. (Section 4.36.540A)
Plan 2	The members' contribution rate is 7.00% of salary as of January 2017. (Section 4.36.540B)
Employer Contribution Rate	The employer contribution rate is the amount that is actuarially determined to be necessary to fund that portion of the retirement allowances not covered by the members' contributions. This amount shall be at least the members' contribution rate. (Section 4.36.545)
Final Compensation	
Plan 1	Final compensation is based on highest average compensation (excluding overtime) during any consecutive 24 months. (Sections 4.36.040 and 4.36.050)
Plan 2	Final compensation is based on highest average compensation (excluding overtime) during any consecutive 60 months. (Sections 4.36.040 and 4.36.050)
Service Retirement	
Plan 1	*Eligibility* 30 years of service; Age 52 and 20 years of service; Age 57 and 10 years of service; or Age 62 and 5 years of service. *Normal Form* Straight life benefit. *Optional Forms* Actuarial equivalent according to the mortality and interest basis adopted by the Retirement Board for such purposes.

Service Retirement
Plan 1 (continued)

Amount of Allowance
The total monthly allowance is generally 2% times final compensation times total years of creditable service.

However, if the member does not qualify in one of the following ways, the 2% factor is reduced by 0.1% for each year that retirement precedes the earliest date the member would be:

(a) Any age with 30 years of service.
(b) Age 51-59, providing the member's age and years of service total 80 or more.
(c) Age 60 or older with 20 years of service.
(d) Age 65 or older with five years of service.

The reduction is somewhat less than 0.1% for members with less than 20 years of service.

For those hired on or after January 1, 1988, creditable service excludes the first six months of service.

Maximum Allowance
The formula-based retirement allowance (as described above) of any member shall be limited to 60% of final compensation, except where the minimum allowance described below applies.

Minimum Allowance
A monthly benefit based on twice the actuarial value of accumulated member contributions. This is not subject to the 60% of final compensation maximum. (Sections 4.36.600, 4.36.605, 4.36.610 and 4.36.640)

Note: Effective January 1, 2020, the conversion of the contributions to an annuity benefit in the minimum allowance reflects option factors that use the new mortality rates.

Service Retirement
Plan 2

Eligibility
Age 55 and 20 years of service;
Age 57 and 10 years of service; or
Age 60 and 5 years of service.

Normal Form
Straight life benefit

Optional Forms
Actuarial equivalent according to the mortality and interest basis adopted by the Retirement Board for such purposes.

Amount of Allowance
The total monthly allowance is generally 1.75% times final compensation times total years of creditable service.

Service Retirement

Plan 2 (continued)

However, if the member does not qualify in one of the following ways, the 1.75% factor is reduced by 0.07% for each year that retirement precedes the earliest date the member would be:

(a) 55-64, providing the member's age and years of service total 85 or more.
(c) Age 55 or older with 30 years of service.
(d) Age 65 or older with five years of service.

The reduction is somewhat more than 0.07% for members with less than 20 years of service.

(Sections 4.36.607, 4.36.608, 4.36.610 and 4.36.640)

Disability Retirement

Plans 1 and 2

Eligibility
Ten years of service credited within the 15 years preceding disability retirement. If disability occurs in the course of City employment, there is no service requirement.

Normal Form
Modified cash refund annuity. An optional survivor's benefit is available if the spouse is the beneficiary.

Amount of Allowance
The total monthly disability allowance is the greater of:

(a) 1.5% times final compensation times completed years of creditable service.
(b) 1.5% times final compensation times total years of creditable service that could have been earned to age 62, but not to exceed one-third of final compensation.

Maximum Allowance
The maximum disability allowance is 60% of final compensation.

Minimum Allowance
The minimum disability allowance is $140 per month.
(Sections 4.36.645 and 4.36.650)

Death Benefits

Plans 1 and 2

Retired Members
Death benefits to retired members are payable according to the form of retirement allowance elected.

Active Members
(a) Payment to the beneficiary of accumulated contributions, including interest; or
(b) If the member had completed 10 years of service at the time of death, a surviving spouse or a registered domestic partner may elect to receive, in place of (a) above, either:
  (1) A monthly allowance for life equal to the benefit the spouse would have received had the member just retired with a 100% contingent annuitant option in force; or
  (2) A cash payment of no more than one-half of the member's accumulated contributions, along with a correspondingly reduced retirement allowance.

(Section 4.36.680)

Withdrawal Benefits

Plans 1 and 2

Form of Payment
Payment of accumulated contributions, with interest.
(Section 4.36.665A)

Vested Withdrawal Benefits

Plans 1 and 2

Eligibility
Five years of service.

Amount of Allowance
Same as service retirement benefit.

Plan 1

Benefits Commence
Age 52, if 20 or more years of service;
Age 57, if 10-19 years of service; or
Age 62, regardless of years of service.
(Section 4.36.665)

Plan 2

Benefits Commence
Age 55, if 20 or more years of service;
Age 57, if 10-19 years of service; or
Age 60, regardless of years of service.
(Section 4.36.665)

Postretirement Benefit Increases

Plans 1 and 2

Provisions
Effective January 1, 2007, the City Council adopted a 65% Restoration of Purchasing Power benefit and an automatic 1.5% annual COLA to all members. If the System reaches a 100% Funding Ratio, the restoration amount increases to 70%.
(Section 4.36.615)

Death Benefit System

Plans 1 and 2

Eligibility
Mandatory for all active members; optional for retired members.

Benefits
$2,000 upon the death of an active member or a participating retired member.

Assessment
Members pay an assessment of $12 per year; the City pays a matching amount. If these assessments are not adequate, additional amounts may be transferred from the interest earnings in the retirement fund.
(Sections 4.36.690 and 4.36.695)

Additional Contributions

Plans 1 and 2

Provisions
Members may voluntarily make contributions in excess of the regular rate; these are make-up contributions that apply only in specific situations.

Retirement Benefit
A monthly annuity which is the actuarial equivalent of accumulated additional contributions with interest.

Other Benefits
Accumulated additional contributions, with interest, generally become payable upon termination other than retirement.
(Sections 4.36.030 and 4.36.540A)

Appendix C Valuation Data

This valuation is based upon the membership of the system as of January 1, 2020. Membership data were supplied by the System and accepted for valuation purposes without audit. However, extensive tests were performed to ensure that the data are sufficiently accurate for valuation purposes.

The data for all contributing members, former contributing members, and their survivors are summarized in Table C-1.

Tables C-2 through C-4 present distributions of members receiving service retirement benefits, members receiving disability retirement benefits, and survivors receiving benefits. Shown in the tables are the numbers of persons receiving benefits, the total annual benefits received (including payments for the annual bonus), and the average annual benefit per recipient.

Table C-5 contains summaries of the data for contributing members. Values shown in the tables are the numbers of members and their total and average annual salaries.

The valuation also includes liabilities attributable to members who have terminated employment but have neither retired nor withdrawn their contributions.

Table C-1
Summary of Membership Data

	Contributing Members			Annuitants		
	Number	Annual Salaries ($1,000)	Average Annual Salaries	Number	Annual Benefits ($1,000)	Average Annual Benefits
January 1, 2020	9,440	$ 819,738	$ 86,833	7,029	$ 214,193	$ 30,473
January 1, 2019	9,388	777,619	82,831	6,792	197,256	29,042
January 1, 2018	9,284	760,987	81,968	6,534	182,794	27,976
January 1, 2017	9,151	725,580	79,288	6,382	174,933	27,411
January 1, 2016	8,882	686,748	77,317	6,223	165,836	26,650
January 1, 2015	8,746	647,800	74,068	6,019	155,597	25,852
January 1, 2014	8,603	606,888	70,548	5,880	147,145	25,026
January 1, 2013	8,465	579,396	68,449	5,742	137,836	24,006
January 1, 2012	8,430	560,412	66,476	5,580	128,645	23,056
January 1, 2011	8,599	569,472	66,225	5,428	118,920	21,909
January 1, 2010	9,071	596,892	65,802	5,304	108,886	20,529
January 1, 2008	8,842	529,062	59,835	5,201	102,772	19,760
January 1, 2006	8,521	468,096	54,934	5,011	83,988	16,761
January 1, 2004	8,382	441,562	52,680	4,876	74,341	15,246
January 1, 2002	8,758	418,908	47,831	4,733	61,801	13,058
January 1, 2000	8,669	382,620	44,137	4,681	55,542	11,865
January 1, 1999	7,779	333,984	42,934	4,644	52,482	11,301

Table C-2
Members Receiving Service Retirement Benefits as of January 1, 2020 – Inactive Lives

		<50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+	Totals
Number of Persons		0	19	219	750	1,592	1,635	973	524	265	228	6,205
Annual Benefits in Thousands	$	0	1,127	9,117	29,471	53,519	52,271	28,316	12,914	6,386	4,536	197,657
Average Annual Benefits	$	0	59,302	41,629	39,295	33,617	31,970	29,102	24,646	24,099	19,897	31,855

Table C-3
Members Receiving Disability Retirement Benefits as of January 1, 2020 – Inactive Lives

		<50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+	Totals
Number of Persons		0	3	10	14	8	4	3	3	1	1	47
Annual Benefits in Thousands	$	0	54	195	288	126	67	38	44	*	*	812
Average Annual Benefits	$	0	17,892	19,509	20,587	15,808	16,724	12,642	14,513	*	*	17,273

Table C-4
Survivors Receiving Retirement Benefits as of January 1, 2020 – Inactive Lives

	<50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+	Totals
Number of Persons	7	11	25	53	88	101	93	81	81	148	688
Annual Benefits in Thousands	$ 86	168	593	1,156	1,893	1,938	2,196	1,647	1,672	2,837	14,186
Average Annual Benefits	$ 12,223	15,284	23,727	21,802	21,513	19,191	23,617	20,329	20,646	19,167	20,619

** Benefit amounts for groups with only one member not shown*

Note: In addition, 89 survivors are receiving $1,537,941 in Option B or Option C benefits for a certain period only.

Table C-5
Distribution of Employees and Salaries as of January 1, 2020 – Active Lives

Number of Employees - By Age Group

Nearest Year of Service	<20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+	Totals
0	1	41	82	84	64	54	60	45	33	20	8	4	496
1	1	47	122	144	142	117	81	66	59	33	7	2	821
2		17	108	168	139	91	84	68	57	33	12	8	785
3-4		7	121	232	254	184	157	141	103	78	24	11	1,312
5-9		2	69	208	331	300	269	200	168	138	54	23	1,762
10-14			1	51	209	286	287	241	229	169	49	22	1,544
15-19				1	39	155	169	219	219	162	54	19	1,037
20-24					1	26	140	195	198	168	48	13	789
25-29							28	111	154	125	45	14	477
30-34								16	86	92	36	10	240
35-39									25	62	36	4	127
40+										17	26	7	50
Totals	2	114	503	888	1,179	1,213	1,275	1,302	1,331	1,097	399	137	9,440

Monthly Salaries in Thousands - By Age Group

Nearest Year of Service	<20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+	Totals
0	$ 3	$ 173	$ 460	$ 494	$ 395	$ 333	$ 350	$ 252	$ 182	$ 98	$ 41	$ 9	$ 2,790
1	2	202	643	898	924	750	564	451	369	181	36	5	5,026
2		74	601	1,102	980	664	571	442	375	224	53	30	5,116
3-4		31	706	1,516	1,825	1,341	1,204	1,056	729	552	113	24	9,097
5-9		17	398	1,434	2,586	2,309	2,112	1,483	1,327	1,068	435	133	13,302
10-14			6	362	1,482	2,200	2,255	1,816	1,646	1,227	333	120	11,447
15-19				7	291	1,157	1,329	1,760	1,706	1,208	371	129	7,957
20-24					7	197	1,205	1,600	1,570	1,327	371	90	6,367
25-29							220	873	1,265	1,013	357	100	3,828
30-34								134	664	753	319	88	1,959
35-39									207	526	294	37	1,064
40+										135	179	44	358
Totals	5	497	2,814	5,814	8,490	8,952	9,808	9,867	10,040	8,313	2,902	809	68,311

Table C-5
Distribution of Employees and Salaries as of January 1, 2020 – Active Lives (continued)

Average Monthly Salaries - By Age Group

Nearest Year of Service	<20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+	Totals
0	$ 3,062	$ 4,228	$ 5,604	$ 5,887	$ 6,166	$ 6,165	$ 5,825	$ 5,604	$ 5,507	$ 4,880	$ 5,186	$ 2,374	$ 5,625
1	1,531	4,297	5,272	6,239	6,504	6,414	6,960	6,837	6,259	5,496	5,189	2,534	6,122
2		4,366	5,567	6,560	7,052	7,295	6,797	6,499	6,582	6,778	4,394	3,720	6,517
3-4		4,361	5,835	6,535	7,185	7,288	7,668	7,487	7,079	7,083	4,716	2,206	6,934
5-9		8,366	5,768	6,894	7,814	7,696	7,852	7,414	7,897	7,742	8,049	5,788	7,549
10-14			6,363	7,107	7,090	7,692	7,856	7,535	7,189	7,261	6,796	5,443	7,414
15-19				6,582	7,470	7,467	7,862	8,037	7,791	7,455	6,864	6,766	7,673
20-24					6,802	7,591	8,607	8,203	7,927	7,898	7,729	6,945	8,069
25-29							7,841	7,867	8,212	8,106	7,938	7,139	8,025
30-34								8,405	7,726	8,188	8,858	8,777	8,162
35-39									8,264	8,488	8,178	9,234	8,379
40+										7,933	6,885	6,348	7,167
Totals	2,297	4,358	5,595	6,547	7,201	7,380	7,693	7,579	7,543	7,578	7,274	5,908	7,236

Appendix D Glossary

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases, the definitions have been modified for specific applicability to the Seattle City Employees' Retirement System. Defined terms are capitalized throughout this Appendix.

Accrued Benefit

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

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

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gain (Loss)

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

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

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

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability (UAAL).

Entry Age Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

Funding Ratio

The Actuarial Value of Assets divided by the Actuarial Accrued Liability. May also be calculated as the Market Value of Assets divided by the Actuarial Accrued Liability, in which case it is indicated that the Funding Ratio is shown on a Market Value basis.

Normal Cost

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

Projected Benefits

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

Surplus Funding

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

Unaccrued Benefit

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

Unfunded Actuarial Accrued Liability

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