# Seattle City Employees' Retirement System

## January 1, 2018 Actuarial Valuation

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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, 2018. This report reflects the benefit provisions and calculated contribution rates in effect as of January 1, 2018.

**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 our best 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.

The Retirement Board elected to use the same assumptions for this valuation as were used in the January 1, 2017 funding valuation. These assumptions are disclosed in Appendix A. New assumptions were adopted at the July Board meeting for use in January 1, 2019 funding valuation. These new assumptions are disclosed in our 2014-2017 Investigation of Experience report, with the exception that an alternative set of economic assumptions was adopted as follows:

| Economic Assumptions | Assumptions used in Funding Valuation | |
|---|---|---|
| | 1/1/2018 | 1/1/2019 |
| Investment Return Assumption[1] | 7.50% | 7.25% |
| Consumer Price Inflation | 3.25% | 2.75% |
| Real Wage Inflation | 0.75% | 0.75% |
| Wage Growth *(price inflation plus wage inflation)* | 4.00% | 3.50% |
| Active Membership Growth | 0.50% | 0.50% |
| Payroll Growth *(wage & membership growth)* | 4.52% | 4.02% |
| Interest on Post-2011 Contributions | 4.75% | 4.00% |

*1. Net of investment expenses.*

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 pension 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. 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 appreciation to the system staff, including Mr. Jeff Davis and Ms. Paige Alderete, who gave substantial assistance in supplying the data on which this report is based.

Respectfully submitted,

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# Section 1 Summary of the Findings

| | January 1, 2018 | January 1, 2017 |
|---|---|---|
| **Total Actuarial Contribution Rate** | 24.40% | 25.00% |
| **Employer Actuarial Contribution Rate** | 14.55% | 14.97% |
| **Funding Ratio** | 69.9% | 68.1% |

## Overview

We are pleased to present the results of the January 1, 2018 actuarial valuation. This valuation determines the minimum actuarially required employer contribution rate (referred to as the employer actuarial contribution rate) payable beginning January 1, 2019 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, 2017, the SCERS assets returned around 15.8% on a market value basis (net of investment expenses) and 8.5% on an actuarial value basis. These rates of return were greater than the assumed rate. From January 1, 2017 to December 31, 2017, the SCERS assets were assumed to earn 7.50%. The result is an actuarial gain on assets for the 2017 year. Note that only one-fifth of this gain will be recognized in the current year Actuarial Value of Assets (AVA), due to the asset smoothing method; see Section 3 of this report for details.

- **Employer Contribution Rate:** The employer actuarial contribution rate has decreased from the prior valuation, from 14.97% to 14.55% of payroll. New assumptions will be used in the January 1, 2019 funding valuation that will increase the employer actuarial contribution rate for the City. Our understanding is that the employer is currently contributing at a rate greater than the minimum 14.97% for 2018. We suggest consideration be given to maintaining or increasing the employer contribution rate to reduce the magnitude of the projected increase in the next valuation.

- **Funding Progress:** On the basis of the January 1, 2017 actuarial valuation, the Funding Ratio (which is measured as the AVA divided by the Actuarial Accrued liability) was 68.1%. Based on the January 1, 2018 valuation, the Funding Ratio has increased to 69.9%.The most significant factors causing this increase were the greater than expected investment return and the amortization payment made by the City during the prior year. Note that these Funding Ratios are 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.

- **Funding Policy:** In August 2013, the Seattle City Council passed a resolution to formally close the period over which any SCERS UAAL will be amortized. This resolution stipulated that the 30-year amortization period would be closed as of the January 1, 2013 actuarial valuation. The result is that, for purposes of the January 1, 2018 valuation calculation, a 25-year remaining closed period is in effect.

**Overview (continued)**

- **New Assumptions Deferred:** The Board adopted new assumptions at its July 2018 Board meeting to be used for the January 1, 2019 funding valuation. For this valuation, which determines the employer actuarial contribution rate to be paid for 2019, the assumptions used in the prior valuation are used. If the new assumptions had been used for this valuation, the employer contribution would have been 0.93% of pay higher (15.48% compared to 14.55%) and the Funding Ratio would have been 1.7% lower (68.2% compared to 69.9%) than reported in this valuation.
- **SCERS Plan 2:** This valuation reflects Plan 2 members, those who first entered SCERS on January 1, 2017 and later. Plan 2 members have a lower contribution rate and level of benefits which resulted in a modest decrease in the overall normal cost rate of SCERS.

**Employer Actuarial Contribution Rate**

Based on the actuarial valuation of the benefits in effect under the SCERS as of January 1, 2018, the total actuarially required contribution rate decreased from 25.00% to 24.40% for the year beginning January 1, 2019.

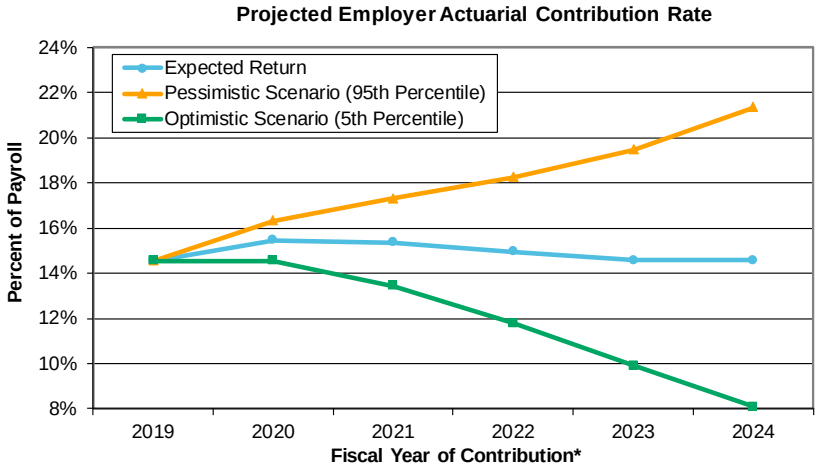
The current contribution rates for the death benefit program are projected to be sufficient to finance the $2,000 death benefit.

Based on the average member contribution rate of 9.85% (a blend of the 10.03% for Plan 1 members and 7.00% for Plan 2 members), the employer actuarial contribution rate may be decreased from 14.97% to 14.55% effective January 1, 2019. This reflects the City's commitment to fund at least the actuarially determined contribution rate, which is based on a 25-year amortization of the UAAL beginning January 1, 2018. A greater City contribution rate would result in a shorter projected amortization of the UAAL, if all actuarial assumptions are met. It would also reduce the magnitude of the projected increase in the next valuation.

We have performed a five-year projection of the employer actuarial contribution rates if a 7.25% return (the new return assumption adopted by the Board for the January 1, 2019 funding valuation) was 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 the reflecting the new assumptions (an increase) and recognizing the currently deferred asset gains and losses over time (a decrease).

**Employer Actuarial Contribution Rate (continued)**

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 below.




**Projected Actuarial Required City Contribution Rate**

| Contribution Year[1] | Assuming 7.25% Future Returns[2] | 90% Asset Return Confidence Interval |
|---|---|---|
| 2019 | 14.55% | 14.55% - 14.55% |
| 2020 | 15.46% | 14.56% - 16.34% |
| 2021 | 15.37% | 13.45% - 17.31% |
| 2022 | 14.97% | 11.79% - 18.24% |
| 2023 | 14.58% | 9.90% - 19.46% |
| 2024 | 14.58% | 8.10% - 21.34% |

*1. Contribution year lags valuation year by one year. For example: Contribution Year 2019 is based on the 2018 valuation results, amortized over 25 years beginning in 2018, if the increase takes place in 2019.*

*2. Projections reflect new assumptions adopted by the Board in the 2020 contribution year.*

**Compounded Average Return for Period**

| | *Percentile* | |
|---|---|---|
| | *95th* | *5th* |
| *1-Year Period* | *-12.3%* | *27.2%* |
| *2-Year Period* | *-7.4%* | *20.5%* |
| *3-Year Period* | *-5.1%* | *17.6%* |
| *4-Year Period* | *-3.7%* | *15.9%* |
| *5-Year Period* | *-2.8%* | *14.8%* |

**Employer Actuarial Contribution Rate (continued)**

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 will be provided in a separate GASB 67 and 68 Disclosure report.

**Funding Progress**

On the basis of the January 1, 2017 actuarial valuation, the Funding Ratio was 68.1%. Based on the January 1, 2018 valuation, the Funding Ratio is 69.9%. The increase in the Funding Ratio is due mainly to investment return and the UAAL payment made by the City in 2017. See Section 3 of this report for a full discussion.

Details are in the table below.

**Analysis of Change**

The table shows the sources of change in the 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, 2017 Actuarial Valuation** | **14.97 %** | **68.1 %** |
| Expected Valuation-to-Valuation Change | - | 0.9 % |
| Asset Gain/Loss on Actuarial Value | (0.18)% | 0.6 % |
| Salary/Membership Growth Different Than Expected | (0.07)% | 0.1 % |
| Demographic Experience | (0.08)% | 0.2 % |
| Lower Normal Cost Rate for Plan 2 Members | (0.04)% | - |
| Changes in Assumptions | - | - |
| Other | (0.05)% | - |
| **Total Change** | (0.42)% | 1.8 % |
| **January 1, 2018 Actuarial Valuation** | **14.55 %** | **69.9 %** |

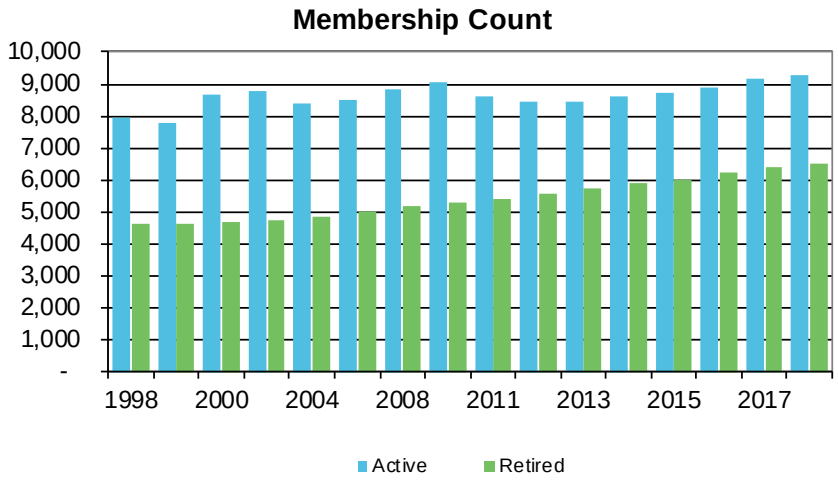
**Contingent COLA Benefits**

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.

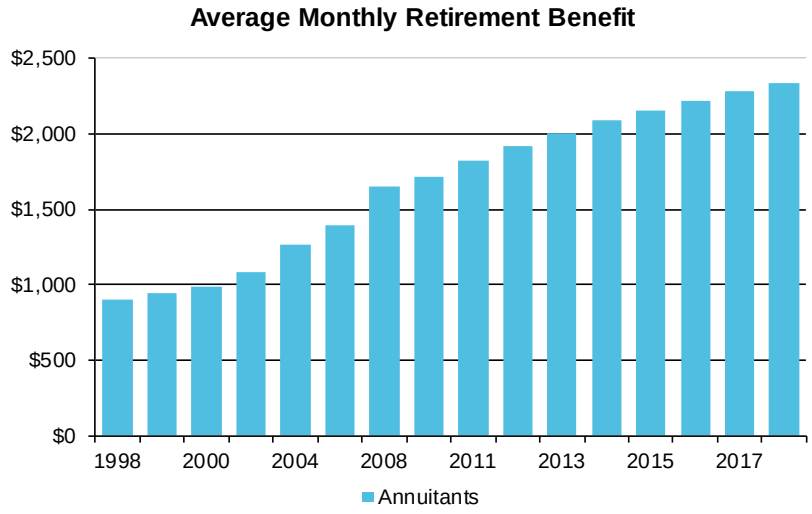
Since it is unknown when this benefit will become effective, especially given the current funded status of the System, we have not included the valuation of these potential benefit changes (i.e., the increase in the ROPP COLA to the 70% level) in this valuation. See Appendix A of this report for further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

## Membership Information

Total valuation payroll has increased by 4.9% since the 2017 valuation, and active membership has increased by 1.5% during this same period. As of January 1, 2018, the annualized payroll is $761 million for 9,284 active members.




Retired member counts and average retirement benefit amounts continue to increase steadily. As of January 1, 2018, there were 6,534 retired members and beneficiaries with an average benefit of $2,332 per month. This represents a 2.4% increase in count and a 2.0% 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, 2017 Valuation** | 9,151 | 2,352 | 6,382 |
| Termination with Refund / Death | (132) | (86) | (261) |
| Termination without Refund | (288) | 288 | - |
| Service Retirement | (300) | (45) | 345 |
| Disability Retirement | (1) | (1) | 2 |
| Rehires | 38 | (38) | - |
| New Entrants / Beneficiaries | 816 | 32 | 66 |
| Data Corrections | - | - | - |
| **January 1, 2018 Valuation** | 9,284 | 2,502 | 6,534 |

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

## Summary Exhibit

A summary of the key results of this valuation, along with a comparison to the January 1, 2017 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.

# Seattle City Employees' Retirement System
# Actuarial Valuation

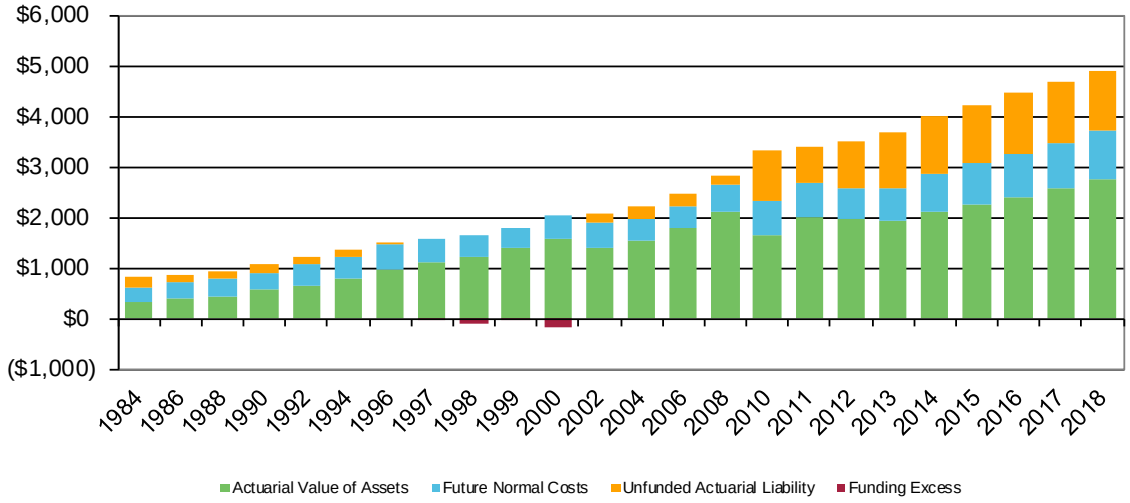
## Table 1 Summary of Results

| | Valuation January 1, 2018 | Valuation January 1, 2017 | Percentage Change |
|---|---|---|---|
| I. Total Membership | | | |
| A. Active Members | 9,284 | 9,151 | 1.5% |
| B. Retired Members & Beneficiaries | 6,534 | 6,382 | 2.4% |
| C. Vested Terminated Members[1] | 2,502 | 2,352 | 6.4% |
| D. Total | 18,320 | 17,885 | 2.4% |
| II. Pay as of Valuation Date | | | |
| A. Annual Total ($millions) | $ 761.0 | $ 725.6 | 4.9% |
| B. Annual Average | $ 81,969 | $ 79,288 | 3.4% |
| III. Average Monthly Benefit Paid to Current Retirees and Beneficiaries | | | |
| A. Service Retirement | $ 2,450 | $ 2,417 | 1.4% |
| B. Disability Retirement | 1,373 | 1,351 | 1.6% |
| C. Surviving Spouse and Dependents | 1,519 | 1,405 | 8.1% |
| D. Total | $ 2,332 | $ 2,285 | 2.0% |
| IV. Actuarial Accrued Liability ($millions) | | | |
| A. Active Members | $ 1,835.4 | $ 1,791.3 | 2.5% |
| B. Retired Members | 1,893.8 | 1,783.6 | 6.2% |
| C. Vested Terminated Members | 212.6 | 191.5 | 11.0% |
| D. Total | $ 3,941.8 | $ 3,766.4 | 4.7% |
| V. Assets | | | |
| A. Actuarial Value of Assets ($millions) | $ 2,755.2 | $ 2,564.1 | 7.5% |
| VI. Unfunded Actuarial Accrued Liability or Surplus Funding ($millions) | $ 1,186.6 | $ 1,202.3 | (1.3)% |
| VII. Normal Cost Rate Plus Amortization of UAAL | | | |
| Total Contribution Rate Needed for 25-Year[2] Amortization (as a % of Payroll) | 24.40% | 25.00% | (2.4)% |
| Employer Actuarial Contribution Rate | 14.55% | 14.97% | (2.8)% |
| VIII. Funding Ratio | 69.9% | 68.1% | 2.7% |
| IX. Normal Cost as a Percent of Salary | 15.56% | 15.83% | (1.7)% |
| **Market Value of Assets (MVA) -- For Informational Purposes Only** | | | |
| X. Assets Based on MVA | | | |
| A. Market Value of Assets ($millions) | $ 2,852.9 | $ 2,488.5 | 14.6% |
| XI. Amortization of UAAL Based on MVA | | | |
| A. Total Contribution Rate Needed for 25-Year[2] Amortization (as a % of Payroll) | 23.61% | 25.61% | (7.8)% |
| XII. Funding Ratio Based on MVA | 72.4% | 66.1% | 9.5% |

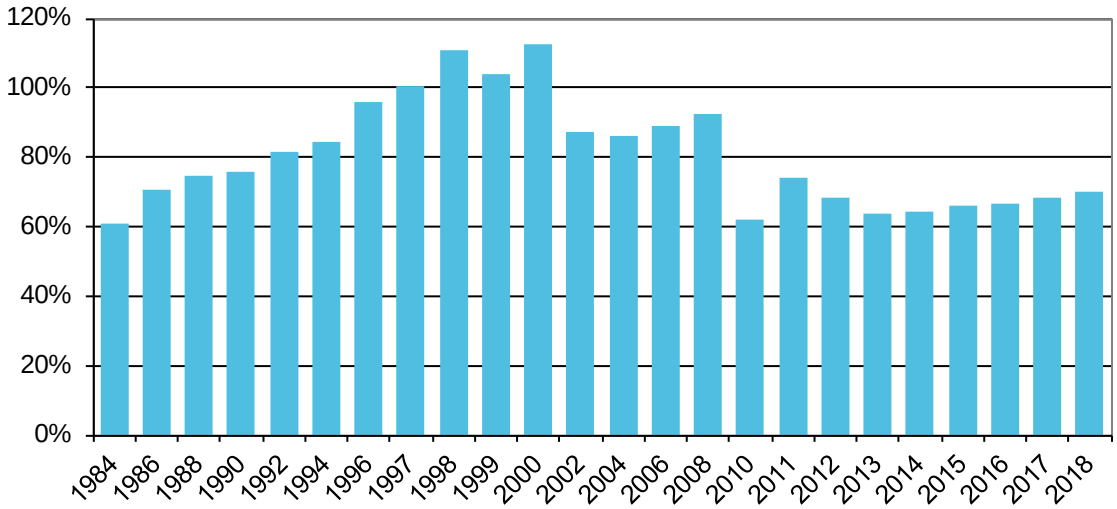
*1. Includes non-vested terminated members whose contributions are still on deposit with SCERS as of valuation date.*

*2. Amortization method is closed 30-year beginning with January 1, 2013 valuation. 2017 values shown are over 26 years.*

## Graph 1 Historical Asset and Liability Comparison




## Graph 2 Historical Funding Ratios




| Year | (in $Millions) PVFB | Assets | PVFNC | UAAL | Funding Ratio |
|---|---|---|---|---|---|
| **2008** | 2,825.8 | 2,119.4 | 531.2 | 175.2 | 92.4% |
| **2010** | 3,328.7 | 1,645.3 | 674.9 | 1,008.5 | 62.0% |
| **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% |

## Section 2 Scope of the Report

This report presents the actuarial valuation of the Seattle City Employees' Retirement System as of January 1, 2018.

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.

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, 2018, 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.

Comparative statistics are presented on the System's membership and contribution rates. Appendix D is a glossary of actuarial terms used in this report.

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# Section 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, 2018. 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 are needed to pay 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

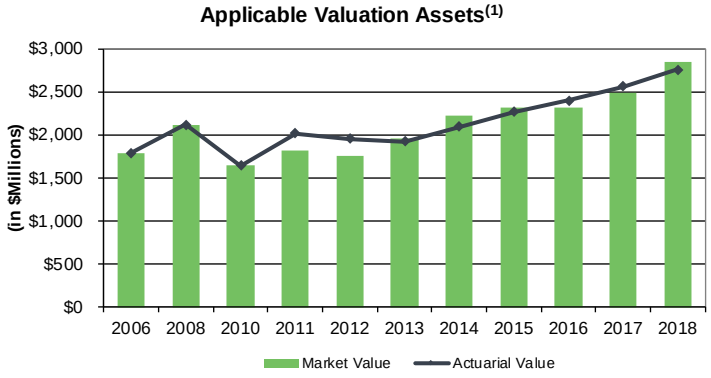
Table 2 shows the calculation of the Actuarial Value of Assets as of January 1, 2018. Note that a net gain is currently being deferred. This means that, if the system earns 7.50% in the future, the AVA will experience an actuarial gain over upcoming years as the remaining portions of deferred gains are 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, 2018 on a Market Value basis. Table 3 shows the Market Value of Assets at January 1, 2018 and January 1, 2017. Table 4 shows the changes in Market Value of Assets during the year ending January 1, 2017 and the year ending January 1, 2018.

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.




*1. Prior to 2010, actuarial valuations were only performed every second year.*

## Table 2 Calculation of Actuarial Value of Assets at January 1, 2018

(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 | | Asset Gain/(Loss) | Current Phase Out | Deferred Amount |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Expected[1] | Actual | | | |
| December 31, 2013 | $ 1,951.4 | $ 137.4 | $ 161.8 | $ 150.3 | $ 2,077.3 | $ 2,216.9 | $ 139.6 | 0% | - |
| December 31, 2014 | 2,216.9 | $ 154.0 | $ 170.7 | 165.7 | 2,365.9 | $ 2,322.7 | (43.2) | 20% | $ (8.6) |
| December 31, 2015 | 2,322.7 | $ 166.9 | $ 183.7 | 173.6 | 2,479.5 | $ 2,313.0 | (166.5) | 40% | (66.6) |
| December 31, 2016 | 2,313.0 | $ 180.2 | $ 194.7 | 172.9 | 2,471.4 | $ 2,488.5 | 17.1 | 60% | 10.3 |
| December 31, 2017 | 2,488.5 | $ 185.8 | $ 210.5 | 185.7 | 2,649.5 | $ 2,852.9 | 203.4 | 80% | 162.7 |
| | | | | | | | | Total Deferred at Jan. 1, 2018: | 97.7 |
| | | | | | | | | Market Value of Assets at Jan. 1, 2018: | 2,852.9 |
| | | | | | | | | Less Total Deferred at Jan. 1, 2018: | 97.7 |
| | | | | | | | | **Actuarial Value of Assets at Jan. 1, 2018:** | **$ 2,755.2** |

*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.*

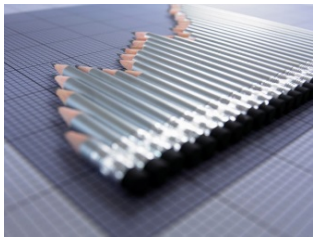
## Table 3 Summary of Plan Net Assets (at Market Value)

| | January 1, 2018 | | January 1, 2017 | |
|---|---|---|---|---|
| | Market Value | Distribution | Market Value | Distribution |
| **Assets** | | | | |
| Cash and short-term investments | $ 116,822,552 | 4.1% | $ 342,730,048 | 13.8% |
| Securities lending collateral | 11,358,941 | 0.4% | 11,130,677 | 0.4% |
| Receivables | | | | |
| Employee | $ 4,327,168 | 0.2% | $ 3,434,870 | 0.1% |
| Employer | 5,657,238 | 0.2% | 6,143,927 | 0.2% |
| Interest and Dividends | 4,103,031 | 0.1% | 3,486,918 | 0.1% |
| Sales Proceeds Receivable | 162,413,460 | 5.7% | 87,345,080 | 3.5% |
| Total Receivables | $ 176,500,897 | 6.2% | $ 100,410,795 | 4.0% |
| Investments at fair value | | | | |
| Fixed Income | $ 676,019,482 | 23.7% | $ 539,527,403 | 21.7% |
| Equity | 1,604,858,505 | 56.3% | 1,350,196,766 | 54.3% |
| Real estate | 304,854,074 | 10.7% | 287,996,774 | 11.6% |
| Alternative | 230,044,927 | 8.1% | 173,578,426 | 7.0% |
| Total investments | $ 2,815,776,988 | 98.7% | $ 2,351,299,369 | 94.5% |
| Total assets | $ 3,120,459,378 | 109.4% | $ 2,805,570,889 | 112.7% |
| **Liabilities** | | | | |
| Pension & Other payables | $ 3,321,750 | -0.1% | $ 1,370,010 | -0.1% |
| Securities lending obligation | 11,350,612 | -0.4% | 11,125,376 | -0.4% |
| Investment commitments payable | 252,914,451 | -8.9% | 304,577,339 | -12.2% |
| Total Liabilities | $ 267,586,813 | -9.4% | $ 317,072,725 | -12.7% |
| **Market Value of Net Assets Held in Trust For Pension Benefits** | **$ 2,852,872,565** | **100.0%** | **$ 2,488,498,164** | **100.0%** |

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

| | January 1, 2018 Market Value | January 1, 2017 Market Value |
|---|---|---|
| **Additions** | | |
| Contributions | | |
| Employer | $ 112,102,982 | $ 108,454,496 |
| Employee | 73,650,409 | 71,755,857 |
| Total contributions | $ 185,753,391 | $ 180,210,353 |
| Investment activities | | |
| Investment income (loss) | | |
| Net change in fair value of investments | $ 363,468,284 | $ 163,299,357 |
| Interest | 13,471,317 | 10,569,831 |
| Dividends | 22,509,987 | 24,780,531 |
| Net investment income (loss) | $ 399,449,588 | $ 198,649,719 |
| Securities lending activities | | |
| Securities lending income | $ 133,711 | $ 100,217 |
| Borrowing rebates | (44,277) | 165,375 |
| Total securities lending income | $ 89,434 | $ 265,592 |
| Securities lending management fees | (20,135) | (66,376) |
| Net income from securities lending | $ 69,299 | $ 199,216 |
| Investment activity expenses | | |
| Investment management fees | $ (9,783,194) | $ (8,186,323) |
| Investment consultant fees | (295,000) | (295,000) |
| Investment custodial fees | (303,869) | (426,443) |
| Total investment activity expenses | $ (10,382,063) | $ (8,907,766) |
| Total additions | $ 574,890,215 | $ 370,151,522 |
| **Deductions** | | |
| Benefits | $ 179,226,526 | $ 168,967,298 |
| Refunds of contributions | 19,158,756 | 16,456,570 |
| Administrative expenses | 12,130,532 | 9,250,653 |
| Total deductions | $ 210,515,814 | $ 194,674,521 |
| Net Increase/(Decrease) | $ 364,374,401 | $ 175,477,001 |
| Net position held in trust for pension benefits | | |
| Beginning of Year | $ 2,488,498,164 | $ 2,313,021,163 |
| **End of Year** | **$ 2,852,872,565** | **$ 2,488,498,164** |

# Section 4 Actuarial Liabilities



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, 2018. 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).

**Actuarial Present 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 deficiency 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, 2018 funding valuation are based on the results of the 2014 Investigation of Experience Report. These assumptions were adopted by the Board effective with the January 1, 2014 actuarial valuation. See Appendix A of this report for details. Note that new assumptions were adopted effective with the January 1, 2019 actuarial valuation based on the results of the 2017 Investigation of Experience Report. These assumptions are not reflected in the actuarial liabilities as of January 1, 2018 used in the calculation of the employer actuarial contribution rate.

**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

## Normal Cost and 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 costs with 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 (and therefore lower normal cost rates) than Plan 1 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, 2018 Plan 1 | January 1, 2018 Plan 2 | January 1, 2018 Total | January 1, 2017 Total |
|---|---|---|---|---|
| A. Active Members | | | | |
| Service Retirement | $ 2,576.5 | $ 52.1 | $ 2,628.7 | $ 2,550.0 |
| Vested Retirement | 69.6 | 2.3 | 71.9 | 69.9 |
| Disability Retirement | 7.8 | 0.4 | 8.1 | 7.7 |
| Survivor Benefits | 23.5 | 0.5 | 24.0 | 23.3 |
| Refund of Member Contributions | 42.2 | 3.9 | 46.1 | 46.6 |
| Total | $ 2,719.6 | $ 59.2 | $ 2,778.8 | $ 2,697.5 |
| B. Inactive Members and Annuitants | | | | |
| Service Retirement | $ 1,770.5 | $ - | $ 1,770.5 | $ 1,670.0 |
| Disability Retirement | 10.3 | - | 10.3 | 10.1 |
| Beneficiaries | 113.0 | - | 113.0 | 103.5 |
| Inactive Members | 212.6 | - | 212.6 | 191.5 |
| Total | $ 2,106.4 | $ - | $ 2,106.4 | $ 1,975.1 |
| **C. Grand Total PVFB** | **$ 4,826.0** | **$ 59.2** | **$ 4,885.2** | **$ 4,672.6** |

## Table 6 Normal Cost Contribution Rates as Percentages of Salary

| | January 1, 2018 | | | January 1, 2017 |
|---|---|---|---|---|
| | Plan 1 | Plan 2 | Total | Total |
| Service Retirement | 12.60 % | 10.19 % | 12.46 % | 12.59 % |
| Vested Retirement | 1.20 | 0.43 | 1.15 | 1.21 |
| Disability Retirement | 0.07 | 0.06 | 0.07 | 0.07 |
| Survivor Benefits | 0.17 | 0.09 | 0.16 | 0.17 |
| Refund of Member Contributions | 1.15 | 0.77 | 1.12 | 1.19 |
| Administrative Expenses | 0.60 | 0.60 | 0.60 | 0.60 |
| **Total** | **15.79 %** | **12.14 %** | **15.56 %** | **15.83** % |

## Table 7 Unfunded Actuarial Accrued Liability (UAAL)

(All dollar amounts in millions)

| | | January 1, 2018 | January 1, 2017 |
|---|---|---|---|
| A. | Actuarial present value of all future benefits for present and former members and their survivors (Table 3) | $ 4,885.2 | $ 4,672.6 |
| B. | Less actuarial present value of total future normal costs for present members | 943.4 | 906.2 |
| C. | Actuarial accrued liability[(1)] [A - B] | $ 3,941.8 | $ 3,766.4 |
| D. | Less actuarial value of assets available for benefits (Table 2) | 2,755.2 | 2,564.1 |
| E. | Unfunded actuarial accrued liability (Funding Excess, if negative) [C - D] | $ 1,186.6 | $ 1,202.3 |
| F. | Funding Ratio [D ÷ C] | 69.9% | 68.1% |

*1. The actuarial accrued liability as of January 1, 2019 is projected to be $4,246.5 million.*

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# Section 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, 2018 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, 2018
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, 2018 valuation, the amortization contribution rate must pay off the current UAAL over a 25-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 24.40% 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.

As of the January 1, 2018 valuation, the employer actuarial contribution rate for the employer has decreased to 14.55% beginning January 1, 2019. This is mainly due to the greater than expected investment return.

The total contribution rate of 25.00% determined in the 2018 valuation was calculated in order to amortize the January 1, 2017 UAAL over a 26-year period; however, this rate is not projected to perfectly amortize the January 1, 2018 UAAL over 25 years due to gains that have occurred during 2017. Table 9 details the expected amortization of the UAAL over the 25-year closed period beginning January 1, 2018.

The total contribution rate can be immediately (i.e., as of the beginning of the next calendar year) decreased from 25.00% of pay to 24.40% of pay to be projected to amortize the UAAL over the scheduled 25 years from January 1, 2018. If the contribution rate is not decreased, the UAAL would be projected to be amortized over a shorter period than 25 years. Because this figure is based on an Actuarial Value of Assets that is currently deferring a net gain, this 24.40% is projected to decrease over the next several years if no other actuarial asset gains or losses were to occur.

**Amortization of UAAL (continued)**

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.

**New Assumptions**

As discussed, new assumptions will be used to determine the employer actuarial contribution rates for the year 2020. This is expected to result in an increase in the rate as discussed in Section 8.

## Table 8 Contribution Rates as Percentages of Salary

| | | Actuarial Required Contribution Beginning | |
|---|---|---|---|
| | | January 1, 2019 | January 1, 2018 |
| A. | Total normal cost rate | 15.56 % | 15.83 % |
| B. | UAAL amortization rate | 8.84 | 9.17 |
| C. | Actuarial required contribution rate | 24.40 % | 25.00 % |
| D. | Member contribution rate | 9.85 | 10.03 |
| E. | Allocation of employer contribution rate[1] | | |
| | Normal cost | 5.71 % | 5.80 % |
| | Amortization payment | 8.84 | 9.17 |
| | Total employer contribution rate | 14.55 % | 14.97 % |

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

## Table 9 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 |
|---|---|---|---|---|---|---|---|---|
| 2018 | $ 761 | 25.00% | 15.56% | 9.44% | $ 1,186.6 | $ 71.8 | $ 86.3 | $ 1,201.1 |
| 2019 | 795 | 24.40% | 15.56% | 8.84% | 1,201.1 | 70.3 | 87.5 | 1,218.3 |
| 2020 | 831 | 24.40% | 15.56% | 8.84% | 1,218.3 | 73.5 | 88.7 | 1,233.5 |
| 2021 | 869 | 24.40% | 15.56% | 8.84% | 1,233.5 | 76.9 | 89.7 | 1,246.3 |
| 2022 | 908 | 24.40% | 15.56% | 8.84% | 1,246.3 | 80.3 | 90.5 | 1,256.5 |
| 2023 | 949 | 24.40% | 15.56% | 8.84% | 1,256.5 | 83.9 | 91.1 | 1,263.7 |
| 2024 | 992 | 24.40% | 15.56% | 8.84% | 1,263.7 | 87.7 | 91.5 | 1,267.5 |
| 2025 | 1037 | 24.40% | 15.56% | 8.84% | 1,267.5 | 91.7 | 91.7 | 1,267.4 |
| 2026 | 1084 | 24.40% | 15.56% | 8.84% | 1,267.4 | 95.9 | 91.5 | 1,263.1 |
| 2027 | 1133 | 24.40% | 15.56% | 8.84% | 1,263.1 | 100.2 | 91.0 | 1,253.9 |
| 2028 | 1184 | 24.40% | 15.56% | 8.84% | 1,253.9 | 104.7 | 90.2 | 1,239.4 |
| 2029 | 1238 | 24.40% | 15.56% | 8.84% | 1,239.4 | 109.5 | 88.9 | 1,218.8 |
| 2030 | 1294 | 24.40% | 15.56% | 8.84% | 1,218.8 | 114.5 | 87.2 | 1,191.5 |
| 2031 | 1352 | 24.40% | 15.56% | 8.84% | 1,191.5 | 119.6 | 85.0 | 1,156.9 |
| 2032 | 1413 | 24.40% | 15.56% | 8.84% | 1,156.9 | 125.0 | 82.2 | 1,114.1 |
| 2033 | 1477 | 24.40% | 15.56% | 8.84% | 1,114.1 | 130.6 | 78.7 | 1,062.2 |
| 2034 | 1544 | 24.40% | 15.56% | 8.84% | 1,062.2 | 136.6 | 74.6 | 1,000.3 |
| 2035 | 1614 | 24.40% | 15.56% | 8.84% | 1,000.3 | 142.8 | 69.8 | 927.3 |
| 2036 | 1687 | 24.40% | 15.56% | 8.84% | 927.3 | 149.2 | 64.1 | 842.1 |
| 2037 | 1763 | 24.40% | 15.56% | 8.84% | 842.1 | 155.9 | 57.4 | 743.6 |
| 2038 | 1843 | 24.40% | 15.56% | 8.84% | 743.6 | 163.0 | 49.8 | 630.4 |
| 2039 | 1926 | 24.40% | 15.56% | 8.84% | 630.4 | 170.4 | 41.0 | 501.0 |
| 2040 | 2013 | 24.40% | 15.56% | 8.84% | 501.0 | 178.0 | 31.0 | 354.0 |
| 2041 | 2104 | 24.40% | 15.56% | 8.84% | 354.0 | 186.1 | 19.7 | 187.6 |
| 2042 | 2199 | 24.40% | 15.56% | 8.84% | 187.6 | 194.5 | 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.*

## Section 6 Additional Actuarial Information


The schedule of funding progress is shown in Table 10 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).

Exhibit 11 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 10 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 |
|---|---|---|---|---|---|---|
| 1986 | $ 395.7 | $ 561.3 | $ 165.6 | 70.5% | $ 182.0 | 91.0% |
| 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 |

*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 11 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) |
|---|---|---|---|---|---|---|---|---|---|
| 1986 | $ 395.7 | $ 110.7 | $ 263.1 | $ 187.5 | $ 561.3 | 100.0% | 100.0% | 11.7% | 70.5% |
| 1988 | 445.4 | 136.0 | 303.6 | 155.7 | 595.3 | 100.0 | 100.0 | 3.7 | 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 |

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

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# Section 7 Actuarial Gains or Losses

An analysis of actuarial gains or losses was performed in conjunction with the January 1, 2016, January 1, 2017, and January 1, 2018 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 12. 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 12 Analysis of Actuarial Gains or Losses[1]

(All dollar amounts in millions)

| | Gain/(Loss) For Period | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| **Investment Income**<br>Investment income on AVA was greater (less) than assumed. | $ 24.5 | $ 2.3 | $ (22.1) |
| **Pay Increases**<br>Pay increases were less (greater) than expected. | 4.9 | 14.5 | (7.3) |
| **Age and Service Retirements**<br>Members retired at older (younger) ages or with less (greater) final average pay than expected. | 4.6 | 20.9 | 17.2 |
| **Disability Retirements**<br>Disability claims were less (greater) than expected. | (0.1) | (0.1) | (0.1) |
| **Death-in-Service Benefits**<br>Survivor claims were less (greater) than expected. | (1.4) | - | - |
| **Withdrawal from Employment**<br>More (less) reserves were released by withdrawals than expected. | (6.2) | (18.9) | (24.0) |
| **Death after Retirement**<br>Retirees died younger (lived longer) than expected. | 1.4 | (1.0) | 9.0 |
| **Total Gain or (Loss) during Period from Financial Experience** | $ 27.7 | $ 17.7 | $ (27.3) |
| **Non-Recurring Items:** | | | |
| Changes in actuarial assumptions and plan amendments caused a gain (loss). | - | - | |
| Data revisions | - | - | - |
| Change in actuarial asset valuation method caused a gain (loss). | N/A | N/A | N/A |
| **Composite Gain (Loss) During Period** | $ 27.7 | $ 17.7 | $ (27.3) |

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

# Section 8 Contribution Rate Projections and Increases


This section of the January 1, 2018 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 new return assumption of 7.25%), the employer actuarial contribution rate would be projected to decrease (and the Funding Ratio would be projected to increase) as the remaining deferred gains are fully phased in. Additionally, the projections reflect the expected impact of the new assumptions in year 2020 and later.
2. Based on this valuation, the total (member and employer) actuarial contribution rate is calculated to be 24.40% of payroll beginning January 1, 2019. Of this, 14.55% 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 experience. As previously discussed, we recommend the City consider maintaining or increasing its current contribution rate to mitigate the expected increase in 2020.

## Projection of Actuarially Required Contribution Rate

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

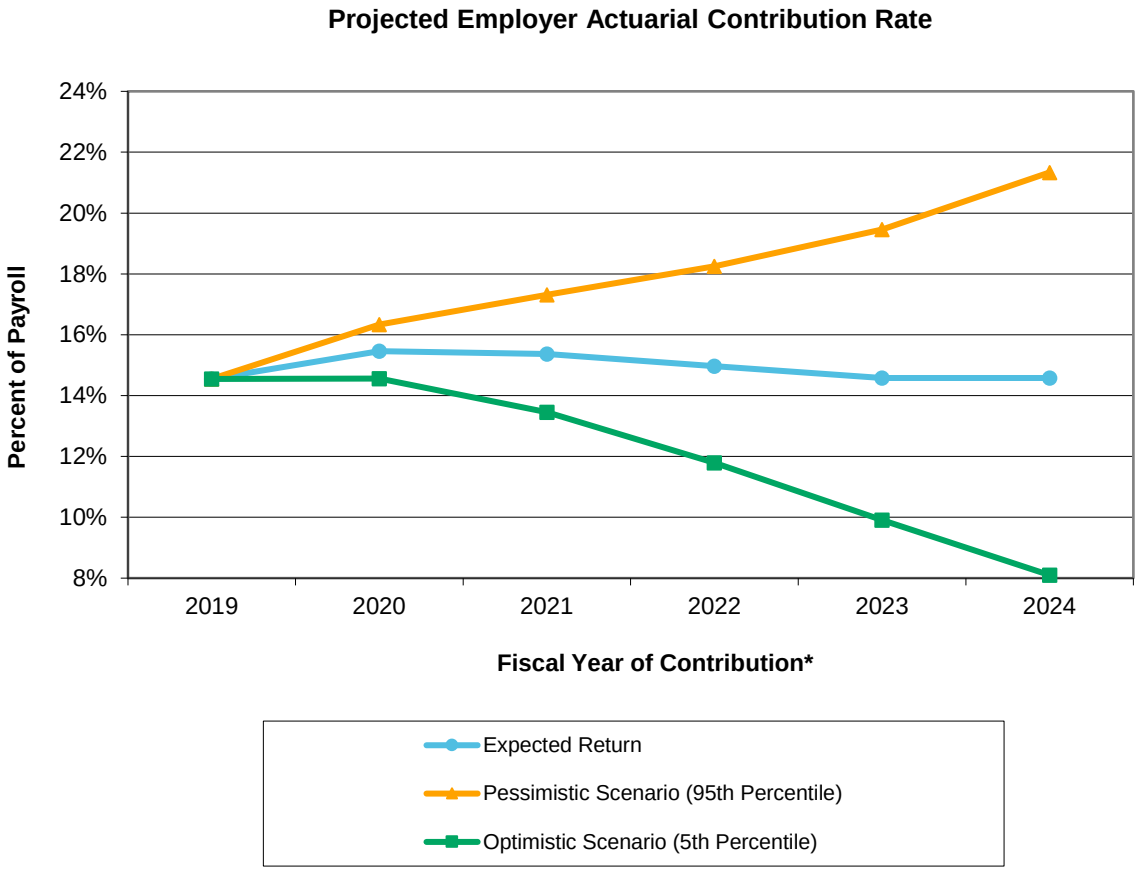
1. Assuming that the investment return assumption of 7.25% is met in each future year.
2. Assuming that the assets return at the 5$^{th}$ percentile.
3. Assuming that the assets return at the 95$^{th}$ percentile.

The result is effectively a 90% confidence interval (based on asset returns) of the projected 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 25-year closed amortization period as of January 1, 2018 and includes a 0.50% population growth assumption. Future returns at the 5$^{th}$ and 95$^{th}$ percentile are based on Milliman's capital market assumptions and SCERS's target asset allocation as of January 1, 2018.

Table 13 provides the results of these projections.

## Table 13 Projected Total Contribution Rates




| Projected Employer Actuarial Contribution Rate | | | |
|---|---|---|---|
| Contribution Year[1] | If Asset Return at 95th Percentile | Assuming 7.25% Future Returns[2] | If Asset Return at 5th Percentile |
| 2019 | 14.55% | 14.55% | 14.55% |
| 2020 | 16.34% | 15.46% | 14.56% |
| 2021 | 17.31% | 15.37% | 13.45% |
| 2022 | 18.24% | 14.97% | 11.79% |
| 2023 | 19.46% | 14.58% | 9.90% |
| 2024 | 21.34% | 14.58% | 8.10% |

*1. Contribution year lags calculation year by one year. For example: Contribution Year 2019 is based on the 2018 valuation results, amortized over 25 years beginning in 2018, if the increase takes place in 2019.*
*2. Projections reflect new assumptions adopted by the Board in the 2020 contribution year.*

**Assumed Returns for Projection**

The projection above uses the 5th and 95th percentile returns based on SCERS' target asset allocation and Milliman's January 1, 2018 capital market assumptions. These percentile returns vary by the number of years of return; for example, the Contribution Year 2019 number assumes one year of return at the one-year 5th or 95th percentile rate; the Contribution Year 2020 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* | *-12.3%* | *27.2%* |
| *2-Year Period* | *-7.4%* | *20.5%* |
| *3-Year Period* | *-5.1%* | *17.6%* |
| *4-Year Period* | *-3.7%* | *15.9%* |
| *5-Year Period* | *-2.8%* | *14.8%* |

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# Section 9 Projection of Benefit Payments and Contribution Dollars

**Projection of Benefit Payments and Contribution Dollars**

This section of the January 1, 2018 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. Note that for these projections we used the actuarial assumptions effective with the January 1, 2019 actuarial valuation that reflect the 2018 Investigation of Experience report.

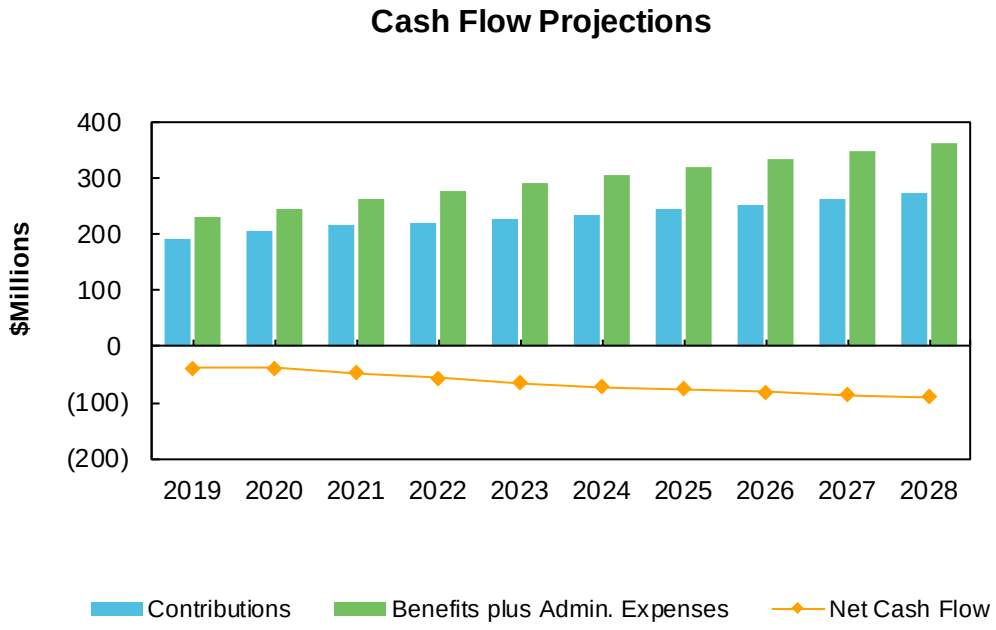
The projection of contribution dollars makes the following three additional key assumptions:

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 14 shows the results of these projections.

## Table 14 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 |
|---|---|---|---|---|---|---|
| 2019 | $ 791.6 | $ 6.3 | $ 224.6 | $ 230.9 | $ 193.1 | $ (37.8) |
| 2020 | 823.4 | 6.6 | 240.9 | 247.5 | 208.4 | (39.1) |
| 2021 | 856.5 | 6.9 | 256.1 | 263.0 | 216.0 | (47.0) |
| 2022 | 890.9 | 7.1 | 270.5 | 277.6 | 221.1 | (56.5) |
| 2023 | 926.7 | 7.4 | 284.8 | 292.2 | 226.4 | (65.8) |
| 2024 | 963.9 | 7.7 | 299.5 | 307.2 | 235.5 | (71.7) |
| 2025 | 1,002.6 | 8.0 | 313.5 | 321.5 | 244.9 | (76.6) |
| 2026 | 1,042.9 | 8.3 | 328.2 | 336.5 | 254.8 | (81.8) |
| 2027 | 1,084.8 | 8.7 | 342.3 | 351.0 | 265.0 | (86.0) |
| 2028 | 1,128.4 | 9.0 | 356.2 | 365.2 | 275.7 | (89.6) |




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

# 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 May 2014 meeting. They are based on Milliman's Investigation of Experience for the period ending December 31, 2013. Further discussion and the rationale for the assumptions are shown in that report. Note that assumptions based on Milliman's Investigation of Experience for the period ending December 31, 2017 will be effective for the January 1, 2019 actuarial valuation. Results based on the new assumptions are disclosed in the Executive Summary. These assumptions are disclosed in the recent Investigation of Investigation report, with the exception that alternative economic assumptions were adopted as follows:

| Economic Assumptions | Assumptions used in Funding Valuation 1/1/2018 | 1/1/2019 |
|---|---|---|
| Investment Return Assumption[1] | 7.50% | 7.25% |
| Consumer Price Inflation | 3.25% | 2.75% |
| Real Wage Inflation | 0.75% | 0.75% |
| Wage Growth *(price inflation plus wage inflation)* | 4.00% | 3.50% |
| Active Membership Growth | 0.50% | 0.50% |
| Payroll Growth *(wage & membership growth)* | 4.52% | 4.02% |
| Interest on Post-2011 Contributions | 4.75% | 4.00% |

*1. Net of investment expenses.*

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-7 show rates of decrement for service retirement, disability, mortality, and other terminations of employment. Table A-8 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 0.60% 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 7.50%. 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 3.25%.

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 4.00% per annum rate of increase in the general wage level of the membership.

**Service Retirement**

Tables A-3 and A-4 show 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-5. 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-6. 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-7. 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-8 gives the assumed probability, at selected ages, that a terminating member will elect to receive a refund of his 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 4.75%.

**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, 2018**

| | | |
|---|---|---|
| I. | Economic assumptions | |
| | A. Price inflation | 3.25% |
| | B. General wage increases | 4.00 |
| | C. Investment return | 7.50 |
| | D. Increase in membership | 0.50 |
| | E. Interest on member accounts | 5.75/4.75[1] |
| II. | Demographic assumptions | |
| | A. Salary increases due to promotion and longevity | Table A-2 |
| | B. Retirement | Tables A-3 to A-4 |
| | C. Disability | Table A-5 |
| | D. Mortality[2] among contributing members<br>Men RP 2000 Employees Table for Males, with ages set back six years.<br>Women RP 2000 Employees Table for Females, with ages set back six years. | Table A-6 |
| | E. Mortality[2] among service retired members and beneficiaries<br>Men RP2000 Combined Healthy Males, with ages set back two years.<br>Women RP2000 Combined Healthy Females, with ages set back one year. | Table A-6 |
| | F. Mortality[2] among disabled members<br>Men RP2000 Disabled Males, with ages set back four years.<br>Women RP2000 Disabled Females, with ages set back four years. | Table A-6 |
| | G. Other terminations of employment | Table A-7 |
| | H. Probabilities of vesting on termination | Table A-8 |

*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 4.75%.*

*2. All mortality tables are generational using Projection Scale AA to reflect expected future mortality improvement.*

## Table A-2 Future Salaries – Plans 1 and 2

**Annual Rate of Increase**

| Years of Service | Promotion and Longevity | Total[1] |
|---|---|---|
| 0 to 1 | 4.50% | 8.68% |
| 1 to 2 | 3.50 | 7.64 |
| 2 to 3 | 2.75 | 6.86 |
| 3 to 4 | 2.00 | 6.08 |
| 4 to 5 | 1.50 | 5.56 |
| 9 to 10 | 0.80 | 4.83 |
| 14 to 15 | 0.45 | 4.47 |
| 19 to 20 | 0.29 | 4.30 |
| 24 to 25 | 0.25 | 4.26 |
| 29 to 30 | 0.25 | 4.26 |
| 35 or more | 0.25 | 4.26 |

*1. Total rate shown reflects compounded effect of merit increase and assumed wage growth of 4.00%.*

## Table A-3 Retirement – Plan 1

| | Annual Probability | | | | | |
|---|---|---|---|---|---|---|
| | Men | | | Women | | |
| | | Eligible for Full Benefits | | | Eligible for Full Benefits | |
| Age | Eligible for Reduced Benefits | Less than 30 years of service | 30 years or more of service | Eligible for Reduced Benefits | Less than 30 years of service | 30 years or more of service |
| Less than 50 | 0.0% | 8.0% | 8.0% | 0.0% | 10.0% | 10.0% |
| 50 | 5.0 | 8.0 | 10.0 | 5.0 | 10.0 | 10.0 |
| 51 | 5.0 | 8.0 | 10.0 | 5.0 | 10.0 | 10.0 |
| 52 | 5.0 | 8.0 | 12.0 | 5.0 | 10.0 | 12.0 |
| 53 | 3.0 | 8.0 | 12.0 | 3.0 | 10.0 | 12.0 |
| 54 | 3.0 | 8.0 | 12.0 | 3.0 | 10.0 | 12.0 |
| 55 | 6.0 | 8.0 | 12.0 | 6.0 | 10.0 | 12.0 |
| 56 | 5.0 | 8.0 | 12.0 | 5.0 | 10.0 | 12.0 |
| 57 | 5.0 | 8.0 | 12.0 | 5.0 | 13.0 | 12.0 |
| 58 | 5.0 | 8.0 | 12.0 | 5.0 | 13.0 | 12.0 |
| 59 | 5.0 | 8.0 | 15.0 | 8.0 | 13.0 | 15.0 |
| 60 | 6.0 | 14.0 | 15.0 | 8.0 | 15.0 | 15.0 |
| 61 | 9.0 | 12.0 | 15.0 | 12.0 | 13.0 | 15.0 |
| 62 | 15.0 | 20.0 | 30.0 | 15.0 | 20.0 | 26.5 |
| 63 | 12.0 | 18.0 | 22.0 | 12.0 | 18.0 | 20.0 |
| 64 | 9.5 | 18.0 | 22.0 | 13.0 | 18.0 | 20.0 |
| 65 | | 40.0 | 32.0 | | 40.0 | 30.0 |
| 66 | | 40.0 | 32.0 | | 40.0 | 38.0 |
| 67 | | 40.0 | 32.0 | | 40.0 | 38.0 |
| 68 | | 30.0 | 26.0 | | 33.0 | 32.0 |
| 69 | | 30.0 | 26.0 | | 33.0 | 32.0 |
| 70 | | (1) | (1) | | (1) | (1) |

*1. Immediate retirement is assumed for every person age 70 or over.*

## Table A-4 Retirement – Plan 2

| | Annual Probability | | | |
|---|---|---|---|---|
| | Male | | Female | |
| Age | Eligible for Reduced Benefits | Eligible for Full Benefits | Eligible for Reduced Benefits | Eligible for Full Benefits |
| Less than 55 | 0.0% | 0.0% | 0.0% | 0.0% |
| 55 | 4.8 | 8.0 | 4.8 | 9.6 |
| 56 | 4.0 | 8.0 | 4.0 | 9.6 |
| 57 | 4.0 | 8.0 | 4.0 | 9.6 |
| 58 | 4.0 | 8.0 | 4.0 | 9.6 |
| 59 | 4.0 | 8.0 | 5.6 | 9.6 |
| 60 | 4.8 | 12.0 | 6.4 | 12.0 |
| 61 | 6.0 | 12.0 | 8.0 | 12.0 |
| 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 | | (1) | | (1) |

*1. Immediate retirement is assumed for every person age 70 or over.*

## Table A-5 Disability – Plans 1 and 2[1]

| Age | Annual Rates | |
|---|---|---|
| | Men | Women |
| 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-6 Mortality – Plans 1 and 2

| | Annual Probability[1] | | | | | |
|---|---|---|---|---|---|---|
| | Contributing Members | | Members Retired for Service and Beneficiaries of Members | | Disabled Members | |
| Age | Men | Women | Men | Women | Men | Women |
| **22** | 0.03 % | 0.02 % | 0.03 % | 0.02 % | 2.26 % | 0.74 % |
| **27** | 0.04 | 0.02 | 0.04 | 0.02 | 2.26 | 0.74 |
| **32** | 0.04 | 0.02 | 0.04 | 0.03 | 2.26 | 0.74 |
| **37** | 0.05 | 0.03 | 0.08 | 0.05 | 2.26 | 0.74 |
| **42** | 0.08 | 0.05 | 0.11 | 0.08 | 2.26 | 0.74 |
| **47** | 0.11 | 0.08 | 0.15 | 0.12 | 2.26 | 0.74 |
| **52** | 0.16 | 0.12 | 0.21 | 0.19 | 2.64 | 0.98 |
| **57** | 0.23 | 0.18 | 0.36 | 0.31 | 3.29 | 1.45 |
| **62** | 0.33 | 0.28 | 0.67 | 0.58 | 3.93 | 1.97 |
| **67** | 0.54 | 0.43 | 1.27 | 1.10 | 4.66 | 2.53 |
| **72** | N/A | N/A | 2.22 | 1.86 | 5.69 | 3.32 |
| **77** | N/A | N/A | 3.78 | 3.10 | 7.33 | 4.58 |
| **82** | N/A | N/A | 6.44 | 5.08 | 9.76 | 6.35 |
| **87** | N/A | N/A | 11.08 | 8.64 | 12.83 | 8.78 |
| **92** | N/A | N/A | 18.34 | 14.46 | 16.22 | 12.25 |

*1. The mortality rates shown above are generationally projected on an individual basis using Projection Scale AA for the valuation.*

## Table A-7 Other Terminations of Employment Among Members Not Eligible to Retire – Plans 1 and 2

| Years of Service | Annual Rates for Men | Annual Rates for Women |
|---|---|---|
| 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-8 Probability of Refund – Plans 1 and 2

| Age | Probabilities of Refund upon Termination[1] |
|---|---|
| 25 | 70.0% |
| 30 | 65.0 |
| 35 | 55.0 |
| 40 | 48.0 |
| 45 | 43.0 |
| 50 | 38.0 |
| 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.

**Service Retirement**
Plan 1 (continued)

*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 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, 2014, 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.

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*

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, 2018. 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, 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 |
| January 1, 1998 | 7,926 | 329,028 | 41,512 | 4,649 | 50,394 | 10,840 |
| January 1, 1996 | 8,078 | 314,448 | 38,926 | 4,619 | 44,271 | 9,585 |

## Table C-2 Members Receiving Service Retirement Benefits as of January 1, 2018 – Inactive Lives

| | <50 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90+ | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Persons | | | | | | | | | | | |
| Male | 0 | 12 | 114 | 374 | 800 | 798 | 471 | 295 | 167 | 146 | 3,177 |
| Female | 0 | 13 | 133 | 391 | 761 | 610 | 269 | 161 | 109 | 102 | 2,549 |
| Total | 0 | 25 | 247 | 765 | 1,561 | 1,408 | 740 | 456 | 276 | 248 | 5,726 |
| Annual Benefits in Thousands | | | | | | | | | | | |
| Male | $ 0 | $ 604 | $ 4,423 | $ 14,044 | $ 26,957 | $ 24,351 | $ 14,319 | $ 7,261 | $ 3,990 | $ 3,499 | $ 99,449 |
| Female | 0 | 529 | 5,213 | 13,471 | 21,751 | 15,823 | 5,908 | 3,160 | 1,767 | 1,241 | 68,863 |
| Total | 0 | 1,133 | 9,636 | 27,515 | 48,708 | 40,174 | 20,227 | 10,421 | 5,757 | 4,740 | 168,312 |
| Average Annual Benefits | | | | | | | | | | | |
| Male | $ 0 | $ 50,366 | $ 38,795 | $ 37,551 | $ 33,697 | $ 30,515 | $ 30,402 | $ 24,613 | $ 23,891 | $ 23,969 | $ 31,303 |
| Female | 0 | 40,660 | 39,199 | 34,453 | 28,582 | 25,940 | 21,962 | 19,629 | 16,213 | 12,166 | 27,016 |
| Total | 0 | 45,319 | 39,013 | 35,967 | 31,203 | 28,533 | 27,334 | 22,854 | 20,859 | 19,115 | 29,394 |

## Table C-3 Members Receiving Disability Retirement Benefits as of January 1, 2018 – Inactive Lives

| | <50 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90+ | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Persons | | | | | | | | | | | |
| Male | 2 | 3 | 2 | 5 | 2 | 4 | 3 | 1 | 1 | 1 | 24 |
| Female | 2 | 2 | 6 | 10 | 4 | 1 | 3 | 2 | 0 | 0 | 30 |
| Total | 4 | 5 | 8 | 15 | 6 | 5 | 6 | 3 | 1 | 1 | 54 |
| Annual Benefits in Thousands | | | | | | | | | | | |
| Male | $ 39 | $ 58 | $ 45 | $ 84 | $ 35 | $ 55 | $ 35 | $ * | $ * | $ * | $ 352 |
| Female | 33 | 43 | 103 | 179 | 73 | * | 34 | 25 | 0 | 0 | 490 |
| Total | 72 | 101 | 148 | 264 | 108 | 55 | 69 | 25 | * | * | 842 |
| Average Annual Benefits | | | | | | | | | | | |
| Male | $ 19,390 | $ 19,313 | $ 22,251 | $ 16,884 | $ 17,573 | $ 13,874 | $ 11,790 | $ * | $ * | $ * | $ 14,652 |
| Female | 16,640 | 21,447 | 17,233 | 17,911 | 18,221 | * | 11,254 | 12,281 | 0 | 0 | 16,330 |
| Total | 18,015 | 20,167 | 18,487 | 17,569 | 18,005 | 11,099 | 11,522 | 8,187 | * | * | 15,570 |

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

## Table C-4 Survivors Receiving Retirement Benefits as of January 1, 2018 – Inactive Lives

| | <50 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90+ | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Persons | | | | | | | | | | | |
| Male | 1 | 0 | 3 | 10 | 6 | 6 | 10 | 3 | 5 | 5 | 49 |
| Female | 5 | 14 | 26 | 49 | 69 | 86 | 59 | 77 | 91 | 145 | 621 |
| Total | 6 | 14 | 29 | 59 | 75 | 92 | 69 | 80 | 96 | 150 | 670 |
| Annual Benefits in Thousands | | | | | | | | | | | |
| Male | $ * | $ 0 | $ 40 | $ 175 | $ 57 | $ 118 | $ 123 | $ 36 | $ 58 | $ 36 | $ 642 |
| Female | 82 | 297 | 510 | 1,197 | 1,454 | 1,614 | 1,139 | 1,428 | 1,542 | 2,047 | 11,311 |
| Total | 82 | 297 | 550 | 1,372 | 1,511 | 1,732 | 1,262 | 1,464 | 1,600 | 2,083 | 11,953 |
| Average Annual Benefits | | | | | | | | | | | |
| Male | $ * | $ 0 | $ 13,308 | $ 17,476 | $ 9,535 | $ 19,623 | $ 12,270 | $ 12,078 | $ 11,611 | $ 7,167 | $ 13,111 |
| Female | 16,453 | 21,239 | 19,602 | 24,431 | 21,075 | 18,767 | 19,306 | 18,546 | 16,944 | 14,119 | 18,214 |
| Total | 13,711 | 21,239 | 18,951 | 23,252 | 20,152 | 18,823 | 18,286 | 18,304 | 16,667 | 13,888 | 17,841 |

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

Note: In addition, 38 male survivors are receiving $705,708 and 46 female survivors are receiving $981,709 in Option B or Option C for a certain period only.

## Table C-5 Distribution of Employees and Salaries as of January 1, 2018 – Active Lives

| 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 | 11 | 34 | 46 | 27 | 14 | 17 | 11 | 14 | 5 | | | 180 |
| 1 | | 16 | 55 | 87 | 76 | 53 | 58 | 40 | 24 | 7 | 4 | | 420 |
| 2 | | 8 | 66 | 75 | 70 | 60 | 47 | 26 | 44 | 21 | 2 | | 419 |
| 3-4 | | 14 | 61 | 95 | 121 | 94 | 103 | 68 | 57 | 41 | 8 | 2 | 664 |
| 5-9 | | 1 | 39 | 104 | 128 | 113 | 108 | 105 | 82 | 67 | 30 | 7 | 784 |
| 10-14 | | | 6 | 71 | 155 | 171 | 166 | 154 | 148 | 94 | 40 | 9 | 1,014 |
| 15-19 | | | | 1 | 33 | 102 | 137 | 150 | 151 | 126 | 52 | 15 | 767 |
| 20-24 | | | | | | 7 | 75 | 93 | 89 | 69 | 16 | 9 | 358 |
| 25-29 | | | | | | 1 | 18 | 78 | 103 | 86 | 36 | 10 | 332 |
| 30-34 | | | | | | | | 10 | 41 | 56 | 27 | 5 | 139 |
| 35-39 | | | | | | | | | 30 | 43 | 7 | 2 | 82 |
| 40+ | | | | | | | | | 3 | 15 | 17 | 9 | 44 |
| Totals | 1 | 50 | 261 | 479 | 610 | 615 | 729 | 735 | 786 | 630 | 239 | 68 | 5,203 |

### Monthly Salaries in Thousands - By Age Group - Males

| 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 | $ 52 | $ 176 | $ 279 | $ 195 | $ 92 | $ 119 | $ 68 | $ 80 | $ 42 | $ | $ | $ 1,105 |
| 1 | | 72 | 283 | 509 | 502 | 360 | 381 | 317 | 159 | 48 | 30 | | 2,659 |
| 2 | | 31 | 358 | 447 | 468 | 415 | 325 | 166 | 320 | 167 | 11 | | 2,708 |
| 3-4 | | 64 | 317 | 654 | 852 | 729 | 759 | 493 | 416 | 278 | 53 | 17 | 4,633 |
| 5-9 | | 1 | 209 | 657 | 942 | 837 | 819 | 783 | 606 | 489 | 188 | 44 | 5,575 |
| 10-14 | | | 29 | 446 | 1,062 | 1,201 | 1,206 | 1,086 | 1,064 | 621 | 257 | 57 | 7,028 |
| 15-19 | | | | 5 | 215 | 755 | 1,033 | 1,126 | 1,162 | 876 | 341 | 99 | 5,611 |
| 20-24 | | | | | | 48 | 563 | 721 | 689 | 479 | 106 | 57 | 2,663 |
| 25-29 | | | | | | 7 | 125 | 611 | 746 | 687 | 258 | 71 | 2,505 |
| 30-34 | | | | | | | | 77 | 310 | 429 | 210 | 38 | 1,064 |
| 35-39 | | | | | | | | | 239 | 381 | 59 | 18 | 696 |
| 40+ | | | | | | | | | 24 | 108 | 120 | 56 | 308 |
| Totals | 1 | 220 | 1,373 | 2,997 | 4,236 | 4,444 | 5,331 | 5,448 | 5,813 | 4,604 | 1,631 | 458 | 36,557 |

## Table C-5 Distribution of Employees and Salaries as of January 1, 2018 – Active Lives (continued)

| 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 | $ 1,472 | $ 4,732 | $ 5,189 | $ 6,073 | $ 7,214 | $ 6,593 | $ 6,978 | $ 6,208 | $ 5,692 | $ 8,457 | $ | $ | $ 6,140 |
| 1 | | 4,493 | 5,142 | 5,845 | 6,606 | 6,791 | 6,573 | 7,925 | 6,617 | 6,796 | 7,420 | | 6,332 |
| 2 | | 3,858 | 5,425 | 5,958 | 6,690 | 6,921 | 6,919 | 6,392 | 7,265 | 7,958 | 5,305 | | 6,463 |
| 3-4 | | 4,577 | 5,203 | 6,884 | 7,045 | 7,761 | 7,373 | 7,250 | 7,297 | 6,775 | 6,565 | 8,628 | 6,978 |
| 5-9 | | 1,404 | 5,366 | 6,319 | 7,357 | 7,409 | 7,584 | 7,456 | 7,389 | 7,293 | 6,267 | 6,303 | 7,111 |
| 10-14 | | | 4,810 | 6,277 | 6,850 | 7,022 | 7,267 | 7,052 | 7,190 | 6,606 | 6,418 | 6,320 | 6,931 |
| 15-19 | | | | 5,143 | 6,517 | 7,397 | 7,541 | 7,505 | 7,696 | 6,954 | 6,548 | 6,599 | 7,316 |
| 20-24 | | | | | | 6,836 | 7,507 | 7,754 | 7,743 | 6,935 | 6,625 | 6,345 | 7,438 |
| 25-29 | | | | | | 6,716 | 6,953 | 7,837 | 7,240 | 7,989 | 7,170 | 7,142 | 7,547 |
| 30-34 | | | | | | | | 7,698 | 7,555 | 7,664 | 7,772 | 7,662 | 7,655 |
| 35-39 | | | | | | | | | 7,952 | 8,857 | 8,472 | 8,859 | 8,493 |
| 40+ | | | | | | | | | 7,970 | 7,167 | 7,068 | 6,236 | 6,993 |
| Totals | 1,472 | 4,406 | 5,260 | 6,256 | 6,945 | 7,226 | 7,313 | 7,413 | 7,396 | 7,307 | 6,826 | 6,734 | 7,026 |

## Table C-6 Distribution of Employees and Salaries as of January 1, 2018 – Active Lives

| 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 | | 10 | 42 | 31 | 31 | 13 | 21 | 10 | 12 | 4 | 2 | 1 | 177 |
| 1 | 1 | 19 | 55 | 83 | 65 | 59 | 29 | 34 | 25 | 11 | 3 | | 384 |
| 2 | | 15 | 38 | 65 | 58 | 35 | 34 | 33 | 31 | 13 | 3 | | 325 |
| 3-4 | | 9 | 59 | 80 | 101 | 62 | 57 | 54 | 43 | 32 | 5 | 1 | 503 |
| 5-9 | | 1 | 30 | 65 | 101 | 101 | 69 | 62 | 54 | 41 | 17 | 3 | 544 |
| 10-14 | | | 3 | 51 | 115 | 113 | 122 | 118 | 97 | 75 | 24 | 7 | 725 |
| 15-19 | | | | 2 | 32 | 77 | 104 | 104 | 111 | 76 | 22 | 16 | 544 |
| 20-24 | | | | | 1 | 19 | 53 | 65 | 62 | 50 | 19 | 4 | 273 |
| 25-29 | | | | | | 2 | 31 | 92 | 102 | 64 | 33 | 5 | 329 |
| 30-34 | | | | | | | 2 | 16 | 62 | 51 | 26 | 2 | 159 |
| 35-39 | | | | | | | | | 19 | 39 | 14 | 5 | 77 |
| 40+ | | | | | | | | | 2 | 15 | 20 | 4 | 41 |
| Totals | 1 | 54 | 227 | 377 | 504 | 481 | 522 | 588 | 620 | 471 | 188 | 48 | 4,081 |

### Monthly Salaries in Thousands - By Age Group - Females

| 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 | $ | $ 33 | $ 216 | $ 154 | $ 195 | $ 81 | $ 132 | $ 64 | $ 74 | $ 16 | $ 14 | $ 2 | $ 981 |
| 1 | 3 | 64 | 305 | 471 | 402 | 381 | 202 | 241 | 171 | 57 | 12 | | 2,310 |
| 2 | | 54 | 207 | 387 | 395 | 217 | 237 | 236 | 205 | 92 | 17 | | 2,048 |
| 3-4 | | 32 | 297 | 500 | 709 | 420 | 369 | 394 | 315 | 232 | 28 | 9 | 3,305 |
| 5-9 | | 5 | 145 | 393 | 692 | 690 | 507 | 411 | 393 | 277 | 100 | 12 | 3,626 |
| 10-14 | | | 14 | 274 | 705 | 782 | 866 | 762 | 645 | 524 | 171 | 29 | 4,771 |
| 15-19 | | | | 12 | 182 | 545 | 740 | 768 | 758 | 516 | 126 | 57 | 3,704 |
| 20-24 | | | | | 4 | 125 | 366 | 474 | 417 | 366 | 103 | 9 | 1,865 |
| 25-29 | | | | | | 14 | 199 | 684 | 689 | 463 | 233 | 20 | 2,301 |
| 30-34 | | | | | | | 14 | 100 | 442 | 372 | 204 | 15 | 1,147 |
| 35-39 | | | | | | | | | 140 | 269 | 98 | 42 | 549 |
| 40+ | | | | | | | | | 15 | 91 | 120 | 26 | 251 |
| Totals | 3 | 188 | 1,183 | 2,192 | 3,286 | 3,255 | 3,630 | 4,134 | 4,265 | 3,275 | 1,227 | 220 | 26,858 |

## Table C-6 Distribution of Employees and Salaries as of January 1, 2018 – Active Lives (continued)

| 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 | $ | $ 3,255 | $ 5,145 | $ 4,975 | $ 6,291 | $ 6,232 | $ 6,278 | $ 6,386 | $ 6,178 | $ 4,063 | $ 7,163 | $ 1,873 | $ 5,543 |
| 1 | 3,177 | 3,388 | 5,540 | 5,679 | 6,191 | 6,450 | 6,949 | 7,099 | 6,857 | 5,167 | 4,147 | | 6,016 |
| 2 | | 3,632 | 5,447 | 5,955 | 6,810 | 6,194 | 6,968 | 7,158 | 6,627 | 7,112 | 5,685 | | 6,303 |
| 3-4 | | 3,550 | 5,028 | 6,255 | 7,018 | 6,771 | 6,471 | 7,304 | 7,328 | 7,236 | 5,661 | 8,974 | 6,570 |
| 5-9 | | 5,115 | 4,823 | 6,049 | 6,852 | 6,837 | 7,344 | 6,634 | 7,277 | 6,754 | 5,904 | 4,009 | 6,665 |
| 10-14 | | | 4,704 | 5,372 | 6,133 | 6,920 | 7,096 | 6,454 | 6,651 | 6,984 | 7,108 | 4,105 | 6,581 |
| 15-19 | | | | 5,762 | 5,702 | 7,080 | 7,111 | 7,381 | 6,833 | 6,786 | 5,733 | 3,554 | 6,808 |
| 20-24 | | | | | 4,392 | 6,561 | 6,911 | 7,296 | 6,729 | 7,325 | 5,446 | 2,236 | 6,833 |
| 25-29 | | | | | | 7,080 | 6,418 | 7,429 | 6,750 | 7,231 | 7,052 | 4,003 | 6,993 |
| 30-34 | | | | | | | 6,824 | 6,273 | 7,124 | 7,299 | 7,849 | 7,391 | 7,213 |
| 35-39 | | | | | | | | | 7,366 | 6,897 | 6,986 | 8,456 | 7,130 |
| 40+ | | | | | | | | | 7,433 | 6,089 | 5,979 | 6,388 | 6,130 |
| Totals | 3,177 | 3,490 | 5,212 | 5,814 | 6,519 | 6,766 | 6,954 | 7,031 | 6,879 | 6,954 | 6,526 | 4,584 | 6,581 |

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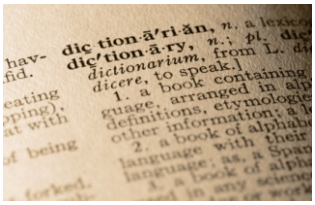
# Appendix D Glossary




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. |