Comprehensive Annual Financial Report

For Fiscal Year Ended
June 30, 2018

Arizona State Retirement System
A component unit of the State of Arizona
2018

The Arizona State Retirement System

Delivering Service With

P.R.I.D.E.

Our Vision:

For the benefit or our members, the Arizona State Retirement System will be a leading state benefit plan administrator in the areas of:

- Core Member Services
- Investment Performance
- Funded Status
- Operational Effectiveness

This will be accomplished while keeping program benefits and associated costs relatively aligned and maintaining actuarial and fiscal integrity.

Our Values:

Professionalism

A highly capable workforce will promote a professional and respectful environment and lead the organization.

Improvement

A climate of continuous quality improvement and enhanced efficiencies will drive the organization.

Excellence

A commitment to service excellence will permeate the organization.

Results

A results-oriented approach to operations will energize the organization.

Diversity

Engagement of diversity by the appreciation, recognition and support for all people will propel the organiztion to ever greater achievement.

Arizona State Retirement System

A component unit of the State of Arizona

Mr. Kevin McCarthy, Chair
Paul Matson, Executive Director

Report prepared by the staff of the Arizona State Retirement System

Comprehensive Annual Financial Report
for fiscal year ended June 30, 2018

2018

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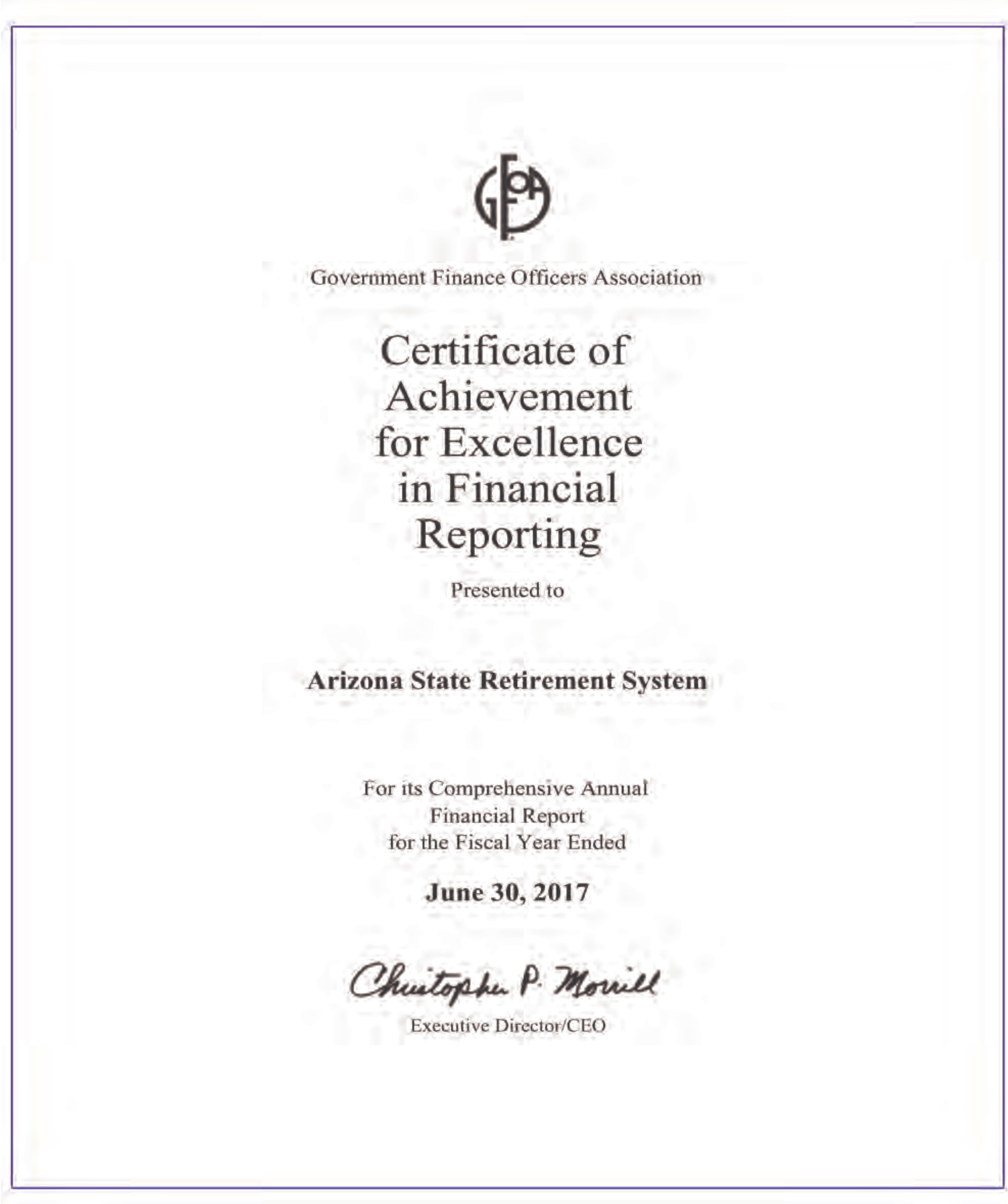
Schedules and information are derived from ASRS internal sources unless otherwise noted.

Introductory Section



Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Arizona State Retirement System

For its Comprehensive Annual Financial Report for the Fiscal Year Ended

June 30, 2017

Christopher P. Morrill

Executive Director/CEO

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Arizona State Retirement System for its Comprehensive Annual Financial Report for the fiscal year ended June 30, 2017. This was the 29th consecutive year that the Arizona State Retirement System has achieved this prestigious award.

PPCC

Public Pension Coordinating Council

Public Pension Standards Award
For Funding and Administration
2018

Presented to

Arizona State Retirement System

In recognition of meeting professional standards for
plan funding and administration as
set forth in the Public Pension Standards.

Presented by the Public Pension Coordinating Council, a confederation of

National Association of State Retirement Administrators (NASRA)
National Conference on Public Employee Retirement Systems (NCPERS)
National Council on Teacher Retirement (NCTR)

Alan H. Winkle

Alan H. Winkle
Program Administrator

The National Association of State Retirement Administrators (NASRA), National Conference on Public Employee Retirement Systems (NCPERS) and the National Council on Teacher Retirement (NCTR) awarded a Public Pension Standards Award to the Arizona State Retirement System for plan design and administration as set forth in the Public Pension Standards for 2018. The Public Pension Standards are intended to reflect minimum expectations for public retirement system management and administration, as well as serve as a benchmark by which all defined benefit public plans should be measured. This is the 14th consecutive year that the Arizona State Retirement System has received this prestigious award.

ARIZONA STATE RETIREMENT SYSTEM

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TOLL FREE OUTSIDE METRO PHOENIX AND TUCSON 1 (800) 621-3778
WWW.AZASRS.GOV

Paul Matson
Director

November 1, 2018,

To: The Arizona State Retirement System Board of Trustees

We are pleased to present, on behalf of the ASRS staff, the Comprehensive Annual Financial Report (CAFR) of the Arizona State Retirement System (ASRS), a component unit of the State of Arizona, for the fiscal year ended June 30, 2018.

Title 38 of the Arizona Revised Statutes requires the ASRS Board of Trustees (ASRS Board) to submit an annual report to the Governor and the Legislature within eight months of the close of each fiscal year. This report complies with the legal requirements governing the preparation and content of annual reports.

Responsibility for both the accuracy of the data, and the completeness and fairness of the presentation, rests with the ASRS management. Management relies on a comprehensive framework of internal controls to provide reasonable, rather than absolute, assurance that the financial statements are free of any material misstatements. Cost/benefit considerations, the risk of management override, and the risk of collusion are inherent limitations on any system of internal control.

CliftonLarsonAllen LLP has issued an unmodified ("clean") opinion on the ASRS financial statements for the year ended June 30, 2018. The Independent Auditors' Report is located at the front of the Financial Section of this report.

Management's Discussion and Analysis (MD&A) immediately follows the Independent Auditors' Report and provides a narrative introduction, overview, and analysis of the basic financial statements. MD&A complements this letter of transmittal and should be read in conjunction with it.

History and Overview

The ASRS was created in 1953 to provide defined contribution retirement benefits to employees of the State of Arizona, Arizona universities, and political subdivisions. During calendar year 1954, Arizona teachers voted to join the ASRS effective January 1, 1955.

In 1970, the State legislature authorized the creation of a defined benefit plan, which became effective July 1, 1971. At June 30, 2018, total ASRS membership, including active, inactive, disabled and retired members was 596,612. There are 568 employer units participating in the ASRS, including school districts, charter schools, state colleges and universities, and local, county and state government.

In addition to pension benefits, the ASRS provides a health insurance premium benefit supplement (Health Benefit Supplement, HBS) and sponsors medical and dental coverage for retired and disabled members, and their eligible dependents and children. Active members also receive long term disability insurance coverage equal to two-thirds of pay at the time of disablement.

Active non-state employees are also eligible to participate in an ASRS sponsored Supplemental Salary Deferral Plan (SSDP) and/or Supplemental Retirement Savings Plan (SRSP) if their employer has joined the plan. The SSDP is a qualified supplemental defined contribution plan under 403 (b) and 457 (b) of the Internal Revenue Code. In addition, the SRSP is a qualified supplemental defined contribution plan under 401 (a) of the Internal Revenue Code.

During fiscal year 2018, more than 153,908 retired annuitants, their survivors, and 3,488 disabled members received approximately $3.2 billion in benefits. As of June 30, 2018, there were 46,722 retired members and their families enrolled in the ASRS-sponsored medical program and 57,397 retired members enrolled in dental plans through the ASRS.

Major Initiatives for Fiscal Year 2018

Investments

Continued implementation of Strategic Asset Allocation ("SAA"):

- The ASRS Board approved a new strategic asset allocation that includes policies for asset allocation, liquidity, leverage and annual implementation plans effective July 1, 2018.

Fixed Income:

- In the Private and Opportunistic Debt asset class, we expanded our commitments to existing managers to take advantage of attractive investment opportunities.

Equities:

- Implement a new strategy for public equities eliminating active management and replace it with 75% enhanced index and 25% factor based strategies.
- Improved trade cost analysis and broker analysis for improved equity trading execution.
- Initiated process with our custody bank for enhancements to middle office, investment book of record and performance accounting.

Continue to implement and improve performance measurement systems:

- Completed holdings and returns based analysis in all major public asset classes.
- Instituted an innovative dollar value-added approach that bridges internal rate of return (IRR) and time-weighted return (TWR) measured asset classes in a comprehensive approach, solving deficiencies in Brinson methods in multi-asset environments.
- Increased the formalization of tactical asset allocation process with new format for house views using data driven analysis.

Benefits Processing and Customer Service Improvements

- Disbursement of benefits: The ASRS completed the third year of a four year, $3.4 million effort to build an internal benefit disbursement process. Currently, the ASRS contracts with an external vendor to perform these services. When this project is complete, the agency expects to significantly reduce its annual costs to disburse benefits, increase payment flexibility, and enhance security. Savings are estimated to be approximately $1 million per year.

- Retiree Health Insurance: The ASRS investigated and moved to convert 13,000 Medicare-aged members from their current Senior Supplement Plan to a new Medicare Advantage PPO Plan. The new plan has the same or better benefits across the board and no disruption with providers, while offering lower out of pocket member costs.

- Retrospective Rate Agreement (RRA): The ASRS Board approved a policy to distribute accumulated RRA funds to eligible participants through reduced premiums in the ASRS Health Insurance Program beginning with Plan Year 2019.

Administration

- Information Security and Privacy: The ASRS continues to invest in information security and privacy improvements including infrastructure advancements.

- Process Improvement Team: This collaborative, cross-divisional team is reviewing ASRS processes to identify whether current processes could be made more efficient to reduce administrative expenses. Two examinations to date are expected to create more than $10.6 million in savings from the ASRS operations budget over the course of the next ten years.

- Internal Audit: The Internal Audit Division is expanding the depth of operational audits, engaging in internal consultative services, advising on enterprise risk management, incorporating lean reviews, and continuing investment audits, fraud hotline management, GASB testing, and ad-hoc audits at the direction of the Operations, Audit and Legislative Committee, or the Director.

- Technology Systems: The ASRS is more than halfway through a $10.2 million effort to modernize and re-engineer its legacy PERIS applications, written in Oracle Forms, to a Java-based environment. The Oracle Modernization Project, when complete, will modernize all the following benefit applications:

    - Member summary information used by front-line contact staff (complete)
    - Participant demographics (complete)
    - Employer demographics (complete)
    - Member accounting and maintenance (complete)
    - Service audit (complete)
    - Service purchase (complete)

- Health insurance (complete)
- Benefits accounting (in process)
- Contributions accounting (in process)
- New Retiree
- Accounts Ledger
- Fiscal Year End Close

Annualized Time-Weighted Rates of Return (Net of Fees)

	1 Year	3 Year	5 Year	10 Year	Since Inception (June 30, 1975)
ASRS Retirement and Health Benefit Supplement Fund	9.4%	7.8%	8.9%	7.4%	9.7%

The ASRS has investment guidelines for its internal and external investment managers and a set of policies, procedures, compliance requirements, and oversight of internal investment management to ensure that investment assets are prudently managed. Both internally and externally generated compliance procedures are in place. Details of the ASRS investment policies and investments are contained in the Investment Section of this report.

Funding

Any excess of additions, which include contributions and investment earnings, over deductions, including benefits and administrative expenses, is accumulated by the ASRS in order to meet future benefit obligations due to retirees and beneficiaries. The Arizona Revised Statutes require the ASRS to conduct an annual actuarial valuation of its plan assets and liabilities.

The funding objective of the ASRS is to maintain reasonably stable contribution rates and to achieve a funded status of 100%. According to the most recently available actuarial valuation, dated June 30, 2017, the total actuarial value of the retirement fund and the HBS fund assets was $36.8 billion. The total actuarial accrued liability of these funds was $52.2 billion. The unfunded actuarial accrued liability of $15.4 billion results in an actuarial funding ratio of 70.5% for the total plan, which is a decrease from 77.6% at June 30, 2016, due to changes in actuarial assumptions. A new experience study was performed as of June 30, 2017, and as a result several key assumptions were changed:

- The discount rate was lowered from 8% to 7.5%
- Mortality assumptions were updated to reflect members are living longer
- Actuarial method Projected Unit Credit was changed to Entry Age Normal
- The assumption for Permanent Benefit Increases (PBI) was changed from zero to 0.30%

A detailed discussion of funding is provided in the Actuarial Section of this report.

Contribution Rate Projections

Although the ASRS funds are well-diversified and professionally managed, they incurred significant losses during the 2001 stock market correction and the global financial crisis of 2008 and 2009. These market corrections and crises, combined with a lower economic growth environment, significant prior benefit increases, and low prior contribution rates have caused the combined Retirement and Health Benefit Supplement contribution rates to rise significantly. In addition, the ASRS recently completed its 2017 experience study, which resulted in changes to the assumptions used in the June 30, 2017 actuarial valuation. Consequently, contribution rates are expected to increase gradually for several more years before gradually beginning to fall.

Awards

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the ASRS for its CAFR for the fiscal year ended June 30, 2018. The ASRS has received this prestigious award in each of the last 29 years.

To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized CAFR that satisfies both accounting principles generally accepted in the United States of America and applicable legal requirements. A Certificate of Achievement is valid for one year only. We believe this report continues to conform to the Certificate of Achievement Program requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

The GFOA also awarded the ASRS the Award for Outstanding Achievement for its June 30, 2017 Popular Annual Financial Report (PAFR). A PAFR must be readily accessible and easily understandable to the general public and other interested parties without a background in public finance. To be awarded the Award for Outstanding Achievement, a government must have received the Certificate of Achievement for Excellence for its CAFR for the previous year or current year. This is the sixth year the ASRS has received this award.

In addition, the Public Pension Coordinating Council awarded a Pension Standards Award for 2018 to the ASRS for meeting professional standards, plan design and administration. To be awarded the Pension Standards Award, a public employee retirement system must certify that it meets requirements in six areas of assessment. The areas assessed are comprehensive benefits program, funding adequacy, actuarial, audit, investments and communications. The Pension Standards Award is valid for one year. This is the 14th year the ASRS has received this award.

Acknowledgements

This report represents the culmination of hours of hard work by the ASRS General Accounting and Investment Management Division staff. It is intended to provide complete and reliable information for decision making, to ensure compliance with legal requirements, and is a means of measuring the responsible stewardship of the assets of the ASRS.

We would like to express our gratitude to the ASRS Board for its support and leadership in overseeing the financial affairs of the ASRS in a responsible and progressive manner. The ASRS Board, along with the ASRS Executive and

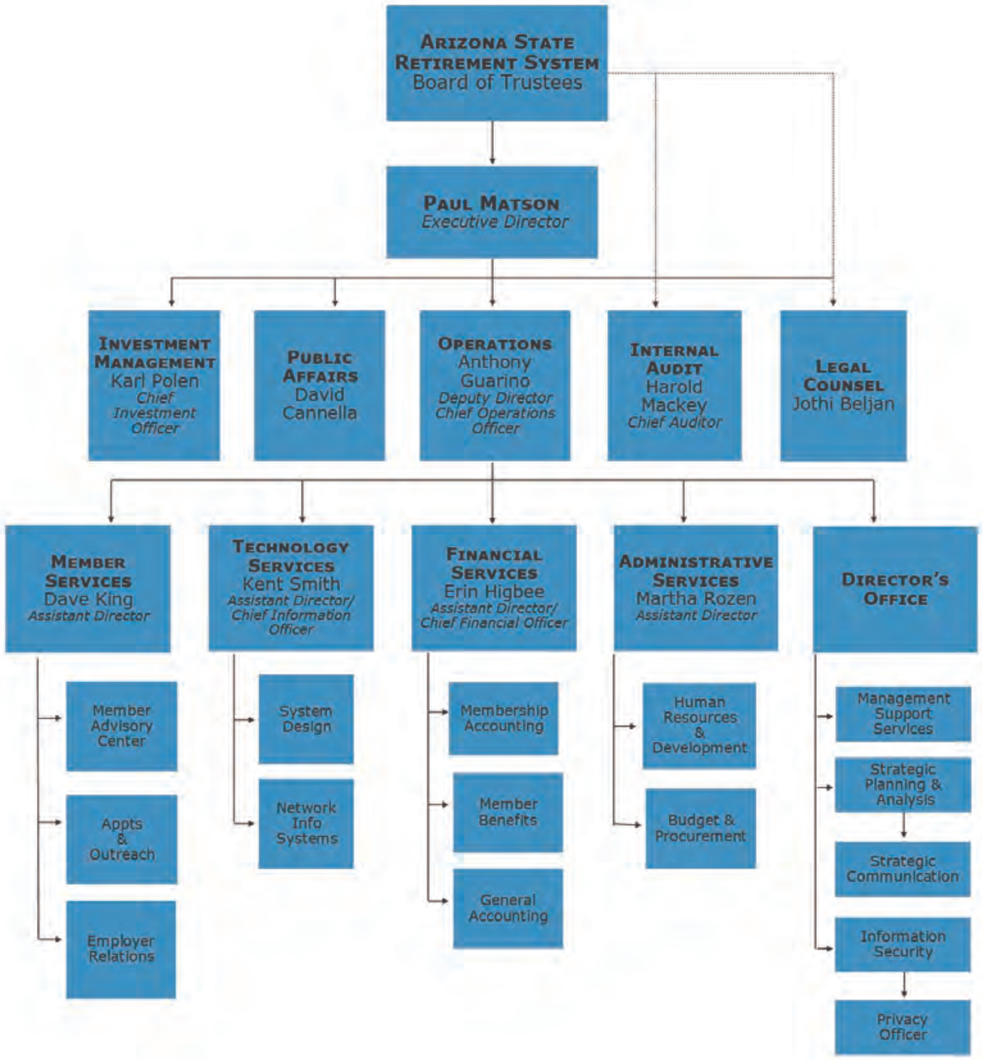
Senior Management, and the entire staff of the ASRS has been instrumental in maintaining the high quality of service and performance, which has become the standard for the ASRS.

Respectfully submitted,

Paul Matson, Executive Director

Erin Higbee, Chief Financial Officer

Organizational Chart



As of June 30, 2018

Investments are managed both internally by the ASRS, and externally through investment managers. Please refer to the Schedule of Broker Commissions, which begins on page 84 in the Investment Section, and the Schedule of Investment Fees on page 86 in the Investment Section.

Kevin McCarthy
Chair
Public

René Guillen
Political Subdivisions

Michael Lofton
Public

Thomas Manos
Retirees

David (Clark) Partridge
Member At Large

Michael Miller
Educator

James Hillyard
State Employees

As of June 30, 2018

Paul Matson
Executive Director

Anthony Guarino
Deputy Director,
Chief Operations Officer

Karl Polen
Chief Investment Officer

Outside Professional Consultants

Actuarial Services	**Gabriel Roeder Smith & Company** Irving, TX
Long Term Disability Benefits	**Broadspire, A Crawford Company** Lexington, KY
Custodial Bank	**State Street Bank and Trust Co.** Boston, MA
Pension Disbursement Services	**State Street Retiree Services** Jacksonville, FL
Independent Auditors	**CliftonLarsonAllen, LLP** Baltimore, MD
General Investment Consultant	**NEPC, LLC** Cambridge, MA
Private Real Estate Consultant	**RCLCO** Bethesda, MD
Private Equity Consultant	**Meketa Investment Group** Boston, MA

Financial Section

CliftonLarsonAllen LLP
CLAconnect.com

INDEPENDENT AUDITORS' REPORT

The Honorable Douglas A. Ducey, Governor
State of Arizona and Board of Trustees
Arizona State Retirement System

Report on the Financial Statements

We have audited the financial statements of the Arizona State Retirement System (ASRS), a component unit of the State of Arizona, which comprise the Combined Statements of Fiduciary Net Position as of June 30, 2018, the related Combined Statements of Changes in Fiduciary Net Position for the year then ended, and the related Notes to the Basic Financial Statements, as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the net position of the ASRS as of June 30, 2018, and the respective changes in its net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Management's Discussion and Analysis and the Schedules of Changes in the Net Pension Liability - Retirement, Net Pension Liability - Retirement, Employer Contributions - Retirement, Investment Returns - Retirement, Changes in the Net OPEB Liability - HBS, Net OPEB Liability – HBS, Employer Contributions – HBS, Investment Returns – HBS, Changes in the Net OPEB Liability – LTD, Net OPEB Liability – LTD, Employer Contributions – LTD, Investment Returns – LTD, and related Notes, as listed in the table of contents, be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Information

Our audit was conducted for the purpose of forming an opinion on the ASRS' financial statements. The Additional Supplementary Information and the Introductory, Investment, Actuarial, and Statistical sections, as listed in the table of contents, are presented for purposes of additional analysis and are not a required part of the financial statements.

The Additional Supplementary Information, as listed in the table of contents, is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. Such information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or to the financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the Additional Supplementary Information is fairly stated, in all material respects, in relation to the financial statements as a whole.

The Introductory, Investment, Actuarial, and Statistical sections, as listed in the table of contents, have not been subjected to the auditing procedures applied in the audit of the financial statements and, accordingly, we do not express an opinion or provide any assurance on it.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated November 1, 2018 on our consideration of the ASRS' internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the ASRS' internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the ASRS' internal control over financial reporting and compliance.

CliftonLarsonAllen LLP

CliftonLarsonAllen LLP

Baltimore, Maryland
November 1, 2018

This section presents Management's Discussion and Analysis (MD&A) of the Arizona State Retirement System's (ASRS) fiduciary net position and changes in fiduciary net position for the fiscal year ended June 30, 2018. It is presented as a narrative overview and analysis. The discussion and analysis should be read in conjunction with the Letter of Transmittal included in the Introductory Section of the ASRS Comprehensive Annual Financial Report (CAFR), and the basic financial statements, and notes to the basic financial statements presented in the Financial Section of the CAFR.

Financial Highlights

During fiscal year 2018, the ASRS' assets increased due to investment earnings. Investment performance exceeded our assumed rate of return for actuarial purposes. This investment performance can be attributed to the overall market gains that were experienced this fiscal year and management's application of the strategic asset allocation policy.

- At June 30, 2018, the ASRS held investments of $40.0 billion (excluding securities lending balances), an increase of $2.2 billion from fiscal year 2017.

- The combined investment portfolio experienced a time-weighted rate of return (net of fees) of 9.4%, compared to 13.9% in fiscal year 2017.

Overview of the Financial Statements

The MD&A is intended to serve as an introduction and overview of the ASRS financial section of the CAFR, which is comprised of the following components: 1) basic financial statements, 2) notes to the basic financial statements, 3) required supplementary information and 4) additional supplementary schedules. Collectively, this information presents the combined fiduciary net position held in trust for benefits for each of the funds administered by the ASRS, which includes the Retirement Fund, Health Benefit Supplement Fund and Long Term Disability Fund, as of June 30, 2018. This financial information also summarizes the combined changes in fiduciary net position held in trust for benefits, for the year then ended. The information available in each of these sections is briefly summarized as follows:

Basic financial statements - For the fiscal year ended June 30, 2018, financial statements are presented for the funds administered by the ASRS. These fiduciary funds are held in trust for the benefit of the ASRS members.

- The Combined Statements of Fiduciary Net Position are presented as of June 30, 2018. This financial statement reflects the resources available to pay benefits to members, including retirees and beneficiaries, as of the end of the fiscal year.

- The Combined Statements of Changes in Fiduciary Net Position are presented for the year ended June 30, 2018. This statement reflects the changes in resources available to pay benefits to retirees and other beneficiaries for the year.

Notes to the Basic Financial Statements - The notes to the basic financial statements provide additional information, which is essential to a full understanding of the data provided in the basic financial statements. The notes to the basic financial statements can be found on pages 22-43 of this report.

Required Supplementary Information – The schedules included in the Required Supplementary Information section present information about the changes in the net pension liability, employer contributions, actuarial assumptions used to calculate the actuarially determined contributions, historical trends, and other required supplementary information. This information is required by the Governmental Accounting Standards Board (GASB).

The money-weighted rate of return expresses investment performance, net of investment expense, and is disclosed per the requirements of GASB 67 and GASB 74.

Additional Supplementary Schedules - These schedules include the Combining Schedules of Fiduciary Net Position, and Changes in Fiduciary Net Position for the ASRS Plan and System retirement programs. The ASRS Plan, a defined benefit plan, and the System, a defined contribution plan with guaranteed benefits, are separate components administered within the same pension plan and trust.

Detailed information about administrative expenses, consultant fees and investment expenses are also included in this section.

Financial Analysis of the ASRS Funds

The ASRS administers retirement, health and long term disability benefits for teachers, state, county and other public municipal employees. The ASRS benefits are funded by member and employer contributions and by earnings on investments. The ASRS has three funds, Retirement, Health Benefit Supplement (HBS) and Long Term Disability (LTD), to which the contributions are distributed according to actuarially determined contribution rates.

Fiduciary Net Position – The ASRS total fiduciary net position held in trust for benefits at June 30, 2018 was $40.5 billion, a 6.2% increase from $38.1 billion at June 30, 2017. The retirement fund's fiduciary net position was $38.5 billion compared to $36.2 billion last year, a 6.3% increase. The HBS' fund net position was $1.8 billion at year end compared to $1.7 billion at fiscal year 2017, a 5.8% increase. The LTD fund's fiduciary net position was $183 million at year end compared to $197 million last year, a 6.7% decrease. The increase in the total fiduciary net position and the fiduciary net position of the retirement and HBS funds is primarily due to investment earnings. The decrease in the LTD fund was because benefits payments exceeded both actuarially determined contributions and investment gains.

Changes in Fiduciary Net Position - For the 2018 fiscal year, member and employer contributions totaled $2.3 billion, a 2.1% increase compared to $2.2 billion at fiscal year end 2017. Multiple factors attributed to the increase in contribution revenue, including an increase in active plan members, an increase in covered payroll and a slight increase in contribution rates. The number of active plan members increased by 0.3%, and covered payroll increased by 1.9%**.** There were also minor increases in the contribution rates. Retirement and HBS combined employer and employee contributions rates were 22.24% and 0.44%, respectively, in fiscal year 2018, and 22.12% and 0.56%, respectively, in 2017. LTD combined employer and employee contribution rates increased from 0.28% in fiscal year 2017 to 0.32% in fiscal year 2018. For employers, the alternate contribution rate increased from 9.47% in 2017 to 9.49% in 2018.

For fiscal year 2018, the ASRS recognized total net investment income of $3.6 billion. The time-weighted rate of return on investment assets was 9.4%.

Deductions from the ASRS net position held in trust for benefits consist primarily of retirement, disability, health insurance, survivor benefits, member refunds and administrative expenses. For the 2018 fiscal year, retirement, disability, health insurance and survivor benefits totaled $3.2 billion, an increase of 3.7% over the $3.1 billion paid during fiscal year 2017. The increase is attributed to an increase in total members and beneficiaries receiving retirement benefits from 148,401 in fiscal year 2017, to 153,908 in fiscal year 2018.

Refunds and transfers to other plans totaled $259.8 million in fiscal year 2018, a 3.7% increase from the $250.6 million paid out in fiscal year 2017. In fiscal year 2018, the cost of administering the ASRS benefits totaled $30.3 million, a decrease of (5.5)% from the $32.1 million paid in fiscal year 2017. This decrease is mainly due to a reduction in payroll achieved via a leaner workforce, and reduced miscellaneous administrative costs compared to last year.

The following tables show the principal ASRS fiduciary net position and changes in fiduciary net position for fiscal years 2018 and 2017:

Exhibit F-1: ASRS Fiduciary Net Position by Fund

June 30, 2018

(Dollars in millions)

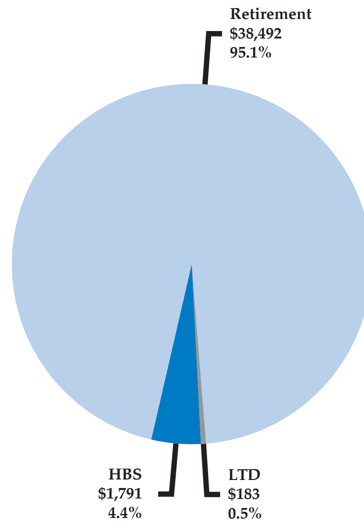


Exhibit F-2: Condensed Summary of Fiduciary Net Position

(Dollars in thousands)

	2018	2017	Change	% Change
Assets				
Cash, receivables, and prepaid benefits	$ 713,082	$ 461,419	$ 251,663	54.5 %
Investments	39,968,355	37,753,498	2,214,857	5.9 %
Securities lending	109,089	174,144	(65,055)	-37.4 %
Total assets	40,790,526	38,389,061	2,401,465	6.3 %
Liabilities				
Payables and other liabilities	215,237	122,905	92,332	75.1 %
Securities lending	109,089	174,144	(65,055)	-37.4 %
Total Liabilities	324,326	297,049	27,277	9.2 %
Fiduciary Net Position Restricted for Pension/ OPEB Benefits	$ 40,466,200	$ 38,092,012	$ 2,374,188	6.2 %

Exhibit F-3: Condensed Summary of Changes in Fiduciary Net Position

(Dollars in thousands)

	2018	2017	Change	% Change
Additions				
Member contributions	$ 1,115,175	$ 1,092,599	$ 22,576	2.1 %
Employer contributions	1,143,911	1,120,718	23,193	2.1 %
Other income	2,225	—	2,225	100.0 %
Service credit purchase and transfers in	22,411	14,649	7,762	53.0 %
Investment and security lending income	3,787,948	4,828,791	(1,040,843)	(21.6)%
Investment and security lending expense	(208,185)	(208,237)	52	— %
Total additions	5,863,485	6,848,520	(985,035)	(14.4)%
Deductions				
Retirement and disability benefits	3,152,302	3,043,259	109,043	3.6 %
Survivor benefits	46,910	40,846	6,064	14.8 %
Refunds and transfers	259,776	250,578	9,198	3.7 %
Administration and other	30,309	32,077	(1,768)	(5.5)%
Total deductions	3,489,297	3,366,760	122,537	3.6 %
Net Change	2,374,188	3,481,760	(1,107,572)	31.8 %
Fiduciary Net Position Restricted for Pension/OPEB Benefits				
Net position beginning of year	38,092,012	34,610,252	3,481,760	10.1 %
Net position end of year	$ 40,466,200	$ 38,092,012	$ 2,374,188	6.2 %

Funded Status - GASB 67 and 74 require public employee pension and OPEB plans which have certain characteristics and whose assets are administered through trusts to use a prescribed accounting methodology for financial reporting purposes. As a result, the ASRS conducts two actuarial valuations each year, one for accounting purposes and one for funding purposes. The differences between the two methodologies are as follows:

Exhibit F-4: Pension Valuation Methodologies

Item	GASB 67 Methodology	ASRS Funding Methodology
Actuarial Method	Entry Age Normal	Entry Age Normal
Assets	Market Value	Smoothed Value
Permanent Benefit Increase Included?	Yes	Yes
Discount Rate	7.50%	7.50%

In order to determine the Retirement Fund's funded status under Generally Accepted Accounting Principles (GAAP), the ASRS used the most recently available actuarial valuation, dated June 30, 2017, and rolled it forward to June 30, 2018. The Retirement Fund's net position at June 30, 2018 was $38.5 billion and the total pension liability was $52.4 billion, which results in a net pension liability of $13.9 billion. The Retirement Fund's fiduciary net position as a percentage of the total pension liability was 73.4%. The notes to the basic financial statements, as well as the required supplementary information, disclose more detailed information about the Retirement Fund's net pension liability.

Exhibit F-5: OPEB Valuation Methodologies

Item	GASB 74 Methodology	ASRS Funding Methodology
Actuarial Method	Entry Age Normal	Entry Age Normal
Assets	Market Value	Smoothed Value
Discount Rate	7.5%	7.5%

In order to determine the HBS and LTD Funds' funded status under GAAP, the ASRS used the most recently available actuarial valuation, dated June 30, 2017, and rolled it forward to June 30, 2018. The HBS Funds' fiduciary net position at June 30, 2018 was $1.67 billion, and the total OPEB liability was $1.64 billion, which results in a net OPEB asset of $36 million. The HBS Fund's net position as a percentage of the total HBS program OPEB liability was 102.2%. The LTD Fund's net position at June 30, 2018 was $183 million, and the total LTD OPEB liability was $236 million, which results in a net LTD OPEB liability of $52 million. The LTD Fund's net position as a percentage of the total LTD OPEB liability was 77.8%. The notes to the basic financial statements as well as the required supplementary information disclose more detailed information about the HBS and LTD Fund's net OPEB liability.

A detailed discussion of the funded status of the Retirement Fund, the Health Benefit Supplement Fund and the Long Term Disability Fund, based on the ASRS funding methodology, is contained in the Actuarial Section of this report.

Investments - During the fiscal year 2018, the ASRS investments were broadly diversified in domestic and international equities, domestic fixed income, real estate, private equity, opportunistic, commodities and cash equivalent instruments. A few highlights of the year are as follows:

- As of June 30, 2018, the fund held investments of $40.0 billion, (excluding securities lending balances), an increase of $2.2 billion from the prior year.
- The combined investment portfolio generated approximately $3.6 billion in net investment earnings during the year.
- The combined investment portfolio experienced a time-weighted rate of return of 9.4% compared to the Interim Total Fund Benchmark return of 8.4%.
- The increase in investments during the year is primarily due to an improved global economy and overall market gains.

A detailed discussion of investments is provided in the Notes to the Basic Financial Statements and the Investment Section of this report.

Information Requests

Request for Information – This financial report is designed to provide a general overview of the Arizona State Retirement System's finances. Questions concerning any of the information provided in this report or requests for additional information should be addressed to:

ASRS Financial Services Division
3300 North Central Avenue
Phoenix, AZ 85012

Combined Statements of Fiduciary Net Position

As of June 30, 2018

(Dollars in thousands)

	Retirement Fund	Health Benefit Supplement Fund	Long Term Disability Fund	Combined
Assets				
Cash	$ 17,647	$ 767	$ 221	$ 18,635
Prepaid benefits	246,289	6,612	—	252,901
Receivables:				
Accrued interest and dividends	46,847	2,036	217	49,100
Securities sold	145,130	6,309	673	152,112
Futures contracts	11,156	485	52	11,693
Contributions	68,039	1,049	763	69,851
Due from other funds	—	135,590	—	135,590
Other	15,097	2,746	5,357	23,200
Total receivables	286,269	148,215	7,062	441,546
Investments:				
Cash and short-term investments	832,011	36,167	3,858	872,036
Equity	21,314,516	926,535	98,835	22,339,886
Fixed income	10,152,553	441,328	47,077	10,640,958
Real estate	4,117,891	179,003	19,094	4,315,988
Multi-asset	1,179,524	51,274	5,469	1,236,267
Other	537,369	23,359	2,492	563,220
Total investments	38,133,864	1,657,666	176,825	39,968,355
Securities lending collateral	104,082	4,524	483	109,089
Total assets	38,788,151	1,817,784	184,591	40,790,526
Liabilities				
Securities purchased	28,944	1,258	134	30,336
Securities lending collateral	104,082	4,524	483	109,089
Futures contracts	14,462	629	67	15,158
Due to other funds	135,423	—	167	135,590
Other	13,291	20,566	296	34,153
Total liabilities	296,202	26,977	1,147	324,326
Net position restricted for pension/OPEB benefits	$ 38,491,949	$ 1,790,807	$ 183,444	$ 40,466,200

The accompanying notes are an integral part of these statements.

Combined Statements of Changes in Fiduciary Net Position

For the Year Ended June 30, 2018
(Dollars in thousands)

	Retirement Fund	Health Benefit Supplement Fund	Long Term Disability Fund	Combined
Additions				
Contributions:				
Member contributions	$ 1,099,663	$ —	$ 15,512	$ 1,115,175
Employer contributions	1,085,033	42,976	15,902	1,143,911
Transfers from other plans	2,423	—	—	2,423
Purchased Service	19,988	—	—	19,988
Total Contributions	2,207,107	42,976	31,414	2,281,497
Investment Activity:				
Investment activity income:				
Net appreciation in fair value of investments	3,135,540	136,591	13,555	3,285,686
Interest	85,999	5,376	370	91,745
Dividends	346,903	15,074	1,574	363,551
Other income	39,335	1,710	163	41,208
Total investment activity income	3,607,777	158,751	15,662	3,782,190
Investment activity expense:				
Management fees	(188,309)	(8,159)	(925)	(197,393)
Custody fees	(1,751)	(76)	—	(1,827)
Consultant and legal fees	(4,130)	(180)	—	(4,310)
Internal investment activity expense	(4,108)	(179)	—	(4,287)
Total investment activity expenses	(198,298)	(8,594)	(925)	(207,817)
Net income from investment activities	3,409,479	150,157	14,737	3,574,373
Securities lending activities:				
Securities lending income	5,495	239	24	5,758
Interest rebate	191	8	1	200
Management fees	(542)	(24)	(2)	(568)
Net income from securities lending activities	5,144	223	23	5,390
Total net investment income	3,414,623	150,380	14,760	3,579,763
Other income	—	2,225	—	2,225
Total additions	5,621,730	195,581	46,174	5,863,485
Deductions				
Retirement and disability benefits	2,998,540	96,098	57,664	3,152,302
Survivor benefits	46,910	—	—	46,910
Refunds to withdrawing members, including interest	259,358	—	—	259,358
Administrative expenses	26,878	1,234	1,555	29,667
Transfers to other plans	418	—	—	418
Other	433	—	209	642
Total deductions	3,332,537	97,332	59,428	3,489,297
Net increase (decrease) in net position	2,289,193	98,249	(13,254)	2,374,188
Net position restricted for pension/OPEB benefits				
Beginning of year	36,202,756	1,692,558	196,698	38,092,012
End of year	$ 38,491,949	$ 1,790,807	$ 183,444	$ 40,466,200

The accompanying notes are an integral part of these statements.

Note 1. Plan Description

Organization – The Arizona State Retirement System (ASRS) is a component unit of the State of Arizona. The ASRS is a cost-sharing, multiple-employer, pension plan established by the State of Arizona to provide pension benefits for employees of the State and employees of participating political subdivisions and school districts. The ASRS is administered in accordance with Title 38, Chapter 5, Articles 2 and 2.1 of the Arizona Revised Statutes (A.R.S.).

The ASRS is a qualified governmental pension plan pursuant to I.R.C. § 414. The ASRS pension plan has two components, the Plan and the System (collectively, Retirement Fund). The assets of the Retirement Fund are utilized to pay benefits to members of both Plan and System. The Plan is a defined benefit plan and the System is a closed defined contribution plan, with guaranteed benefits. These plans are administered through a trust.

The System was established by the Arizona Legislature in 1953 to provide retirement and other benefits for state employees, teachers, and employees of political subdivisions that elected coverage. In 1943, the Legislature established the Arizona Teachers' Retirement System (the Teachers' System) to provide benefits for teachers. After the establishment of the ASRS, teachers who were, or later became, eligible through employment covered by the ASRS were transferred to the System. The Teachers' System then became inactive, except for continuation of retirement benefits already being paid and obligations to teacher members who did not become eligible for the ASRS.

The Plan, enacted by the Legislature in 1970, became effective July 1, 1971. Effective July 1, 1981, all non-retired members of the System became members of the Plan, as prescribed by Laws of 1980, Chapter 238.

In addition to retirement benefits, the ASRS provides retired members access to health insurance and a health insurance premium supplement benefit. The ASRS also provides a long term disability program for actively contributing members. The Health Benefits Supplement (HBS) program is administered in accordance with Title 38, Chapter 5, Article 2. The Long Term Disability (LTD) program is administered in accordance with Title 38, Chapter 5, Article 2.1.

A.R.S. § 38-783 and A.R.S. § 38-797 establish the health insurance premium benefits (HBS) program and the long term disability benefits program (LTD), respectively. Effective July 1, 1995, the ASRS established an account for each benefit program and has reported those funds in the basic financial statements. Both the Health Benefit Supplement (HBS) Program and the Long Term Disability (LTD) Program are cost-sharing, multiple-employer postemployment benefit plans. The LTD and HBS Funds' assets or income may be utilized solely for the payment of eligible member benefits of each respective fund.

Plan Administration – The operations and administration of the ASRS are vested with the ASRS Board , which is comprised of nine members, whom are appointed by the Governor and confirmed by the Arizona Senate pursuant to A.R.S. § 38-211. The ASRS Board is responsible for establishing and maintaining the funding policy.

The composition of the ASRS Board, their qualifications and term are defined in A.R.S. §38-713. Five of the trustees must be ASRS members each representing one of the following member groups: an educator, an employee of a political subdivision, a retired member, an employee of the State and an at large member who may represent any ASRS member group. Each trustee representing an ASRS member group must have no less than five years of administrative management experience. Additionally, four trustees, who are not ASRS members, are appointed to represent the public. Four trustees of the ASRS Board must have a minimum of 10 years of investment experience. There is no limit on the number of terms a trustee may serve.

Pursuant to the Arizona Revised Statutes, contribution requirements for active members and their participating employers are established and may be amended by the ASRS Board. Contribution rates are actuarially determined and are expected to finance the costs of benefits earned by members during the year and any unfunded accrued liability. The cost of administering the Plan is financed through employer contributions, member contributions and investment earnings.

Health Insurance - Pursuant to A.R.S. §38-782, the Retiree Group Insurance Program makes available group health insurance coverage to eligible retired and disabled members and their dependents. Retired and disabled members of the ASRS, University Optional Retirement Plans, the Public Safety Personnel Retirement System, the Elected Officials' Retirement Plan, the Elected Officials Defined Contribution Plan, the Community College District Optional Retirement Plans and the Corrections Officer Retirement Plan are eligible for health insurance benefits through the ASRS.

The ASRS, and eligible retirees, pay premiums on a monthly basis to a contracted health insurance provider as consideration for health insurance coverage provided. The ASRS contract with the insurance provider allows for a portion of the difference between the total revenues and total claims expenses incurred by the provider to be distributed back to the ASRS in the form of a Retrospective Rate Agreement (RRA) refund. The amount is calculated based on a targeted retention ratio as agreed upon per the contract and may fluctuate from year-to-year. The ASRS is due an RRA refund for revenue and claims expense activity that occurred during fiscal year 2018. The rebate was for approximately $2.1 million and is included with Other receivables on the Statement of Fiduciary Net Position. RRA assets are reported in the HBS fund but are not restricted to pay HBS program benefits.

Health Benefit Supplement Program - Pursuant to A.R.S. §38-783, retired and disabled members, with at least five years of credited service, are eligible to participate in the HBS program. This assistance is provided to those members who elect group coverage through either the ASRS Retiree Group Insurance Program or their former member employer. For a more detailed summary of benefits, refer to the Summary of Plan Provisions in the Actuarial Section of this report.

In accordance with the funding policy as of June 30, 2018, the required contribution rate for employers for their active members was 0.44% of covered payroll. There were 74,529 retired members or their beneficiaries receiving benefits as of June 30, 2018.

Long Term Disability Program - Pursuant to A.R.S. §38-797, members of the ASRS are eligible for LTD benefits in the event they become unable to perform their work. The monthly benefit is equal to two-thirds of their monthly compensation. Participants continue to earn service credit up to their normal retirement dates. Members with LTD commencement dates after June 30, 1999 are limited to 30 years of service or the service on record as of the effective disability date, if their service is greater than 30 years.

In accordance with the funding policy as of June 30, 2018, the required contribution rate for employers and active members was 0.16% of covered payroll. There were 3,488 disabled members receiving long term disability benefits as of June 30, 2018.

Reporting Entity – The financial statements of the ASRS include the financial activities of the Retirement Fund, HBS Fund and LTD Fund. The ASRS is considered a component unit of the State of Arizona reporting entity and is included in the State's financial reports as a pension trust fund.

ASRS Membership – at June 30, 2018 ASRS membership and employer units consisted of the following:

Exhibit F-6: Plan Members

Member Status	Retirement Plan	Retirement HBS[1]	Retirement LTD
Inactive plan members or beneficiaries receiving benefits	153,908	74,529	3,488
Inactive plan members entitled to, but not yet receiving benefits	232,568	37,469	—
Active plan members	210,136	210,136	210,136
Total membership	596,612	322,134	213,624

[1]The count of inactive plan members entitled to HBS Program benefits is less than that of the Retirement Program, because members must have at least 5 years of service to receive HBS benefits.

Exhibit F-7: Employer Units

Member Type	Employer Unit Count
School districts	235
Charter schools	134
Cities and towns	79
Counties	15
Special districts	91
Community college districts	10
Universities	3
State government	1
Total employer units	568

Note: The 568 employer units represent 673 total employers.

Retirement Benefits – The ASRS provides benefits under formulas and provisions described in Arizona State law. Benefits and administrative expenses are paid from monies contributed by members and employers and from earnings on investments. The ASRS provides for retirement, disability, health insurance premium supplemental benefits and survivor benefits.

Retirement benefits are calculated on the basis of total credited service, average monthly compensation, and graded multiplier, which is established on a fiscal year basis (July 1 to June 30). Members with an initial membership date before July 1, 2011, are eligible for full retirement benefits upon the earliest of attaining:

- Age 65;
- Age 62 with 10 years of credited service;
- Age plus credited service equaling 80 or more

Members with initial membership dates on or after July 1, 2011, are eligible for full retirement benefits upon the earliest of attaining:

- Age 65;
- Age 62 with 10 years of credited service;
- Age 60 with 25 years of credited service;
- Age 55 with 30 years of credited service

Average monthly compensation is determined by a 60-month or 36-month calculation depending on the membership date.

Termination pay includes vacation/sick pay (except for state and county employees), compensation time pay, termination incentive pay (excludes payments made after retirement begins, such as VIP or ESP), or any other payments paid at the time of termination.

Exhibit F-8: Average Monthly Compensation Calculation

Membership Date	Calculation	
Prior to January 1, 1984	*Greater of the following calculations:*	
	36 Months	This is calculated by taking the highest consecutive 36 months of contributions within the last 120 months (10 years) of contributions reported. Termination Pay is excluded.
	60 Months	This is calculated by taking the highest consecutive 60 months of contributions within the last 120 months (10 years) of contributions reported. Termination Pay is included.
January 1, 1984 - June 30, 2011	36 Months	This is calculated by taking the highest consecutive 36 months of contributions within the last 120 months (10 years) of contributions reported. Termination Pay is excluded.
July 1, 2011, or after	60 Months	This is calculated by taking the highest consecutive 60 months of contributions within the last 120 months (10 years) of contributions reported. Termination Pay is excluded.

The graded multiplier is a percentage set by Arizona State statute. It is the percentage of the average monthly compensation members will receive for each year of credited service they have accrued at retirement. This percentage is based on their total years of service at retirement based on the following graded multiplier schedule:

Exhibit F-9: Graded Multiplier

Years of Service	Multiplier
0.00-19.99 years	2.10%
20.00-24.99 years	2.15%
25.00-29.99 years	2.20%
30.00 or more years	2.30%

Permanent Benefit Increase (PBI) – Retired members who have been retired for at least one year, and members receiving LTD benefits, are eligible for a benefit increase adjustment annually up to a maximum of 4%, if funds are available.

The PBI is paid when the average investment return is in excess of 8% over a rolling 10 year period from a reserve of excess investment earnings. Funds are reserved when total actuarial investment returns for each fiscal year are greater than 8%. If there are no excess investment earnings in the reserve, then no additional benefit increase is paid. As of June 30, 2018, there is a zero balance in the reserve for future PBIs.

Enhanced Permanent Benefit Increase (EPBI) – Retired members with at least 10 years of service who have been retired five or more years are eligible for an enhanced permanent benefit increase.

For each complete five-year period the member has been retired, an incremental benefit is paid if monies to pay the benefit are available. This benefit is funded by an interest credit of 8% of the reserve for future PBIs.

Due to legislation enacted in the 2013 legislative session, PBIs and EPBIs will not be awarded to members hired after September 13, 2013.

For a more detailed summary of benefits, refer to the Summary of Plan Provisions in the Actuarial Section of this report.

HBS Benefits – Pursuant to A.R.S. § 38-783, retired and disabled members, with at least five years of credited service, are eligible to receive HBS program benefits. The benefits are payable only with respect to allowable health insurance premiums for which the member is responsible. The maximum monthly benefits for members with 10 or more years of service range from $150 to $215, depending on age and number of dependents. For members with five to nine years of service, the benefits are the same dollar amounts as above multiplied by a vesting fraction equal to 10% for each completed year of service (i.e., 50% to 90%).

LTD Benefits – Pursuant to A.R.S. § 38-797, members of the ASRS are eligible for LTD benefits in the event they become unable to perform their work. The monthly benefit is equal to two-thirds of their monthly compensation. Participants continue to earn service credit up to their normal retirement dates. Members with LTD commencement dates after June 30, 1999 are limited to 30 years of service or the service on record as of the effective disability date, if their service is greater than 30 years.

Contributions – Per the Arizona Revised Statutes, contribution requirements for active members and their participating employers are established, and may be amended, by the ASRS Board. Contribution rates are actuarially determined and are expected to finance the costs of benefits accrued by plan members during the year and any unfunded accrued liability. The cost of administering the pension and other postemployment benefits is financed through employer contributions, member contributions and investment earnings.

Employers are also required to pay an Alternate Contribution Rate (ACR) for retired members who return to work. ACR contributions totaling $28.6 million were received during the 2018 fiscal year and are included in Employer Contributions on the Combined Statements of Changes in Fiduciary Net Position.

The contractually required contribution rates of employers as a percentage of covered payroll and the employees' matching contributions were as follows for fiscal year 2018:

Exhibit F-10: Contribution Rates

Contribution Rates	Employer	Member
Retirement	10.90%	11.34%
Health benefit supplement	0.44%	0.00%
Long term disability	0.16%	0.16%
Total required	11.50%	11.50%

Exhibit F-11: Alternate Contribution Rates

Alternate Contribution Rates	Employer	Member
ACR Retirement	9.26%	0.00%
ACR Health benefit supplement	0.10%	0.00%
ACR Long term disability	0.13%	0.00%
Total ACR required	9.49%	0.00%

The Arizona Revised Statutes allow the purchase of eligible service credit for which no benefit can be paid by another qualified plan. Purchasable services include leave of absence, military service, other public service employment and previously forfeited service under the ASRS. The Arizona Revised Statutes also allow purchase of military service regardless of whether a benefit may be paid.

Termination of Employment – Upon termination of employment, members may elect to receive their contributions made to the Plan, plus accrued interest. Members with an initial membership date before July 1, 2011, may receive a percentage of employer contributions to the Plan based on years of service as follows:

Exhibit F-12: Vesting Period

(Initial membership date before July 1, 2011)

Years of Service	Vesting
5 to 5.9	25%
6 to 6.9	40%
7 to 7.9	55%
8 to 8.9	70%
9 to 9.9	85%
10 or more	100%

Members with an initial membership date on or after July 1, 2011 will not receive any portion of the employer contributions if they withdraw their account balance prior to retirement. This does not apply to terminations due to an employer reduction in force or position elimination, in which case the above ASRS vesting schedule will apply.

Withdrawal of accumulated contributions results in forfeiture of the member's accrued benefits in the Plan; however, state law allows for reinstatement of a member's forfeited service upon repayment of the accumulated contributions, plus interest if a former member returns to covered service.

Note 2. Summary of Significant Accounting Policies

Basis of Accounting – The financial statements of the Arizona State Retirement System are prepared using the accrual basis of accounting. The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the United States of America that apply to government accounting of fiduciary funds issued by the GASB.

Contributions are recognized as revenues when due, pursuant to statutory and contractual requirements. Benefits and refunds are recognized when due and payable and expenses are recorded when the corresponding liabilities are incurred, regardless of when contributions are received or payment is made. Administrative expenses are recognized when incurred.

Investments – Publicly traded investments are reported at fair values determined by the custodial agent. The agent's determination of fair values includes, among other things, utilization of pricing services or prices quoted by independent brokers at current exchange rates.

See Note 4 for a schedule of investments measured at fair value and additional information regarding the inputs used to determine the fair value of investments.

The derivative instruments held by ASRS consist of futures, forward contracts, options, swaps, rights and warrants. Fair values of derivative instruments are determined by the custodial agent and reported on the Statement of Fiduciary Net Position. Changes in fair values of derivative instruments are reported as net appreciation of fair value on the Statement of Changes in Fiduciary Net Position.

The fair value of limited partnership investments are based on estimated current values and accepted industry practice. Fair value is based on estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values.

Investments classified as multi-asset and commodities are in commingled funds. Multi-asset commingled funds consist of various types of publicly traded investments. Commodities commingled funds consist of commodities futures.

Retirement, HBS and LTD investments are pooled. Each program's respective ownership percentage of the pool is determined based on the daily cash flows related to each program by virtue of purchases and redemption of shares of the pooled asset fund. Realized and unrealized gains are allocated daily using the same methodology.

Income derived from investments is recognized when earned. Investment expenses are recognized when incurred. Performance fees are reported net with the appreciation in the fair value of investments.
Net appreciation in the fair value of investment assets is determined by calculating the change in the fair value of investments between the end of the year and the beginning of the year, adjusting for cash flows related to investment purchases and sales. Interest income is recorded on the accrual basis and dividends are recorded on the ex-dividend date. Security transactions and any resulting gains or losses are accounted for on a trade date basis.

Public market investment managers, and some private market investment managers, are paid directly for manager fees. Private market investment managers, whose manager fees are not paid directly, report account valuations on a net of fee basis. The ASRS made a good faith effort to identify and separately report manager fees as investment expense by requesting a confirmation of fees from the managers and reviewing investment capital account statements.

Capital Assets – Capitalization thresholds have been established as follows:

Exhibit F-13: Capitalization Thresholds

Capitalizable Assets		Threshold
Furniture and fixtures	$	1,000,000
Computers and other equipment	$	1,000,000
Internally developed computer software	$	10,000,000
Externally purchased software	$	1,000,000
Websites	$	1,000,000

As of June 30, 2018, there were no capitalizable expenditures at or above the stated thresholds.

Accounts Receivable – Accounts receivable are comprised of employer contributions that are expected to be received within 60 days of year end, member overpayments, and member service purchase payroll deduction amounts (PDAs) that are expected to be collected within one year or more.

Federal Income Tax Status – The Plan is organized as a qualified retirement plan under the Internal Revenue Code (IRC). The ASRS is an integral part of the State of Arizona, and accordingly is not subject to U.S. federal income tax.

Actuarial Valuation – The actuarial information presented for the retirement, HBS and LTD funds are based on the June 30, 2017 actuarial valuation, which was rolled forward to June 30, 2018. Significant actuarial assumptions used in the valuations are included in the notes to the financial statements and required supplementary schedules.

Use of Estimates – The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and changes therein, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Note 3. Cash and Investments

Cash – Cash deposits are subject to custodial risk. Custodial risk is the risk that deposits owned by ASRS will not be returned in the event of a bank failure. The Arizona Revised Statutes do not require ASRS deposits to be collateralized. The ASRS Board has not adopted a more restrictive policy. Cash on deposit with the Arizona State Treasurer in excess of FDIC coverage is collateralized at 100% of the deposit balance. In addition, the FDIC insures ASRS cash deposits up to $250,000 per member based on the ratio of the member's account balance to the ASRS net position.

Investments – The Arizona Revised Statutes authorize the ASRS to make investments in accordance with the "Prudent Person" rule. Section 38-718 (E) of the Arizona Revised Statutes interprets the rule to be that investment management shall discharge the duties of their position with the care, skill, prudence and diligence, under the circumstances then prevailing, that a prudent person acting in a like capacity and familiar with the same matters would use in the conduct of an enterprise of a like character and with like aims as that of ASRS. Within this broad framework, the ASRS has chosen to invest in short-term securities, obligations of the U.S. government or agencies of the U.S. government, corporate bonds, common and preferred stocks (domestic and foreign), mortgages, derivatives, commodities, real estate, loans, and direct investments in partnerships.

The Arizona Revised Statutes place the following restrictions on the ASRS investment fund portfolio:

- No more than 80% of the assets held by the ASRS may be invested at any given time in equities, measured at market value.
- No more than 5% of the assets held by the ASRS may be invested in securities issued by any one institution, agency or corporation, other than securities issued as direct obligations of or fully guaranteed by the U.S. government or mortgage backed securities and agency debentures issued by federal agencies, measured at market value.
- No more than 40% of the assets held by the ASRS may be invested in non-U.S. public equity investments, measured at market value.
- No more than 60% of the assets held by the ASRS may be invested internally, measured at market value.
- No more than 10% of the assets held by the ASRS may be invested in bonds or other evidences of indebtedness of those multinational development banks in which the U.S. is a member nation, including the International Bank for Reconstruction and Development, the African Development Bank, the Asian Development Bank, and the Inter-American Development Bank, measured at market value.

The ASRS Board has not formally adopted more restrictive policies than required by state statute for the various types of risks. The management of the ASRS believes it has complied with the above guidelines. Management does expect the money managers to abide by contract requirements, which are considerably more restrictive than the statute.

Due to the flow of securities to and from transfer agents and the security lending program, securities occasionally cannot be delivered for a sale or received for a purchase, resulting in a "failed" transaction. Securities with trade dates in June and settlement dates in July result in "outstanding" transactions. Since these securities have contractually changed ownership, receivables and payables result from these transactions.

Such transactions resulted in a receivable for securities sold of $152.1 million and a payable for securities purchased of $30.3 million at June 30, 2018.

Investment Policy – The ASRS policy in regard to the allocation of invested assets is established and may be amended by the ASRS Board. Plan assets are managed on a total return basis with a long term objective of achieving and maintaining a fully funded status for benefits to be provided. The following is the asset allocation policy adopted by the ASRS Board as of June 30, 2018:

Exhibit F-14: Target Asset Allocation

Asset Class	Target Allocation
Equity	58%
Fixed income	25%
Commodities	2%
Real estate	10%
Multi-asset class	5%
Total	100%

Rate of Return – For the year ended June 30, 2018, the annual money-weighted rate of return on Retirement Fund, HBS Fund and LTD Fund investments held by the ASRS, net of investment expense, was 9.30%, 9.32% and 9.69%, respectively. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

Investments are subject to a number of risks including custodial credit risk, concentration of credit risk, credit quality risk, interest rate risk and foreign currency risk.

Custodial Credit Risk – For an investment, custodial credit risk is the risk that, in the event of a failure of a counter party, the ASRS will not be able to recover the value of its investment or the collateral securities that are in the possession of an outside party. Publicly traded securities are registered in the name of the ASRS, including loaned securities.

Credit Quality Risk – Credit quality risk is the risk that the issuer will not fulfill its obligations to the purchaser of its debt instruments. The Arizona Revised Statutes are not specific as to the credit ratings of the investments of the ASRS. The statutes require the "Prudent Person" rule. The ASRS Board has not adopted a formal policy on credit ratings. The present management policy is to set standards for each portfolio manager based on an assessment of their expertise.

Concentration of Credit Risk – Concentration of credit risk is the risk of substantial loss if investments are concentrated in one issuer. The Arizona Revised Statutes require that no more than 5% of the assets can be invested in one issuer, except for the U.S. government and its agencies. The ASRS Board has not adopted a more restrictive policy.

The following table presents the fixed income investments at June 30, 2018, categorized to give an indication of the level of credit quality risk assumed by the ASRS:

Exhibit F-15: Credit Quality Risk

Fixed Income Securities

(Dollars in thousands)

Credit Rating[1]	Fair Value	Fair Value as a Percent of Total Debt Securities Investments
AAA	$ 129,750	6.28%
AA	1,200,283	58.14%
A	180,355	8.73%
BBB	261,650	12.67%
BB	87,989	4.26%
B	157,500	7.63%
CCC	43,276	2.10%
CC	2,242	0.11%
C	1,109	0.05%
Not rated	642	0.03%
Total	$ 2,064,796	100.00%

[1]When a security received split ratings between Moody's, S&P and Fitch, this schedule was prepared using the rating that is indicative of the highest degree of risk.

Interest Rate Risk – Interest rate risk is the risk that debt securities will lose value due to rising interest rates. The Arizona Revised Statutes are silent regarding interest rate risk. The ASRS Board has not adopted a specific formal policy for interest rate risk. It does set more restrictive requirements in its contracts with money managers. The ASRS utilizes effective duration to identify and manage its interest rate risk. Effective duration measures the expected change in value of a fixed income security for a given change in interest rate. The method takes into account the likely timing and amounts of variable cash flows for bonds with call options and prepayment provisions.

The following table shows the effective duration by investment type as of June 30, 2018:

Exhibit F-16: Interest Rate Risk

Fixed Income Securities
(Dollars in thousands)

Fixed Income Security Type	Fair Value	Weighted Average Maturity (in years)
Asset Backed Securities	$ 9,814	3.8
Commercial Mortgage Backed Securities	36,924	31.1
Corporate Bonds	789,966	8.7
Municipal/Provincial Bonds	30,409	9.0
Government Related	2,032	1.3
Government Agencies	16,817	1.1
Government Bonds	770,808	7.5
Government Mortgage Backed Securities	408,026	23.9
Total	$ 2,064,796	

Foreign Currency Risk – Foreign currency risk is the risk that changes in the foreign exchange rate will adversely impact the fair value of an investment. The ASRS is authorized to invest part of its assets in foreign investments. According to the Arizona Revised Statutes, no more than 40% of the assets held by the ASRS may be invested in foreign securities and the investments must be made by investment managers with expertise in those investments. The ASRS Board has not adopted a formal policy that is more restrictive. Management does have certain policies in the contracts with the money managers permitted to invest in foreign denominated securities.

Exhibit F-17: Foreign Currency Risk
(Dollars in thousands)

The following table shows exposure to foreign currency risk (U.S. dollars) as of June 30, 2018:

Currency Type	Short-term Investments	Equity Securities	Private Equity	Real Estate	Total
Australian Dollar	$ 1,043	$ 429,873	$ —	$ —	$ 430,916
Canadian Dollar	5,623	141,251	—	—	146,874
Danish Krone	1,880	109,005	—	—	110,885
Euro Currency	9,596	2,220,458	194,351	—	2,424,405
Hong Kong Dollar	1,109	213,697	—	—	214,806
Japanese Yen	15,409	1,660,291	—	—	1,675,700
Mexican Peso	—	7,211	—	7,117	14,328
New Israeli Sheqel	526	27,094	—	—	27,620
New Taiwan Dollar	1,164	—	—	—	1,164
New Zealand Dollar	122	24,766	—	—	24,888
Norwegian Krone	210	69,316	—	—	69,526
Pound Sterling	8,438	1,182,289	—	—	1,190,727
Qatari Rial	(232)	—	—	—	(232)
Singapore Dollar	664	104,500	—	—	105,164
South Korean Won	32	—	—	—	32
Swedish Krona	463	189,988	—	—	190,451
Swiss Franc	1,811	461,040	—	—	462,851
Thailand Baht	784	—	—	—	784
Total	$ 48,642	$ 6,840,779	$ 194,351	$ 7,117	$ 7,090,889

Note 4. Fair Value Measurements

Fair value measurements are categorized within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset and give the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 measurements) and the lowest priority to unobservable inputs (Level 3 measurements).

Level 1 Unadjusted quoted prices for identical instruments in active markets.

Level 2 Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which all significant inputs are observable.

Level 3 Valuations derived from valuation techniques in which significant inputs are unobservable.

Investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not classified in the fair value hierarchy.

In instances where inputs used to measure fair value fall into different levels in the fair value hierarchy, fair value measurements in their entirety are categorized based on the lowest level input that is significant to the valuation. The assessment of the significance of particular inputs to these fair value measurements requires judgment and consideration of factors specific to each asset or liability.

Equity securities classified in Level 1 are valued using prices quoted in active markets for those securities. Equity securities classified as Level 2 are valued using most recent trade price available in inactive markets. Equity securities classified in Level 3 are valued using unobservable inputs, including situations where there is little market activity, if any.

Fixed income securities classified in Level 2 are valued using matrix pricing technique. Matrix pricing is used to value securities based on the securities' relationship to benchmark quoted prices.

Real estate assets classified in Level 3 are real estate investments valued by external appraisals. An external appraisal is generally obtained at least annually and performed by an independent appraiser. The appraisals are performed using generally accepted valuation approaches applicable to the property type.

Cash and short-term investments generally include cash, foreign currencies, STIF, and U.S. Treasury bills that mature within one year. These investments are reported at cost, or cost plus accrued interest, which approximates fair value.

Reinvested cash collateral held related to securities lending activities is reported based on the cash deposit value of the collateral held, which approximates fair value. Accordingly, securities lending cash collateral held is not categorized within the fair value level hierarchy. See Note 5 for a discussion of the ASRS' securities lending activities.

The following schedule presents investments categorized according to the fair value hierarchy and is followed by a schedule with additional information regarding investments measured at the net asset value as of June 30, 2018:

Exhibit F-18: Investments and Derivative Instruments Measured at Fair Value

(Dollars in thousands)

		Fair Value Measurements Using		
Investments by fair value level	**6/30/2018**	**Quoted Prices in Active Markets Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Public Equity securities				
U.S. Large Cap	$ 7,544,651	$ 7,544,651	$ —	$ —
U.S. Mid Cap	1,225,892	1,225,892	—	—
U.S. Small Cap	1,182,186	1,179,777	1,651	758
International - Developed Markets Large Cap	6,032,087	6,032,087	—	—
International - Developed Markets Small Cap	701,678	701,678	—	—
Public Opportunistic Equity	10,221	10,221	—	—
Total equity securities	16,696,715	16,694,306	1,651	758
Public Fixed income securities				
Core U.S. fixed income	1,776,036	—	1,776,036	—
High Yield U.S. fixed income	288,760	—	288,760	—
Total fixed income securities	2,064,796	—	2,064,796	—
Real estate	42,767	—	—	42,767
Total investments by fair value level	18,804,278	16,694,306	2,066,447	43,525
Investments not subject to fair value leveling				
(at cost or amortized cost)				
Cash and short term instruments[1]	872,036			
Total Investments not subject to fair value leveling	872,036			
Investments measured at the net asset value (NAV)				
Commingled funds - international emerging markets	1,806,657			
Commingled funds - fixed income	2,016,945			
Commingled funds - multi asset	1,236,267			
Private equity funds	3,556,460			
Opportunistic equity funds	280,054			
Private debt funds	4,823,529			
Opportunistic debt funds	1,735,688			
Real estate funds	4,273,221			
Farmland fund	189,792			
Infrastructure fund	373,428			
Total investments measured at the NAV	20,292,041			
Total investments	$ 39,968,355			

[1] The ASRS exposes cash assets to the market through derivative instruments. See Note 6 for information regarding the ASRS' use of derivative instruments.

Exhibit F-19: Investments Measured at the NAV

(Dollars in thousands)

Investment	Fair Value	Unfunded Commitments	Redemption Frequency (if Currently Eligible)	Redemption Notice Period
Commingled funds - international emerging markets	$ 1,806,657	$ —	Daily	1 - 2 Days
Commingled funds - fixed income	2,016,945	—	Daily	2 Days
Commingled funds - multi asset	1,236,267	—	Monthly	3 Days
Private equity funds	3,556,460	2,220,704	N/A	N/A
Opportunistic equity funds	280,054	152,715	N/A	N/A
Private debt funds	4,823,529	2,571,045	N/A	N/A
Opportunistic debt funds	1,735,688	1,055,191	N/A	N/A
Real estate funds	4,273,221	2,159,225	N/A	N/A
Farmland fund	189,792	—	N/A	N/A
Infrastructure fund	373,428	—	N/A	N/A
Total investments measured at the NAV	$ 20,292,041	$ 8,158,880		

Commingled Funds – The types of strategies within commingled funds include investments in fixed income, public equity, real estate, commodities, and multi-asset type funds. Investments in the commingled multi-asset fund are invested in liquid public securities. Multi-asset class strategies invest tactically within and across asset classes, seeking to exploit quantitative or fundamental drivers of asset class returns or risk allocations as market conditions warrant. The funds have a perpetual life. Redemption frequencies range from daily to monthly. There are no plans to liquidate the total portfolio.

Private Equity and Opportunistic Equity Funds – Private Equity and Opportunistic Equity investments are invested primarily within limited partnerships. The types of investment strategies within these partnerships include: buyouts, distressed debt, special situations, secondaries, mezzanine and venture capital. These investments have an approximate life of 10 years and are considered illiquid. Redemptions are restricted over the life of the partnerships. During the life of the partnerships, distributions are received as underlying partnership investments are realized. There are no plans to liquidate the total portfolio.

Private Debt and Opportunistic Debt Funds – Private Debt and Opportunistic Debt investments are invested within limited partnerships or limited liability companies. The types of investment strategies within these structures consist of corporate debt, asset backed securities and special situations. These investments have an approximate life of 7 to 10 years and are generally illiquid. Redemption restrictions are generally in place throughout the life of the investment unless an early termination right exists. If the early termination right is exercised, the result is an acceleration of distributions and the approximate life of the investment would be reduced. Distributions are received as investments are realized. There are no plans to liquidate the portfolio.

Real Estate Funds – Investments in real estate funds are invested within limited partnerships or limited liability companies. Real estate investments include opportunistic, stabilized and development assets within multi-family and senior housing, industrial, retail, office, and self-storage, with a North America focus. Redemption restrictions are generally in place throughout the life of the investment unless an early termination right exists. If the early termination right is exercised, the result is an acceleration of distributions and the approximate life of the investment would be reduced. Distributions are received as investments are realized. There are no plans to liquidate the portfolio.

Infrastructure Fund – Infrastructure investments are invested in one limited partnership. The investment consists of mature, operational core infrastructure assets located in countries with investment-grade ratings. This investment has an open-ended life and is generally illiquid. Redemption restrictions are in place throughout the life of the investment. Distributions are received as investments are realized. There are no plans to liquidate the investment.

Farmland Fund – Farmland investments are invested within one limited partnership. The investment strategy within this partnership includes: purchasing farmland, renting production land and active farming. This investment has an approximate life of 10 years and is considered illiquid. Redemptions are restricted over the life of the partnership. During the life of the partnerships, distributions are received as underlying partnership investments are realized. There are no plans to liquidate the investment.

Note 5. Securities Lending Program

The Arizona Revised Statutes Section 38-718(G) allows the ASRS to participate in a securities lending program. The custodial bank used by ASRS enters into agreements with borrowers to loan securities and have the same securities redelivered at a later date. Securities eligible for loan include U.S. fixed income securities and U.S. and international equities.

The ASRS currently receives as collateral at least 102% of the market value of the loaned securities and maintains collateral at no less than 100% for the duration of the loan. At yearend, the ASRS had limited counter party risk to borrowers because the collateral held by the ASRS for each loan exceeded the market value owed to the ASRS. Securities loaned are initially fully collateralized by cash (USD), U.S. Government or Agency securities, sovereign debt, corporate bonds and/or equities.

Cash collateral may be reinvested (under certain constraints) in:

- Instruments issued or fully guaranteed by the U.S. Government, Federal agencies, or sponsored agencies or sponsored corporations,
- Repurchase agreements,
- Money market mutual funds,
- Commercial paper,
- Certificates of deposit,
- Bank notes.

The ASRS records the reinvested cash collateral as an asset, and the cash collateral received as an obligation, for securities on loan on the Combined Statements of Fiduciary Net Position. The maturities of the investments are closely matched to those of the security loans to avoid interest rate exposure. The ASRS receives a spread for its lending activities. The obligation for securities on loan is recorded as a liability because the ASRS must return the cash collateral to the borrower upon expiration of the loan.

At June 30, 2018, the fair value of securities on loan was $1.7 billion, of which $104.6 million were cash collateralized loans. Cash of $109.1 million received as collateral for securities loaned was reinvested and had a net asset value of $109.1 million as of June 30, 2018. The securities lending payable at June 30, 2018 was $109.1 million.

The ASRS does not have the ability to pledge or sell the collateral unless there is a borrower default. There are no statutory restrictions on the dollar amount of security loans that may be made by the ASRS. The ASRS is indemnified against gross negligence and borrower default by the lending agents, but is not indemnified against cash collateral reinvestment risk.

Note 6. Derivatives

A derivative instrument is a financial instrument or other contract with all three of the following characteristics:

- Settlement Factors: It has one or more reference rates and one or more notional amounts or payment provisions or both. Those terms determine the amount of the settlement or settlements, and, in some cases, whether or not a settlement is required.

- Leverage: It requires no initial net investment or an initial net investment that is smaller than would be required for other types of contracts that would be expected to have a similar response to changes in market factors.

- Net Settlement: Its terms require or permit net settlement, it can readily be settled net by means outside the contract, or it provides for delivery of an asset that puts the recipient in a position not substantially different from net settlement.

Derivatives are considered "Investment Derivative Instruments" as defined in GASB 53 "Accounting and Financial Reporting for Derivative Instruments".

Derivative instruments, which can consist of futures contracts, forward contracts, options, swaps, rights and warrants are measured at fair value and reported on the Statement of Combined Fiduciary Net Position. Changes in fair value of derivative instruments are reported as net appreciation of fair value on the Combined Statement of Changes in Fiduciary Net Position.

The fair value balances and notional amounts of derivative instruments outstanding at June 30, 2018, classified by type, and the changes in fair value of derivative instruments for the year then ended as reported in the June 30, 2018 financial statements are as follows:

Exhibit F-20: Investment Derivatives by Type
(Dollars in thousands)

	Changes in Fair Value[1]		Fair Value at June 30, 2018		
Investment Derivatives	**Classification**	**Amount[2]**	**Classification**	**Amount**	**Notional Value**
Commodity Futures Long	Net Appreciation in Fair Value	$ 58,364	Not Applicable	$ —	$ 300,011
Commodity Futures Short	Net Appreciation in Fair Value	(18,718)	Not Applicable	—	(59,303)
Fixed Income Futures Long	Net Appreciation in Fair Value	(4,352)	Not Applicable	—	—
Fixed Income Futures Short	Net Appreciation in Fair Value	269	Not Applicable	—	(14,783)
Foreign Currency Forwards	Net Appreciation in Fair Value	3,033	Futures Receivable	—	—
Index Futures Long	Net Appreciation in Fair Value	31,405	Not Applicable	—	81,329
Index Futures Short	Net Appreciation in Fair Value	(48)	Not Applicable	—	—
Rights	Net Appreciation in Fair Value	66	Equity Securities	580	580
Warrants	Net Appreciation in Fair Value	(746)	Equity Securities	46	46
Total		$ 69,273		$ 626	$ 307,880

[1] Excludes futures margin payments.

[2] Brackets refer to losses.

The fair value of derivative instruments reported by the ASRS is based on quoted market prices off national exchanges. The fair values of foreign currency forward contracts are based on mathematical models and are valued using a pricing service, which uses published Reuter's foreign currency rates as the primary source for the calculation.

Credit Risk – The maximum amount of loss due to credit risk that the ASRS would incur if the counterparties to the derivative instrument failed to perform according to the terms of the contract, without respect to any collateral or other security or netting arrangement, is the total unrealized gain of derivatives at the end of the reporting period.

The ASRS has no general investment policy requiring collateral or other security to support derivative instruments. Each investment manager hired has discretion with respect to derivative investments and risk control. Each investment manager is governed by its Investment Manager Agreement.

The ASRS has no general investment policy with respect to netting arrangements. Investment managers used by the ASRS have master netting arrangements to allow net settlement with the same counterparty in the event the counterparty defaults on its obligations.

As of June 30, 2018, investing activity in derivative futures were exchange traded contracts. The ASRS did not have any over-the-counter investment derivative instruments as of June 30, 2018. Accordingly, the ASRS was not exposed to loss in case of default of all counterparties of over-the-counter positions as of June 30, 2018.

Interest Rate Risk – The ASRS has exposure to interest rate risk due to the investments in fixed income futures. The required risk disclosures are included in the Interest Rate Risk schedule in Note 3.

See Exhibit F-21: Derivative Instruments Highly Sensitive to Interest Rate Changes for a schedule of the fair value and exposure of the fixed income futures outstanding at June 30, 2018, and for the year then ended.

Foreign Currency Risk – The ASRS is exposed to foreign currency risk on its foreign currency forward contracts and future contracts. See Exhibit F-22: Derivative Instruments Foreign Currency Risk for a summary of foreign currency risk from derivative instruments. See the Foreign Currency Risk schedule in Note 3 for additional information on currency risk exposure.

Exhibit F-21: Derivative Instruments Highly Sensitive to Interest Rate Changes
(Dollars in thousands)

Asset ID	Asset Description	Interest Rate	Fair Value	Total Exposure
Fixed Income Futures Short:				
ADI0ZZBN5	US 10YR NOTE (CBT)SEP18	n/a	$ —	$ (14,783)
Total Fixed Income Futures Short			$ —	$ (14,783)

Exhibit F-22: Derivative Instruments Foreign Currency Risk
(Dollars in thousands)

Currency Name	Options	Total Exposure
Australian Dollar	$ 4	$ 4
Euro Currency	423	423
Pound Sterling	153	153
Total	$ 580	$ 580

Note 7. Expected Long Term Rate of Return

The long term expected rate of return on investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage, excluding any expected inflation.

On June 29, 2018, the ASRS Board approved updated strategic asset allocation targets, to be effective beginning July 2018. The ASRS' estimates of geometric real rates of return for each major asset class are summarized in the following table:

Exhibit F-23: Expected Return, Geometric Basis

Asset Class	Target Asset Allocation Effective July 1, 2018	Real Return Geometric Basis	Long term Contribution to Expected Real Return
Equity	50%	5.50%	2.75%
Fixed income	30%	3.83%	1.15%
Real estate	20%	5.85%	1.17%
Total	100%		5.07%

Actual returns may be different due to volatility of returns.

Note 8. Net Pension Liability of Employers

The components of the net pension liability of the participating employers at June 30, 2018 were as follows:

Exhibit F-24: Net Pension Liability of Employers
(Dollars in thousands)

Net Pension Liability	
Total pension liability	$ 52,438,430
Retirement fiduciary net position	(38,491,949)
Employers' net pension liability	$ 13,946,481
Retirement fiduciary net position as a percentage of total pension liability	73.40%

Actuarial Assumptions – The total pension liability was determined by an actuarial valuation as of June 30, 2017, and rolled forward to June 30, 2018, by incorporating the expected value of benefit accruals, the actual plan benefit payments, and interest accruals during the year.

Exhibit F-25: Actuarial Assumptions - Pension

Assumptions	
Actuarial valuation date	June 30, 2017
Actuarial roll forward date	June 30, 2018
Actuarial cost method	Entry age normal
Asset valuation	Fair value
Discount rate	7.5%
Projected salary increases	2.7 - 7.2%
Inflation	2.3%
Permanent benefit increase	Included
Mortality rates	2017 SRA Scale U-MP

These actuarial assumptions pertain to assumptions utilized for financial reporting requirements are very similar to the assumptions utilized for funding purposes. The principal difference between the actuarial assumptions for financial reporting purposes and those utilized for funding purposes is, valuation of the Retirement Fund assets.

The actuarial assumptions related to funding appear in the Notes to Required Supplementary Information and the Actuarial Section. The actuarial assumptions related to financial reporting and funding were selected on the basis of an experience study which was performed for the five-year period ending June 30, 2016. The ASRS Board adopted the experience study, which recommended changes, and those changes were effective as of the June 30, 2017 actuarial valuation. Details of the assumptions resulting from the experience study performed as of June 30, 2016 appear in the *Actuarial Section* beginning on page 87.

Discount rate – The discount rate used to measure the total pension liability was 7.5%. The projection of cash flows used to determine the discount rate assumed that contributions from participating employers will be made based on the actuarially determined rates based on the funding policy of the ASRS Board, which establishes the contractually required rate under Arizona statute. Based on those assumptions, the Retirement Fund's fiduciary net position was projected to be available to make all the projected future benefit payments of current members. Therefore, the long term expected rate of return on investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the net pension liability to changes in the discount rate – The table below presents the net pension liability of the participating employers calculated using the discount rate of 7.5%, as well as the employers' net pension liability if it were calculated using a discount rate that is 1% lower (6.5%) or 1% higher (8.5%) than the current rate at June 30, 2018:

Exhibit F-26: Discount Rate Sensitivity - Pension

(Dollars in thousands)

1% Decrease (6.50)%	Current Discount Rate (7.50)%	1% Increase (8.50)%
$ 19,881,029	$ 13,946,481	$ 8,988,261

Note 9. Net OPEB Liability of Employers

The components of the net OPEB liability of the participating employers at June 30, 2018 for the HBS fund were as follows:

Exhibit F-27: Net OPEB Liability (Asset) of Employers - HBS

(Dollars in thousands)

Net OPEB Liability - HBS	
Total HBS program OPEB liability	$ 1,638,886
HBS program assets	(1,674,895)
Employers' net HBS program OPEB liability (asset)	$ (36,009)
HBS program assets as a percentage of total HBS OPEB liability (asset)	102.20%
Reconciliation of HBS program assets to HBS Fund fiduciary net position:	
HBS program assets	$ 1,674,895
Health insurance RRA rebate assets	115,912
HBS Fund fiduciary net position	$ 1,790,807

The components of the net OPEB liability of participating employers at June 30, 2018 for the LTD fund were as follows:

Exhibit F-28: Net OPEB Liability of Employers - LTD

(Dollars in thousands)

Net OPEB Liability - LTD	
Total LTD liability	$ 235,694
LTD fiduciary net position	(183,444)
Employers' net LTD OPEB liability	$ 52,250
LTD fund fiduciary net position as a percentage of total LTD OPEB liability	77.83 %

Actuarial Assumptions – The total OPEB liabilities were determined by an actuarial valuation as of June 30, 2017, and rolled forward to June 30, 2018 by incorporating the expected value of benefit accruals, the actual plan benefit payments, and interest accruals during the year. The actuarial assumptions used to determine the total OPEB liabilities are based on the same experience study discussed in Note 8.

Exhibit F-29: Actuarial Assumptions - HBS

Assumptions	
Actuarial valuation date	June 30, 2017
Actuarial roll forward date	June 30, 2018
Actuarial cost method	Entry Age Normal
Asset valuation method	Fair Value
Inflation	2.3%
Investment Rate of Return	7.5%
Mortality rates	2017 SRA Scale U-MP
Healthcare Trend Rates	N/A

Exhibit F-30: Actuarial Assumptions - LTD

Assumptions	
Actuarial valuation date	June 30, 2017
Actuarial roll forward date	June 30, 2018
Actuarial cost method	Entry Age Normal
Asset valuation method	Fair Value
Inflation	2.3%
Investment Rate of Return	7.5%
Recovery rates	2012 GLDT
Healthcare Trend Rates	N/A

Sensitivity of the net HBS and LTD OPEB liability (asset) to changes in the discount rate – The table below presents the net OPEB liability (asset) of the participating employers calculated using the discount rate of 7.5%, as well as the employers' net HBS and LTD OPEB liabilities (assets) if they were calculated using a discount rate that is 1% lower (6.5%) or 1% higher (8.5%) than the current rate at June 30, 2018:

Exhibit F-31: Discount Rate Sensitivity
(Dollars in thousands)

	1% Decrease (6.50)%	Current Single Assumption Discount Rate (7.50)%	1% Increase (8.50)%
HBS	$ 127,589	$ (36,009)	$ (175,362)
LTD	59,214	52,250	45,494

Note 10. Contingent Liabilities

The ASRS is a party in various litigation matters. While the final outcome cannot be determined at this time, management is of the opinion that the final obligation, if any, for these legal actions will not have a material adverse effect on the financial position or results of operations of the ASRS.

Note 11. Commitments

The ASRS has unfunded capital commitments in connection with the purchase of various limited partnership interests in private equity, opportunistic equity, private debt, opportunistic debt, real estate and portfolios. See Note 4 for additional information regarding these commitment amounts.

Note 12. Due To and From Other Funds

Due to/from other funds includes amounts that need to be transferred after the year end resulting from allocations of contribution revenue as well as allocations of pooled investments.

Note 13. Required Supplementary Schedules

Required supplementary information prepared in accordance with the parameters of GASB Statement No. 67 and GASB Statement No. 74 is included immediately following the Notes to the Financial Statements.

Note 14. Subsequent Events

The ASRS has evaluated subsequent events through November 1, 2018, the date the financial statements were available to be issued. Events or transactions occurring after June 30, 2018, but prior to November 1, 2018 that provided additional evidence about conditions that existed at June 30, 2018 have been recognized in the financial statements for the year ended June 30, 2018. Events or transactions that provided evidence about conditions that did not exist at June 30, 2018, but arose before the financial statements were available to be issued have not been recognized in the financial statements for the year ended June 30, 2018.

Exhibit F-32: Schedule of Changes in the Net Pension Liability - Retirement

Years Ended June 30,
(Dollars in thousands)

	2018	2017	2016	2015	2014
Total Pension Liability:					
Service cost	$ 1,360,306	$ 1,137,270	$ 1,144,436	$ 1,013,854	$ 966,705
Interest	3,764,172	3,883,789	3,906,808	3,832,255	3,607,440
Changes of benefit terms	—	—	—	—	—
Differences between expected and actual experience[1]	576,321	(43,772)	(967,522)	(1,187,231)	1,078,966
Changes of assumptions[1]	(1,738,368)	984,132	(1,242,164)	—	—
Benefit payments	(3,304,808)	(3,181,407)	(3,062,846)	(2,927,102)	(2,812,573)
Net change in total pension liability	657,623	2,780,012	(221,288)	731,776	2,840,538
Total pension liability - beginning	51,780,807	49,000,795	49,222,083	48,490,307	45,649,769
Total pension liability - ending (a)	52,438,430	51,780,807	49,000,795	49,222,083	48,490,307
Retirement Fiduciary Net Position:					
Contributions - employers	$ 1,085,033	$ 1,053,197	$ 1,015,974	$ 1,004,747	$ 965,969
Contributions - employees	1,099,663	1,079,256	1,036,714	1,031,954	995,284
Net investment income	3,414,623	4,406,943	222,906	849,160	5,514,246
Benefit payments, including refunds of member contributions	(3,304,808)	(3,181,407)	(3,062,846)	(2,927,102)	(2,812,573)
Administrative expenses	(26,878)	(27,895)	(22,965)	(26,400)	(26,107)
Other	21,560	12,871	24,362	19,582	31,456
Net change in retirement fiduciary net position	2,289,193	3,342,965	(785,855)	(48,059)	4,668,275
Retirement fiduciary net position - beginning	36,202,756	32,859,791	33,645,646	33,693,705	29,025,430
Retirement fiduciary net position - ending (b)	38,491,949	36,202,756	32,859,791	33,645,646	33,693,705
Retirement net pension liability - ending (a) - (b)	$ 13,946,481	$ 15,578,051	$ 16,141,004	$ 15,576,437	$ 14,796,602

[1] The total pension liability is adjusted each year to reflect the potential for future PBIs based on actual asset returns through each year end. The impact of this change has been shown as a change in assumption for fiscal years ended June 30, 2016, 2017 and 2018. For fiscal years ended June 30, 2014 and 2015, the impact of these changes were included in the differences between expected and actual experience.

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-33: Schedule of Net Pension Liability - Retirement

Years Ended June 30,
(Dollars in thousands)

Net Pension Liability	2018	2017	2016	2015	2014
Total pension liability - ending (a)	$ 52,438,430	$ 51,780,807	$ 49,000,795	$ 49,222,083	$ 48,490,307
Retirement fiduciary net position - ending (b)	38,491,949	36,202,756	32,859,791	33,645,646	33,693,705
Retirement's net pension liability - ending (a) - (b)	$ 13,946,481	$ 15,578,051	$ 16,141,004	$ 15,576,437	$ 14,796,602
Retirement fiduciary net position as a percentage of the total pension liability	73.40%	69.92%	67.06%	68.35%	69.49%
Covered payroll	$ 9,697,173	$ 9,518,309	$ 9,125,089	$ 9,226,319	$ 9,027,752
Net pension liability as a percentage of covered payroll	143.82%	163.66%	176.89%	168.83%	163.90%

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-34: Schedule of Employer Contributions - Retirement

Last 10 Fiscal Years

(Dollars in thousands)

Fiscal Year Ended June 30,	Actuarial Determined Contribution	Contributions In Relation To The Actuarially Determined Contributions[1]	Contribution Deficiency (Excess)	Covered Payroll	Contributions As A Percentage Of Covered Payroll
2018	$ 1,056,995	$ 1,056,995	$ —	$ 9,697,173	10.90%
2017	1,026,079	1,026,079	—	9,518,309	10.78%
2016	990,072	990,072	—	9,125,089	10.85%
2015	1,004,746	1,004,746	—	9,226,319	10.89%
2014	965,969	965,969	—	9,027,752	10.70%
2013 [2]	889,580	889,580	—	8,678,829	10.25%
2012 [3]	850,456	850,456	—	8,616,575	9.87%
2011 [4]	782,347	782,347	—	8,149,448	9.60%
2010 [5]	749,636	749,636	—	8,329,289	9.00%
2009	754,044	754,044	—	8,425,073	8.95%

[1] Beginning with fiscal year 2016, the required employer contributions to the retirement fund presented above reflect total employer contributions less ACR contributions. ACR is not part of the required contribution rate. Employers were required to pay ACR contributions beginning in 2013 for retired members who returned to work.

[2] The 2013 required contributions from the employer for the retirement fund reflect total employer contributions of $911,300 less $931 of unfunded employer liabilities.

[3] The 2012 required contributions from the employer for the retirement fund reflect total employer contributions of $852,167 less $1,711 of unfunded employer liabilities.

[4] The 2011 required contributions from the employer for the retirement fund reflect total employer contributions of $786,662 less $4,315 of unfunded employer liabilities.

[5] The 2010 required contributions from the employer for the retirement fund reflect total employer contributions of $763,100 less $13,464 of unfunded employer liabilities.

See Notes to Required Supplementary Information.

Exhibit F-35: Schedule of Investment Returns - Retirement

Years Ended June 30,

Fiscal Year Ended June 30,	Annual money-weighted rate of return, net of investment expenses
2018	9.30%
2017	13.89%
2016	0.29%
2015	3.04%
2014	17.78%

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-36: Schedule of Changes in the Net OPEB Liability - HBS

Years Ended June 30,
(Dollars in thousands)

	2018	2017
Total OPEB liability:		
Service cost	$ 47,331	$ 43,540
Interest on the total OPEB liability	117,414	116,594
Changes of benefit terms	—	—
Differences between expected and actual experience	(40,460)	—
Changes of assumptions	84,540	—
Benefit payments, including refunds of employee contributions	(96,098)	(95,720)
Net change in total OPEB liability	112,727	64,414
Total OPEB liability - beginning	1,526,159	1,461,745
Total OPEB liability - ending (a)	1,638,886	1,526,159
Plan Fiduciary Net Position:		
Contributions - employers	$ 42,976	$ 53,914
Contributions - employees	—	—
OPEB plan net investment income	148,652	190,870
Benefit payments, including refunds of employee contributions	(96,098)	(95,720)
OPEB plan administrative expenses	(1,234)	(1,294)
Other	—	—
Net change in plan fiduciary net position	94,296	147,770
Plan fiduciary net position - beginning	1,580,599	1,432,829
Plan fiduciary net position - ending (b)	1,674,895	1,580,599
Net OPEB liability (asset) - ending (a) - (b)	$ (36,009)	$ (54,440)

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-37: Schedule of Net OPEB Liability - HBS

Years Ended June 30,
(Dollars in thousands)

Net OPEB Liability	2018	2017
Total OPEB liability - ending (a)	$ 1,638,886	$ 1,526,159
Plan fiduciary net position - ending (b)	1,674,895	1,580,599
Net OPEB liability (asset) - ending (a) - (b)	$ (36,009)	$ (54,440)
Plan fiduciary net position as a percentage of the total OPEB liability	102.20%	103.57%
Covered payroll [1]	$ 9,697,173	$ 9,518,309
Net OPEB liability as a percentage of covered payroll	(0.37)%	(0.57)%

[1] The covered payroll is an estimate of the actual payroll, imputed from individual employer contributions.

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-38: Schedule of Employer Contributions - HBS

Last 10 Fiscal Years
(Dollars in thousands)

Fiscal Year Ended June 30,	Actuarial Determined Contribution	Actual Contributions[1]	Contribution Deficiency (Excess)	Covered Payroll	Contributions As A Percentage Of Covered Payroll
2018	$ 42,668	$ 42,668	$ —	$ 9,697,173	0.44%
2017	53,298	53,298	—	9,518,309	0.56%

[1]The required employer contributions to the HBS fund presented above reflect total employer contributions less ACR contributions. ACR is not part of the required contribution rate. Employers were required to pay ACR contributions beginning in 2013 for retired members who returned to work.

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-39: Schedule of Investment Returns - HBS
Years Ended June 30,

Fiscal Year Ended June 30,	Annual money-weighted rate of return, net of investment expenses
2018	9.32%
2017	13.85%

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-40: Schedule of Changes in the Net OPEB Liability - LTD

Years Ended June 30,
(Dollars in thousands)

	2018	2017
Total OPEB Liability:		
Service cost	$ 27,713	$ 27,792
Interest on the total OPEB liability	18,288	19,349
Changes of benefit terms	—	—
Differences between expected and actual experience	1,522	—
Changes of assumptions	12,889	—
Benefit payments, including refunds of employee contributions	(57,664)	(56,525)
Net change in total OPEB liability	2,748	(9,384)
Total OPEB liability - beginning	232,946	242,330
Total OPEB liability - ending (a)	235,694	232,946
Plan Fiduciary Net Position:		
Contributions - employers	$ 15,902	$ 13,606
Contributions - employees	15,512	13,342
OPEB plan net investment income	14,760	22,021
Benefit payments, including refunds of employee contributions	(57,664)	(56,525)
OPEB plan administrative expenses	(1,555)	(1,782)
Other	(209)	(358)
Net change in plan fiduciary net position	(13,254)	(9,696)
Plan fiduciary net position - beginning	196,698	206,394
Plan fiduciary net position - ending (b)	183,444	196,698
Net OPEB pension liability - ending (a) - (b)	$ 52,250	$ 36,248

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-41: Schedule of Net OPEB Liability - LTD

Years Ended June 30,
(Dollars in thousands)

Net OPEB Liability		2018		2017
Total OPEB liability - ending (a)	$	235,694	$	232,946
Plan fiduciary net position - ending (b)		183,444		196,698
Net OPEB liability - ending (a) - (b)	$	52,250	$	36,248
Plan fiduciary net position as a percentage of the total OPEB liability		77.83%		84.44%
Covered payroll [1]	$	9,697,173	$	9,518,309
Net OPEB liability as a percentage of covered payroll		0.54%		0.38%

[1] The covered payroll is an estimate of the actual payroll, imputed from individual employer contributions.

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-42: Schedule of Employer Contributions - LTD

Last 10 Fiscal Years

(Dollars in thousands)

Fiscal Year Ended June 30,	Actuarial Determined Contribution	Actual Contributions[1]	Contribution Deficiency (Excess)	Covered Payroll	Contributions As A Percentage Of Covered Payroll
2018	$ 15,512	$ 15,512	$ —	$ 9,697,173	0.16%
2017	13,342	13,342	—	9,518,309	0.14%

[1]The required employer contributions to the LTD fund presented above reflect total employer contributions less ACR contributions. ACR is not part of the required contribution rate. Employers were required to pay ACR contributions beginning in 2013 for retired members who returned to work.

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Exhibit F-43: Schedule of Investment Returns - LTD

Years Ended June 30,

Fiscal Year Ended June 30,	Annual money-weighted rate of return, net of investment expenses
2018	9.69%
2017	11.26%

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.

See Notes to Required Supplementary Information.

Actuarial Methods and Assumptions Used in Determining Contribution Rates

The actuarial assumptions and methods used to determine the fiscal year 2018 contribution rates are described below based on the actuarial valuation study for the year ended June 30, 2016, reflecting the 2012 experience study results.

Exhibit F-44: Actuarial Assumptions - Retirement

Assumptions	
Actuarial valuation date	June 30, 2016
Actuarial cost method	Projected Unit Credit
Amortization Method	Level dollar, layered
Remaining amortization period	30 years each new layer
Asset valuation	10-year smoothed market
Discount rate	8%
Projected salary increases	3 - 6.75%
Inflation	3%
Permanent benefit increase	Not valued
Mortality rates	1994 GAM Scale BB

Exhibit F-45: Actuarial Assumptions - HBS

Assumptions	
Actuarial valuation date	June 30, 2016
Actuarial cost method	Projected Unit Credit
Amortization method	Level dollar, layered
Remaining amortization period	15 years each new layer
Asset valuation method	10-Year smoothed market
Inflation	3%
Investment Rate of Return	8%
Mortality rates	1994 GAM Scale BB
Healthcare Trend Rates	N/A

Exhibit F-46: Actuarial Assumptions - LTD

Assumptions	
Actuarial valuation date	June 30, 2016
Actuarial cost method	Projected unit credit
Amortization method	Level Dollar, layered
Remaining amortization period	15 years each new layer
Asset valuation method	10-Year smoothed market
Inflation	3%
Investment rate of return	8%
Mortality rates	1994 GAM Scale BB
Healthcare Trend Rates	N/A

Transition to New Experience Study

The ASRS commissioned a new Actuarial Experience Study dated October 18, 2017, in order to update actuarial assumptions and thereby more accurately portray its actuarial condition. The contribution rates in effect during fiscal year 2018 were based on the 2012 Experience Study. The contribution rates for fiscal year 2019 will be based on the 2017 Experience Study. The major changes in assumptions were the discount rate, the actuarial method, the inflation rate, the investment rate, and the mortality table. See Notes 8 and 9 for the new assumptions for the fiscal year 2018 liability.

Significant Factors Affecting Identification of Trends

The following information is an executive summary of the 2017 Experience Study conducted by an independent actuary. The purpose of this experience study is to review actual experience in relation to the actuarial assumptions currently in effect. This study covers the experience of active, inactive, and retired members for the period July 1, 2011, through June 30, 2016.

The ASRS Board adopted all of the proposed assumptions at its meeting on October 27, 2017. The assumptions adopted by the ASRS Board were included in the June 30, 2017 valuation. With respect to the retirement fund, the June 30, 2017 values were rolled forward to June 30, 2018.

Summary of Process

In determining liabilities and contribution rates for retirement plans, actuaries must make assumptions about the future. The assumptions that must be made include:

- Retirement rates
- Mortality rates
- Turnover rates
- Disability rates

- Disability recovery rates
- Investment return rate
- Salary increase rates
- Inflation rate
- Future Permanent Benefit Increases (PBIs)

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For others, such as the investment returnrate, the link between past experience and future expectation is much weaker. In either case, actuaries should review the retirement plan's assumptions periodically and determine whether these assumptions are consistent with actual past experience and with future expectation.

Summary of Results for Assumptions – Plan, HBS and LTD

The results of the 2017 Experience Study, adopted by the ASRS Board in its meeting on October 27, 2017, are summarized as follows:

Economic Assumptions

- We recommend decreasing the nominal investment return assumption from 8.00%. A rate of 7.50% is close to the expected return in our independent capital market analysis over a longer time horizon. A rate of 7.75% is close to the midpoint of the two sets of results provided by NEPC (7.2% short-term and 8.5% long-term). Based on the much lower probability of achieving the rate of return assumption over the shorter term, our preferred assumption would be 7.50%.
- We recommend decreasing the inflation assumption from 3.00% to 2.30%.
- We recommend a general wage inflation (GWI) assumption of 2.50%, made up of price inflation and general productivity. This assumption is used primarily to index each cohort of new entrants used in the projections and as a starting point for the payroll growth assumption (amortization payment growth rate).
- We recommend a nominal annual salary increase assumption for long-service members of 2.70%, made up of a 2.3% price inflation and a 0.40% for general productivity and individual merit and promotion.
- We recommend a payroll growth assumption equal to the GWI assumption of 2.50%. This is the rate amortization payments are anticipated to grow in the future.
- The valuation currently assumes there will be no PBI provided to retirees. We recommend future PBIs be reflected in the funding calculations at a rate of 0.30% per year in conjunction with a 7.50% investment return assumption.

Mortality Assumptions

- We recommend updating the post-retirement mortality tables for non-disabled retirees to reflect recent ASRS member experience. We also recommend assuming that mortality rates will improve in the future using a fully generational approach, but with the ultimate rates of the most recently published projection scale ("U-MP").
- We recommend updating post-retirement mortality tables for disabled retirees to the most recently published national tables, the RP-2014 tables for disabled lives. We also recommend continuing to assume mortality rates will improve in the future using a fully generational approach, but with the ultimate rates of the most recently published projection scale ("U-MP").

Other Demographic Assumptions

- We recommend small adjustments in the overall termination rates consistent with ASRS member experience and future expectations.

- We recommend small adjustments in the overall retirement rates consistent with ASRS member experience and future expectations.

- We recommend small decreases to the disability patterns for members consistent with ASRS experience and future expectations.

Actuarial Methods and Policies

- We recommend continuing to use the asset smoothing method that recognizes each year's gain or loss over a closed 10-year period. However, we recommend a small modification to the method to allow for direct offsetting of unrecognized gains and losses.

- We recommend changing to the Entry Age Normal (EAN) actuarial cost method. Further, the normal cost rate would be based on the benefits payable to each individual active member, sometimes referred to as the "Individual" EAN actuarial cost method. The Projected Unit Credit (PUC) actuarial cost method is the current funding method being used to allocate the actuarial costs of ASRS. The EAN actuarial cost method will generally produce level contribution amounts for each member as a percentage of salary from year to year and allocated cost among various generations of taxpayers in a reasonable manner. It is by far the most commonly used actuarial cost method for large public retirement systems and the method used for accounting disclosures. Changing the method will produce more stability in the contribution rates from year to year and allow for one set of liabilities to be used for funding and accounting purposes.

Assumptions Specific to the Long Term Disability Program

- We recommend updating the recovery rates to the 2012 Group Long Term Disability Valuation Table (2012 GLDT) as proposed by the Society of Actuaries' Group Disability Experience Committee for use by the National Association of Insurance Commissioners. Specifically, we recommend the rates applicable to plans with a six-month elimination period, "Own Occupation" definition of disability, initial maximum guaranteed benefit of $2,000 for active members and actual initial maximum guaranteed benefit for current LTD recipients, "No Diagnosis" cause of disability, 15% margin for recovery, 27% margin for deaths.

- We recommend updating the offset methodology for current LTD recipients to assume members will have a minimum offset of 30% within three years of initial receipt of LTD benefits. Offsets due to overpayments will apply until the overpayments are expected to be fully recovered based on the data received from the plan administrator.

- We recommend updating the offset methodology for future LTD recipients such that the benefits, after all applicable offsets, are 60% of the benefits before the offsets.

Combining Schedule of Retirement Fiduciary Net Position

As of June 30, 2018

(Dollars in thousands)

	Retirement Plan	Retirement System	Total Retirement Fund
Assets			
Cash	$ 17,527	$ 120	$ 17,647
Prepaid benefits	243,270	3,019	246,289
Receivables:			
Accrued interest and dividends	46,528	319	46,847
Securities sold	144,141	989	145,130
Futures contracts	11,080	76	11,156
Contributions	68,039	—	68,039
Due from other funds	—	—	—
Other	15,000	97	15,097
Total receivables	284,788	1,481	286,269
Investments:			
Cash and short-term investments	826,336	5,675	832,011
Equity	21,169,142	145,374	21,314,516
Fixed income	10,083,308	69,245	10,152,553
Real estate	4,089,805	28,086	4,117,891
Multi-asset	1,171,479	8,045	1,179,524
Other	533,704	3,665	537,369
Total investments	37,873,774	260,090	38,133,864
Securities lending collateral	103,372	710	104,082
Total assets	38,522,731	265,420	38,788,151
Liabilities			
Securities purchased	28,747	197	28,944
Securities lending collateral	103,372	710	104,082
Futures contracts	14,363	99	14,462
Due to other funds	119,442	15,981	135,423
Other	13,204	87	13,291
Total Liabilities	279,128	17,074	296,202
Net position restricted for pension benefits	$ 38,243,603	$ 248,346	$ 38,491,949

In accordance with GASB 34, for financial reporting purposes the Retirement Plan and the Retirement System are presented in one column, Retirement Fund, in the ASRS Basic Financial Statements because they are administered within a single pension plan within a trust. The Combining Schedule of Retirement Fiduciary Net Position and Changes in Retirement Fiduciary Net Position are presented here to provide members with more detailed information about the two plan components.

Combining Schedule of Changes in Retirement Fiduciary Net Position

For the Year Ended June 30, 2018
(Dollars in thousands)

	Retirement Plan	Retirement System	Total Retirement Fund
Additions			
Contributions:			
Member contributions	$ 1,099,656	$ 7	$ 1,099,663
Employer contributions	1,085,026	7	1,085,033
Transfers from other plans	2,423	—	2,423
Purchased Service	19,988	—	19,988
Total Contributions	2,207,093	14	2,207,107
Investment Activity:			
Investment activity income:			
Net appreciation in fair value of investments	3,112,327	23,213	3,135,540
Interest	85,371	628	85,999
Dividends	344,407	2,496	346,903
Other income	39,048	287	39,335
Total investment activity income	3,581,153	26,624	3,607,777
Investment activity expense:			
Management Fees	(186,956)	(1,353)	(188,309)
Custody fees	(1,739)	(12)	(1,751)
Consultant and legal fees	(4,102)	(28)	(4,130)
Internal investment activity expense	(4,080)	(28)	(4,108)
Total investment activity expense	(196,877)	(1,421)	(198,298)
Net income from investment activities	3,384,276	25,203	3,409,479
Securities lending activities:			
Securities lending income	5,455	40	5,495
Interest rebate	190	1	191
Management fees	(538)	(4)	(542)
Net income from securities lending activities	5,107	37	5,144
Total net investment income	3,389,383	25,240	3,414,623
Total additions	5,596,476	25,254	5,621,730
Deductions			
Retirement and disability benefits	2,956,441	42,099	2,998,540
Survivor benefits	46,786	124	46,910
Refunds to withdrawing member, including interest	259,309	49	259,358
Administrative expenses	26,684	194	26,878
Transfers to to other plans	418	—	418
Other	433	—	433
Total deductions	3,290,071	42,466	3,332,537
Net increase (decrease) in net position	2,306,405	(17,212)	2,289,193
Net position restricted for pension benefits			
Beginning year	35,937,198	265,558	36,202,756
End of year	$ 38,243,603	$ 248,346	$ 38,491,949

In accordance with GASB 34, for financial reporting purposes the Retirement Plan and the Retirement System are presented in one column, Retirement Fund, in the ASRS Basic Financial Statement because they are administered within a single pension plan within a trust. The Combining Schedule of Retirement Fiduciary Net Position and Changes in Retirement Fiduciary Net Position are presented here to provide members with more detailed information about the two plan components.

Exhibit F-47: Schedule of Administrative Expenses

For the Year Ended June 30, 2018

(Dollars in thousands)

Administrative Expense		
Personnel services:		
Salaries	$	13,127
Retirement contributions		1,399
Other employee related expenses		3,822
Total personnel services		18,348
Professional services:		
Actuarial services		352
Attorney services		310
Auditing services		119
Banking services		1,601
Staffing services		2,288
LTD administrative services		1,553
Other professional services		456
Total professional services		6,679
Communications:		
Telephone		275
Printing		18
Postage and mailing		212
Total communications		505
Facilities:		
Lease expense		1,512
Total facilities		1,512
Software and equipment:		
Computer supplies and software		1,368
Maintenance agreements		62
Equipment and equipment rental		460
Total software and equipment		1,890
Education, meetings, and travel:		
Professional development		24
Travel		44
Tuition reimbursement		5
Total education, meetings, and travel		73
General:		
Advertising		5
Insurance		280
Membership dues		71
Office supplies		48
Periodicals and publications		247
Miscellaneous		9
Total general		660
Total administrative expenses	$	29,667

Exhibit F-48: Schedule of Professional Consultant Fees

For the Year Ended June 30, 2018
(Dollars in thousands)

Professional/Consultant		
Actuarial services:		
Gabriel, Roeder, Smith & Company (GRS)	$	279
Segal Co		54
Mercer Health & Benefits LLC		19
Total actuarial services		352
Attorney & Legal services:		
Arizona Office of the Attorney General		227
Fennemore Craig, P.C.		61
Charles W. Whetstine, P.C.		11
Other		11
Total attorney services		310
Auditing services:		
CliftonLarsonAllen, LLP		119
Total auditing services		119
Banking services:		
State Street Bank And Trust Company		1,601
Total banking services		1,601
LTD program administrative services:		
Broadspire Management		1,553
Total LTD program administrative services		1,553
Staffing services:		
Guidesoft Inc.		2,288
Total staffing services		2,288
Other professional services:		
Guidesoft Inc.		313
Accenture, LLP		50
CliftonLarsonAllen, LLP		34
Runtime Technology		25
Arizona Department of Administration		18
Staples, Inc.		10
Other		6
Total other professional services		456
Total professional and consulting services	$	6,679

Exhibit F-49: Schedule of Investment Expenses

For the Year Ended June 30, 2018

(Dollars in thousands)

	Management Fees	Other Expenses	Total
Investing Activity			
Public Investments Management Fees:			
Public Equity	$ 16,000	$ —	$ 16,000
Public Opportunistic Equity	626	—	626
Public Fixed Income	1,951	—	1,951
Multi-Asset	23,325	—	23,325
Commodities	1,264	—	1,264
Real Estate	2		2
Total Public Investments Management Fees	43,168	—	43,168
Private Investments Management Fees:			
Private Equity	54,007	—	54,007
Opportunistic Equity	199	—	199
Opportunistic Debt	16,039	—	16,039
Private Debt	42,137	—	42,137
Real Estate	35,872	—	35,872
Farmland and Timber	2,391	—	2,391
Infrastructure	3,580	—	3,580
Total Private Investments Management Fees	154,225	—	154,225
Total Management Fees	197,393	—	197,393
Investment custodial fees:			
State Street Bank and Trust Company	—	1,827	1,827
Total investment custodial fees	—	1,827	1,827
Investment consultant fees:			
RCLCO	—	1,261	1,261
Meketa Investment Group	—	565	565
NEPC, LLC	—	500	500
Torreycove Capital Partners, LLC	—	145	145
Guidesoft Inc.	—	73	73
Institutional Shareholder Services, Inc.	—	68	68
State Street Bank And Trust Company	—	46	46
Glass, Lewis & Co.	—	20	20
Chicago Clearing Corporation	—	6	6
Enterprise Networks Solutions	—	6	6
Total investment consultant fees	—	2,690	2,690
Outside investment legal fees:			
Foley & Lardner LLP	—	1,288	1,288
Cox, Castle & Nicholson LLP	—	230	230
Ballard Spahr LLP		102	102
Total outside investment and legal fees	—	1,620	1,620
Internal investment activity expenses - see detailed schedule		4,287	4,287
Total Investing Activity	$ 197,393	$ 10,424	$ 207,817
Securities Lending Activity			
Securities Lending Borrower Rebates (Income)	$ —	$ (200)	$ (200)
Securities Lending Management Fees	568		568
Total Securities Lending Activity Expenses (Income)	$ 568	$ (200)	$ 368

Exhibit F-50: Schedule of Internal Investment Activity Expenses

For Year Ended June 30, 2018

(Dollars in thousands)

Expense		Total
Personnel services:		
Salaries	$	1,344
Employee Insurance		145
Retirement Contributions - ASRS		147
Other Personnel Expense		161
Total Personnel Services		1,797
Facilities:		
Lease expense		45
Total Facilities		45
Education, meetings and travel:		
Professional development		5
Travel		21
Total Education, Meetings and Travel		26
General administrative expense:		
Research and information services:		2,382
Membership dues		10
Equipment		18
Miscellaneous		9
Total general administrative expense		2,419
Total internal investment activity expense	$	4,287

Investment Section

ARIZONA STATE RETIREMENT SYSTEM

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Paul Matson
Director

November 1, 2018

Dear Members,

It is a privilege to deliver this Investment Section to the Comprehensive Annual Financial Report of the Arizona State Retirement System. In this section we will discuss our investment strategy, the investment environment and our investment results. We will also discuss our commitment to compliance, governance, rigorous measurement, and transparent reporting. Finally, we will deliver various documents and schedules providing detailed information about the ASRS investment program. Returns presented in the investment section for public market asset classes are calculated on a total return basis, using time-weighted rates of return, net of all fees and based on market values. Returns presented for private market asset classes are calculated based on an internal rate of return (IRR), net of all fees, and based on market values.

Investment Strategy

ASRS manages its investments in accordance with a strategic asset allocation. The ASRS investment team seeks to enhance returns compared to strategic asset allocation benchmarks through its implementation of the investment program and tactical positioning relative to strategic targets.

Fundamentally, investment returns are rewards for risks taken. ASRS manages its risk in a highly diversified program across multiple global markets including equities, real estate and credit. The diversity of the program expands opportunities for gain and reduces risk that would be present in a more concentrated approach.

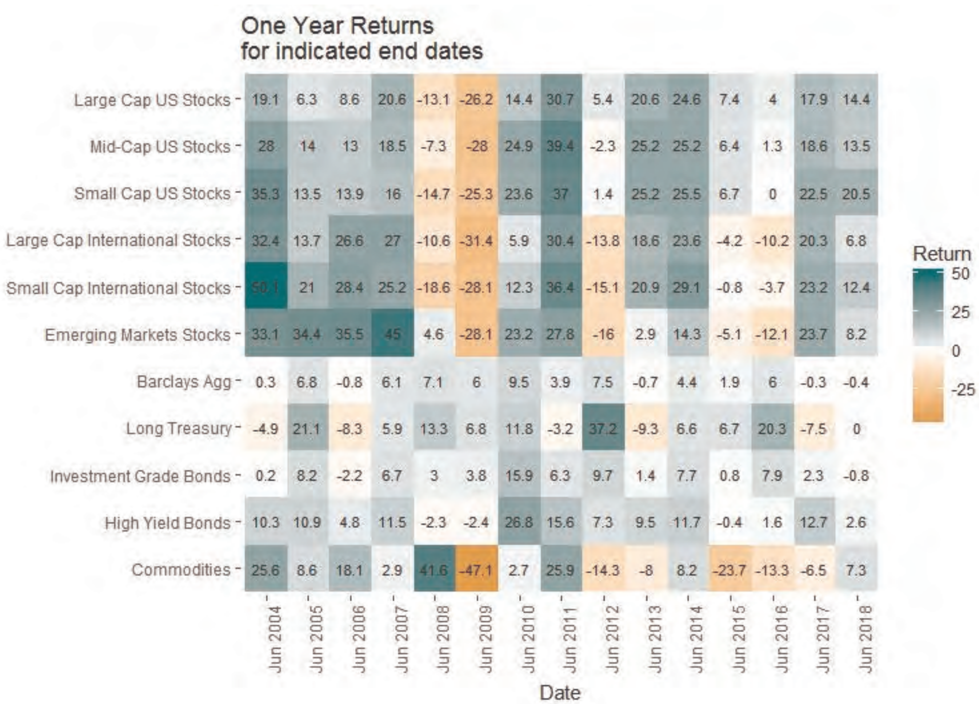
ASRS is a long-term investor with a multi-decade horizon for its decisions. We will tolerate short-term market fluctuations in order to position ourselves for long run gains. We are a value oriented investor and, at times, will buy in markets out of favor and patiently await their recovery.

ASRS maintains a high level of liquidity with assets totaling over 30 times the net cash required to be raised to fund benefits. As a pension fund, the cash requirements for benefits are highly stable and predictable. These two facts combine to give ASRS an advantage in the market allowing it to provide liquidity to market participants with less flexibility and unpredictable cash needs. ASRS capitalizes on this by participating in less liquid private markets for equities, real estate and credit. These programs have significantly enhanced the diversity of our investments and have increased our returns.

Investment Environment

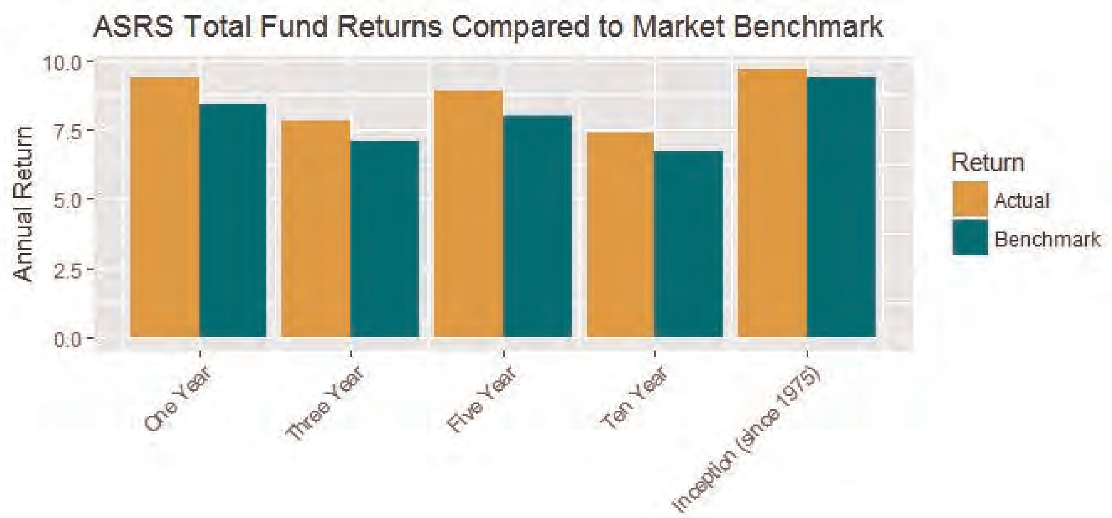
Global capital markets have come a long way in recovering from the global financial crisis. With economic conditions improving across the globe, equity markets are generally strong, especially in the United States, which recently has seen record valuations. Credit markets continue to be impacted as institutions continue to adjust to new regulatory regimes, and ASRS has capitalized on this by providing liquidity to sectors no longer served by commercial banks. Investment grade bond markets were buoyed for a number of years after the financial crisis by central bank policies including low interest rates and asset purchases sometimes referred to as "quantitative easing". However, with improving conditions, central banks have raised policy rates and reduced asset purchases. Consequently, bond markets have been flat for the last two years.

The following chart shows market returns for the last 15 years for the public market asset classes included in the ASRS strategic asset allocation.

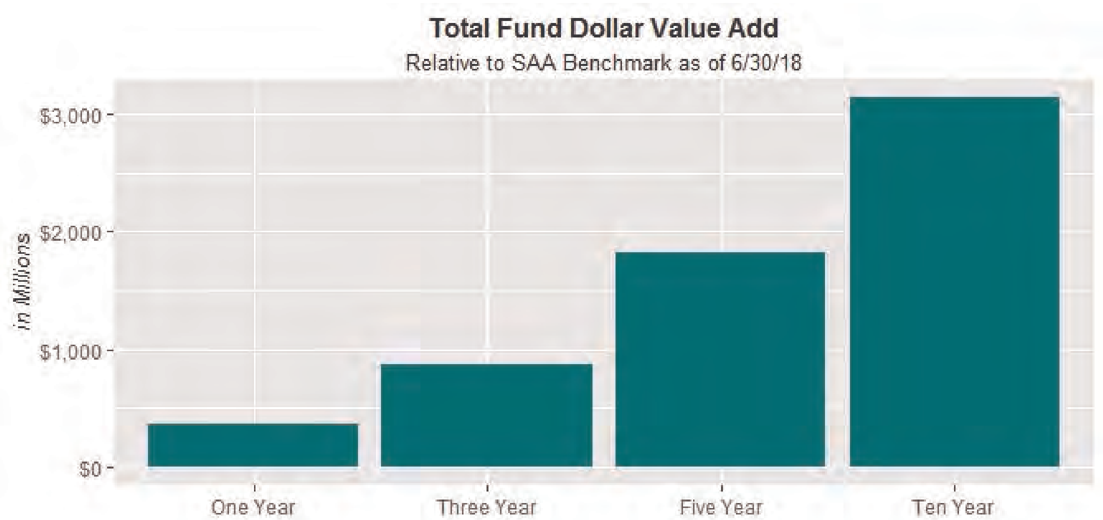


Investment Results

The ASRS investment program had another good year. Not only were markets positive, but our implementation decisions added value compared to our benchmarks. Our one year return of 9.4% exceeded our strategic asset allocation benchmark by 1%. Our ten year return of 7.4% exceeded its benchmark by 0.7%. Notably, the ten year results were only 0.1% lower than the long run actuarially assumed return of 7.5%, notwithstanding the devastating impacts of the global financial crisis during the early years of that time frame. On a long run basis, ASRS has earned compound returns of 9.7% per year for the last 43 years.



Stated in terms of dollars, small differences in returns compounded over a number of years have a big impact on the value of the total fund. The 1% outperformance in the most recent year translates to additional profits of $368 million added to the value of the fund. Over ten years, the 0.7% outperformance added $3.1 billion in value to the fund.



Governance and Compliance

ASRS operates the investment program in accordance with statutory requirements under the direction of the ASRS Board and Executive Director. ASRS has adopted a formal and well documented governance process as set forth in the Board Governance Policy Handbook and various Strategic Investment Policies and Standard Operating Procedures which have been adopted by the ASRS Board and ASRS management.

The investment program is further guided by an Investment Policy Statement, which incorporates Investment Beliefs, which are adopted by the ASRS Board. As noted above, the investments are implemented in accordance with a Strategic Asset Allocation, which is adopted by the ASRS Board with input from investment staff and the external investment consultant. Copies of the Investment Policy Statement and Strategic Asset Allocation are included in the materials for this Investment Section.

Investments are implemented by the ASRS investment team under the direction of the Executive Director and with oversight by the external investment consultant and the Board Investment Committee of the ASRS Board. In accordance with written policies, investment decisions are made by Asset Class Committees which meet monthly, or more frequently if necessary, and are documented by formal minutes and meeting materials which consist of staff reports and external consultant reports. The external investment consultant attends the Asset Class Committee meetings to remain informed on investment matters and to monitor that all governance procedures are followed.

Compliance with statutes and policies is further monitored by our custody bank which checks every trade and reports daily on the compliance status of the portfolio. Additionally, external consultants monitor the private markets program reviewing partnerships annually to confirm that fees are correctly calculated and reported, valuation policies are observed and that partnerships are being administered in accordance with the terms of the partnership agreement.

Cost

While cost management is not an investment strategy per se, cost reduction is one of the most important ways to improve investment performance. ASRS aggressively manages costs to help ensure the highest value is achieved for all our investment expenditures.

In the case of public markets, where research and experience indicate that the prospects for adding value through management are limited, we are parsimonious in the payment of fees. We manage approximately 50% of public market assets in house at effectively zero incremental cost. Internally managed assets are implemented in enhanced index strategies designed to earn a premium compared to market returns, and these strategies in aggregate have consistently outperformed their benchmarks by about 10bp per year.

In private markets, costs are necessarily higher to implement these programs, and we carefully monitor investments to ensure these costs are appropriate. We are extremely cost conscious in the implementation of the private markets program. We reduce costs by concentrating our relationships with a smaller number of highly qualified managers who agree to enter into custom negotiated partnerships at reduced fees. These partnerships, called "separate accounts", provide benefits to ASRS beyond reduced fees, including custom investment criteria and favorable liquidity terms that give ASRS rights to influence or determine the pace of investment and liquidation of the partnership. ASRS plans to continue to grow the separate account program to around 75% of private market assets.

Reporting and Performance Measurement

ASRS has implemented a comprehensive and transparent system of reports to keep the ASRS Management, ASRS Board and the public informed on ASRS investments. ASRS complies with all required reporting under GASB standards and voluntarily complies with recommended disclosures of the Government Financial Officers Association ("GFOA"). All GFOA recommended disclosures are included in this investment section.

Additionally, ASRS has been a leader in adopting rigorous investment performance measurement systems. ASRS believes that sophisticated performance measurement contributes to the efficacy of portfolio management, improves decisions and leads to better results. Starting in 2012, ASRS implemented performance measurement systems in its private markets investments based on new research recommending "public market equivalent" measurements of performance. ASRS continued the performance measurement project focusing on public equities and implementing Brinson-style attribution analysis across the portfolio, returns based performance analysis using various statistical methods across rolling time frames and holdings-based style analysis across rolling time frames. These methods were extended to fixed income assets in 2017 and to total fund reporting in 2018.

Technology

ASRS is committed to using state of the art technology to bring the most sophisticated analytical methods to its decisions, to implement quality in data bases and information systems and to continuously enhance the productivity of the investment team. As noted above, ASRS is implementing an ambitious performance measurement system project, greatly increasing both the quality and quantity of information available for investment decisions. We are implementing this at very low incremental cost utilizing the analytical expertise and software coding skills of existing staff. Through automation of tasks previously performed by hand, we are increasing the amount of time available for higher value and more creative work. We also increase the reliability of information through automation and elimination of manual steps. We are currently in the process of implementing a unified data system of position and performance data which will improve efficiency by eliminating human processing steps, enhance reliability, and improve flexibility in performance analysis.

Conclusion

It is an honor to serve the members and beneficiaries as your Chief Investment Officer. We hope you find the materials in this Investment Section informative and helpful in understanding the investments of the Arizona State Retirement System.

Sincerely,

Karl Polen, Chief Investment Officer

Purpose

The purpose of this Investment Policy Statement (IPS) is to set forth the investment, beliefs, goals & objectives, constraints and establish the guidelines for the development and implementation of the ASRS strategic and tactical asset allocation policy.

The ASRS recognizes that a well-articulated investment policy is important to the long term success of achieving the ASRS investment objectives. As such, the ASRS has developed this IPS with the following goals in mind:

- To clearly and explicitly establish the objectives and parameters that govern the investments of the ASRS' assets;
- To establish a target asset allocation that is long-term in nature but dynamic to allow the ASRS to take advantage of market opportunities which is expected to achieve its investment rate of return objectives;
- To help protect the financial health of the ASRS through the implementation of this policy statement;
- To establish a framework for monitoring investment activity, and promote effective communication between the Board, Staff, and other involved parties.

Investment Goals & Objectives

The ASRS has established a set of Investment Goals and Objectives that describe the macro-level expected outcomes that the ASRS seeks to achieve.

Goals

1. Maximizes Fund Rates of Return for Acceptable Levels of Fund Risk.

   This goal has an asset oriented focus. Here, the returns generated or earned by the investment Fund should be considered in conjunction with the risk or volatility that the Fund will support, where risk is essentially the possibility of a change in the value of the ASRS Fund attributed to changes in economic conditions, interest rates, dividend policy and other variables in any given year.

2. Achieves 75th Percentile Rates of Return Compared to Peers.

   This goal compares the performance of ASRS' aggregate investment portfolio to other public pension funds with over $1 billion of assets under management. Though ASRS' asset allocation policy will differ from other public pension funds given its risk return profile and investment beliefs, it is common practice to compare returns between comparable public pension funds.

3. Achieves Long-term Fund Rates of Return Equal to or Greater than the Actuarial Assumed Interest Rate.

   This goal has a liability oriented focus. Here, the returns generated or earned by the investment Fund should be considered in conjunction with the actuarial assumed interest rate, where this interest rate is essentially an estimate of the long-term average of the combination of expected inflation rates and expected real rates of return. The actuarial assumed interest rate is also the discount rate used to calculate the present value of liabilities.

4. Achieves Long-term Economic and Actuarial Funded Statuses of 100 percent.

This goal has a funded-status oriented focus. Here, the structuring of the investment fund should be considered in conjunction with the level, volatility, and direction of the economic and actuarial funded status of the Fund. Although both actuarial and economic funded status levels are valuable for discussion and decision-making, economic-funded status is more reflective of financial condition and long-term policy implications. Economic-funded status is defined as the actual or market value of investments as a percentage of the actual or market value of liabilities and excludes such accounting constructs as smoothing and amortization.

5. Mitigates Contribution Rate Volatility.

This goal has a contribution-rate orientation focus. Here, the structuring of the investment Fund should be considered in conjunction with the level, volatility, and direction of the contribution rates that will need to be paid by both employees and employers in the Fund. In general, lower levels and volatility in contribution rates are preferred.

Collectively, the above goals incorporate the following elements that are important for a fund's comprehensive investment structure:

1. Complementary use of absolute and relative rates-of-return perspectives.
2. Complementary use of asset-only and asset-liability perspectives.
3. Complementary use of economic and actuarial perspectives.

Objectives

Total Fund Performance

1. Achieve a 20-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.

Twenty-year Total Fund Net Rate of Return	Twenty Years	
	Actual	Benchmark[1]
Twenty-year rolling annual total fund net rate of return	6.5%	8.0%

[1] The benchmark rate was 8.0% for 19 years, and 7.5% for the most recent year, averaging 8.0% over 20 years

2. Achieve 1-year and 3-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS asset allocation policy (SAAP) Benchmark.

One and Three-year Total Fund Net Rate of Return	One Year		Three Years	
	Actual	Benchmark	Actual	Benchmark
Rolling annual total fund net rate of return	9.4%	8.4%	7.8%	7.1%

Asset Class Performance

3. Achieve 1-year and 3-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

Net Rate of Return by Asset Class	One Year		Three Years	
	Actual	Benchmark	Actual	Benchmark
Public Markets Fixed Income	-0.1%	0.1%	2.6%	2.6%
Private Debt	10.4%	7.1%	10.8%	7.4%
Opportunistic Debt[1]	6.1%	n/a	5.7%	n/a
Total Domestic and International Equity	11.0%	11.5%	8.7%	9.0%
Domestic Equity	14.0%	15.0%	11.5%	12.1%
International Equity	7.7%	7.6%	5.2%	5.5%
Private Equity	14.6%	10.4%	12.2%	8.1%
Opportunistic Equity[1]	3.3%	n/a	9.5%	n/a
Real Estate	7.6%	6.7%	10.9%	9.4%
Infrastructure	21.9%	5.7%	13.7%	5.7%
Farmland & Timber	2.2%	5.7%	2.6%	5.7%
Commodities	13.0%	7.4%	-3.0%	-4.5%
Multi-Asset Class Strategies	7.3%	1.3%	0.9%	0.3%

[1] Net absolute rate of return expectations range from 10% to 14% per annum.

Cash Flow Performance

4. Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash-flow requirements.

Investment Beliefs

Frame of Reference

The following Investment Beliefs have been established to ensure the development of congruent and synergistic investment strategies, and to ensure the effective and efficient allocation of resources. These Investment Beliefs determine the general paradigm within which investment strategies are developed, investment ideas are reviewed, and investment decisions are implemented.

Modifications to these Investment Beliefs will occur if experiential, academic, conceptual, and/or practical perspectives suggest that a superior belief system exists.

Investment Beliefs

1. **Asset Class Decisions are Key:** In general, decisions with respect to which asset classes and sub-asset classes to invest in, and the allocations to these asset classes and sub-asset classes, have a greater impact on total fund investment returns than decisions in which specific securities to invest.

2. **Theories and Concepts Must be Sound:** Over longer periods of time, investment outcomes (e.g. rates of return, volatility) conform to logical theories and concepts. Significant deviations (e.g. internet bubble, pre-subprime erosion of risk premiums) from theoretically and conceptually sound investment constructs are usually not sustainable and are typically self-reverting.

3. **House Capital Market Views Are Imperative:** The development and articulation of sound *House Views* (e.g. views on interest rates, corporate spreads, asset valuations) will ensure consistency among investment decisions, clarity of investment direction, baselines for debates, and conformity of understanding.

4. **Investment Strategies Must be Forward Looking:** Investment strategies will be developed based on forward-looking insights, rather than simply on successful strategies of the past.

   Asset class valuations and security valuations are significantly affected by endogenous outcomes (e.g. earnings, GDP growth rates, competitive barriers) that are probabilistic, and these outcomes are typically well analyzed by the investment industry.

   Asset class valuations and security valuations are also significantly affected by random outcomes (e.g. natural disasters, certain supply & demand shocks) that are virtually unpredictable, and these outcomes are typically not analyzed directly by the investment industry.

   Asset class valuations and security valuations are also significantly affected by exogenous outcomes (e.g. foreign policies, global cultural interactions) that can possibly be modeled, and these outcomes are typically not analyzed by the investment industry.

5. **Public Markets are Generally Informationally Efficient:**

   <u>Asset Class Valuations</u>

   Asset class valuations (e.g. stock market levels versus interest rate levels) are often in equilibrium with one another, but anomalous situations do occur which result in disequilibria between asset class valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

   <u>Security Valuations</u>

   Security valuations (e.g. IBM versus Cisco) are often in equilibrium with one another, but private markets and anomalous public market situations do occur which result in disequilibria between security valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

   The extent of informational efficiency varies across asset classes.

   Private markets offer significant opportunities for asset mispricing and manager excellence which we will pro-actively seek and capitalize on.

6. **Market Frictions are Highly Relevant:** Market frictions (e.g. management fees, carried interest, revenue sharing, expenses, costs, transaction spreads, market impacts, taxes, commissions) can be significantly detrimental to investment performance and as a result transactions will be initiated only to the extent there is a strong level of conviction that they will result in increased investment returns or decreased risks net of all market frictions.

7. **Internal Investment Professionals are the Foundation of a Successful Investment Program:** In-house investment management capability engaged in direct portfolio management results in superior investment decision-making.

   In-house investment management pro-actively monitors capital markets in order to determine mispricing opportunities & allocate capital and will successfully increase risk adjusted returns.

   In-house investment professionals are more closely aligned with, and have a better understanding of, the purpose and risk & reward tolerance of the ASRS than external parties.

   In-house investment professionals will impact direct investment negotiations, better align economic interests, and influence investment industry conditions (e.g. private deal structures, fee levels, introduction of innovative products & strategies).

8. **External Investment Management is Beneficial:** External investment organizations can often offer greater expertise, resources, and/or flexibility than internal personnel for various investment strategies.

9. **Investment Consultants:** Investment consultants will be effectively utilized in the following four general categories, and utilization of consultants will be focused on situations where there is a demonstrable need in at least one of the four areas:

   - Independence: When oversight or controls should be enhanced.
   - Perspective: When internal perspectives are not broad enough.
   - Special Skills: When internal skills are not deep enough.
   - Resource Allocation: When Investment Management's resources can be enhanced.

10. **Trustee Expertise:** Trustees often have expertise in various areas of investment management, and this expertise should be utilized while ensuring separation between Board oversight and staff management.

Investment Considerations

1. **Arizona State Statutes**

   ASRS investments may be limited by Arizona Revised Statutes. To ensure compliance, checks and balances have been established which both reside within and external to the ASRS Investment Management Division. Reporting processes are implemented and, as appropriate, disseminated to the Director, Board Committees, and Board.

2. **Time Horizon**

   The ASRS is managed on a going-concern basis. The following timeframes are utilized for portfolio construction decisions and contribution rate determination:

Portfolio Construction Decisions:

- Strategic asset allocations focus on medium term (3-5 years) capital market expectations, subject to the constraint of meeting the long-term assumed actuarial rate based on long-term (30 year) Capital Market Assumptions.
- Tactical deviation decisions are based on shorter term (less than 3-5years) capital market expectations.

Contribution Rate Determination:

- Liabilities are discounted based upon long-term (30 year) capital market expectations.
- Contribution rates are set based upon longer-term (currently 10 year) investment valuation smoothing periods, and longer-term (currently 30 years 'closed') deficit/surplus amortization periods.

The impact on contribution rates of any realized short-term volatility of returns will be mitigated through actuarial time-series diversification (smoothing & amortizing), rather than by lowering short-term expected return volatility at the expense of lower expected returns (and therefore higher aggregate contribution rates).

Contribution rates are the realized cash flow financial outputs, and based upon the above, they are relatively insensitive to shorter-term portfolio volatilities. This enables the ASRS to combine the traditional cross-sectional diversification benefits of a large employee pooled plan with time-series diversification benefits of a multi-generational plan, resulting in higher expected short-term return volatility which enables higher expected long-term returns.

3. Liquidity and Cash-Flow

The ASRS maintains a long-term investment horizon; however, managing short-term liquidity and cash-flow is paramount to ensure that pension obligations, health insurance, member refunds, administrative payments and other cash-flow requirements are made. This requires Investment Management and Financial Services Divisions to anticipate internal and external cash-flow needs, and to efficiently manage transactions in order to mitigate the costs of ensuring adequate liquidity.

Risk Management, Monitoring and Reporting

The ASRS applies a risk management framework for identifying, managing and reporting on ASRS Investments. These include, but are not limited to, operational risk (e.g., internal and external portfolio(s) guideline compliance, cash management, securities lending, Investment Management business continuity, etc.) and investment risk (e.g., deviations from target allocation, manager oversight, performance measurement/attribution, ability to achieve investment objectives, etc.).

In conjunction with the agency risk management program, appropriate steps are taken to provide reasonable assurance to Executive Management and the Board that investment management programs are designed, implemented and maintained to achieve investment goals and objectives as referenced in the ASRS Strategic Plan.

Responsibilities reside with the ASRS investment staff, custody bank, general consultant, project consultants, investment managers, and ASRS Internal Audit.

Reporting periodicity and the level of investment information dissemination vary depending upon target audience. Daily report generation and investment monitoring reside with the custody bank and Investment Management / Internal Audit; Quarterly/Annual aggregate, portfolio positions, and asset class performance are reported to the Investment Committee/Board.

The use of leverage is defined in the applicable ASRS investment documentation. For separate account public market investments (internally or externally managed portfolios), authorization to permit or not permit leverage is explicitly denoted in the managers' Letter of Direction and Clarification; monitoring is conducted by Investment Management and ASRS consultants. For commingled public and private markets investments, authorization to permit or not permit leverage is explicitly denoted in the managers' contracts or partner agreements; monitoring is conducted by the designated partnership agreement external auditor and, as applicable, reviewed at limited partnership advisory meetings.

The use of derivatives is defined in the applicable ASRS investment documentation. For separate account public market investments (internally or externally managed portfolios), authorization to permit or not permit derivatives is explicitly denoted in the managers' Letter of Direction and Clarification; monitoring is conducted by Investment Management and ASRS consultants. For commingled public and private markets investments, authorization to permit or not permit derivatives is explicitly denoted in the managers' contracts or partner agreements; monitoring is conducting by the designated partnership agreement external auditor and, as applicable, reviewed at limited partnership advisory meetings.

The management of currency exposure is defined in the applicable ASRS investment documentation. For separate account public market investments (internally or externally managed portfolios), authorization to permit or not permit currency hedging is explicitly denoted in the managers' Letter of Direction and Clarification; monitoring is conducted by Investment Management and ASRS consultants. For commingled public and private markets investments, authorization to permit or not permit currency hedging is explicitly denoted in the managers' contracts or partner agreements; monitoring is conducting by the designated partnership agreement external auditor and, as applicable, reviewed at limited partnership advisory meetings.

Asset Allocation

As part of strategic asset allocation development, the ASRS asset mix will reflect investments in strategic and tactical asset classes and strategies whose collective risk/return profile are anticipated to achieve its long-term investment rate of return goals and objectives.

The ASRS employs a dynamic strategic asset allocation study approach whose initiation and periodicity will primarily be a function of market dynamics. The strategic asset allocation is used to determine the long-term policy asset weights. Investment opportunities and asset classes are constantly evolving and developing, such that they may become attractive and suitable for institutional investment portfolios before the next scheduled policy review. Therefore, asset allocation reviews in addition to periodic studies are conducted as warranted or triennially, whichever is shorter.

The strategic asset allocation study may include, but not be limited to, the following:

- Discussion and analysis of existing and evolving asset classes and investment strategies.

- Evaluation of expected sources of investment returns, risk and diversification (quantitatively/qualitatively).
- Reviewing investment industry developments (academic and pragmatic).
- Utilization of quantitative tools (e.g., efficient frontier mean-variance optimization, risk budgeting) and evaluation of multiple scenarios.
- Reviewing and engaging discussions regarding capital market assumptions.
- Reviewing asset allocation policies from other public and non-public entities.

Rebalancing

The ASRS has established and maintains an asset class rebalancing policy(s) which encompasses the guidelines and processes for identifying and determining potential courses of action precipitated by the ASRS asset class over/under weight deviations relative to its broad strategic asset allocation policy (SAAP), ASRS cash-flow needs and/or to take tactical positions between and within SAAP asset classes.

The frequency and magnitude of portfolio rebalancing is determined by the Investment Rebalancing Committee consisting of the Director, CIO, and Investment Management Asset Class Portfolio Managers. The CIO reports asset class rebalancing activities to the Director and, through the Director, to the Investment Committee and full Board.

Voting of Portfolio Proxies

The ASRS votes its ownership interest with an objective of maximizing the present value of its investment. Proxy voting for the ASRS internally-managed equity ("E") portfolios and those assigned to external U.S. and non-U.S. equity managers shall not be influenced or directed by political or social prerogatives that may diminish or impair the economic value of an investment.

The ASRS currently engages Glass-Lewis & Co., LLC (GLC) and employs its research and voting guidelines for the voting of proxies for the "E" portfolios. This process is not applicable to ASRS externally-managed equity portfolios.

The ASRS external equity managers use their discretion to vote their portfolio proxies; voting records are monitored for consistency with both the individual external manager's voting policy and the GLC proxy voting policy. External equity manager voting records found to be inconsistent with or different from the GLC proxy voting policy are researched and documented. Investment Management retains the right to direct external equity managers' voting on any issue(s) if doing so is deemed beneficial to the Fund.

Securities Litigation

The ASRS monitors and participates in securities litigations when appropriate to protect the ASRS interests. From time to time, class action lawsuits are brought against companies, their directors, and/or their officers, as well as third parties such as the companies' independent public accountants, for alleged violations of federal and state securities laws relating to various disclosure obligations and breaches of fiduciary or other duties. As a shareholder or bondholder, the ASRS may join or initiate a securities class action or pursue a private action when securities fraud and other acts of wrongdoing have taken place.

Monitoring and reporting is carried out by the ASRS contracted outside counsel who may make recommendations to the ASRS and depending on the merits of the recommendation are discussed by the Securities Litigations Oversight Committee (SLOC). In the event the SLOC recommends the ASRS consider pursuing lead plaintiff or private action, Board approval is required before such action can be taken.

Securities Lending

The ASRS is allowed to lend securities with either the custody bank or tri-party in a separate account or commingled security lending structure. The CIO and Director will determine the ASRS securities lending program parameters (risk profile, aggregate lending balance, types of securities on loan, collateral requirements, etc.). The ASRS securities lending program primarily focuses on identifying loan intrinsic value.

Management of Investment Management Fees (Cost)

The ASRS strives to maintain an efficient and relatively low aggregate investment management fee structure. The ASRS internally-managed public market portfolios are managed to provide beta-like market returns with low management fees (approximately 1 bps); external public and private portfolios are anticipated to generally provide alpha, take active risk and enable the ASRS the ability to access market capital opportunities which may not be available through ASRS internal investment program.

To the extent possible, the ASRS negotiates and monitors investment fees for external public and private investment managers. For external public equity managers, securities-level transaction(s) cost analyses will be evaluated by Investment Management staff. Those managers whose transaction costs appear high relative to the market in which they trade or who use soft dollars may be subject to participation in the ASRS commission recapture program.

The ASRS Investment Management staff will oversee public manager portfolio transitions, e.g., securities from one public manager to another. These transactions may be executed on a security-level basis by either Investment Management staff or through an intermediary who may possess skills and/or can execute transactions on a more effective cost basis. Pre- and post-transaction cost analyses (commission, trading costs, market impact, etc.) are evaluated by the Investment Management staff.

Roles & Responsibilities

The ASRS Board governance structure provides the Investment Committee with general investment oversight responsibilities. In addition, the Director’s Asset Class Committees implement Board policies and provide detail oversight of the ASRS investments. Specific duties of the Investment Committee and Asset Class Committees are outlined in the ASRS Board Governance Policy Handbook.

Asset Allocation

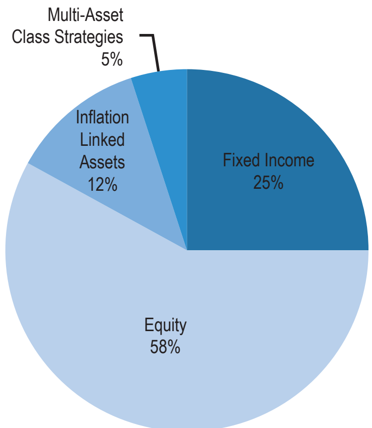
Exhibit I-1: Asset Allocation Targets

During fiscal year 2018, the ASRS asset allocation policy targets and ranges were as follows:

Asset Allocation Targets

Inflation Linked Assets (Range 10-16%)	**12.0%**
Commodities	2.0%
Real Estate	10.0%
Infrastructure	0.0%
Farmland & Timber	0.0%
Opportunistic Inflation Linked	0.0%

Equity (Range 48-65%)	**58.0%**
Large Cap	20.0%
Mid Cap	3.0%
Small Cap	3.0%
International Developed Large Cap	17.0%
International Developed Small Cap	2.0%
Emerging Markets	5.0%
Private Equity	8.0%
Opportunistic Equity	0.0%



Multi-Asset Class Strategies (Range 0-12%)	**5.0%**
Multi-Asset Class Strategies	5.0%

Fixed Income (Range 18-35%)	**25.0%**
Core Bonds	11.0%
High Yield	2.0%
Private Debt	12.0%
Treasuries (Long Duration)	0.0%
Opportunistic Debt	0.0%

Cash (Range 0-3%)	**0.0%**
Tactical Cash (Unassetized)	0.0%
Operating Cash (Unassetized)	0.0%
Operating Cash (Assetized)	0.0%

Exhibit I-2: Schedule of Investment Portfolios by Asset Class

(Dollars in thousands)

Investment Portfolios by Asset Class[2]		**Fair Value**	**Percentage of Investments at Fair Value**
Cash and Short-Term Investments[1]	$	872,036	2.2%
U.S. Fixed Income		4,081,741	10.2%
Private Debt		4,823,529	12.1%
Opportunistic Debt		1,735,688	4.3%
U.S. Equity		9,952,729	24.9%
International Equity		8,540,422	21.4%
Private Equity		3,556,460	8.9%
Public Opportunistic Equity		10,221	0.0%
Private Opportunistic Equity		280,054	0.7%
Real Estate		4,315,988	10.8%
Infrastructure		373,428	0.9%
Farmland and Timber		189,792	0.5%
Multi-Asset		1,236,267	3.1%
	$	39,968,355	

[1] The ASRS utilizes short-term investments as collateral for its derivative investing activities. See Note 6 to the financial statements for more information on the notional value of derivative instruments.

[2] A detailed listing of investments is available upon request. Direct inquiries to: ASRS, 3300 North Central Avenue, Phoenix, AZ 85012

Performance Accounting / Computation Standards

The ASRS investment performance rates of return for public market asset classes are calculated on a total return basis, using time-weighted rates of return, net of all fees and based on market values. Returns presented for private market asset classes are on an internal rate of return (IRR), net of all fees and based on market values. The fair value of real estate, private equity and opportunistic investments are based on estimated values. Fair value is based on estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values.

Performance is calculated on an accrual basis provided that the accrual information is available from the custodian or record-keeper. The rates of return are generated by asset class and include cash holdings.

Below are the rates of return on the overall portfolio, as well as specific asset classes, along with the benchmark used to compare performance.

Exhibit I-3: Annualized Rates of Return On Publicly Traded Investments (Net of Fees)

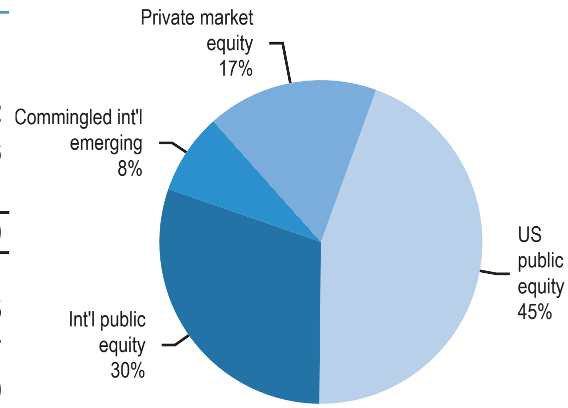
	Time-Weighted Rates of Return				
Asset Class / Benchmark	**1 Year**	**3 Year**	**5 Year**	**10 Year**	**Inception**
Total Fund	**9.4%**	**7.8%**	**8.9%**	**7.4%**	**9.7%**
Interim SAA Policy Benchmark	8.4%	7.1%	8.0%	6.7%	9.4%
Domestic Fixed Income	**(0.1%)**	**2.6%**	**2.7%**	**4.3%**	**7.9%**
ASRS Custom Index	0.1%	2.6%	2.3%	3.8%	—%
Total Equity	**11.0%**	**8.7%**	**10.1%**	**7.8%**	**7.1%**
Custom Total Equity Index	11.5%	9.0%	10.5%	7.8%	6.6%
Domestic Equity	**14.0%**	**11.5%**	**13.1%**	**10.6%**	**11.3%**
Custom Domestic Equity Index	15.0%	12.1%	13.5%	10.6%	11.4%
International Equity	**7.7%**	**5.2%**	**6.4%**	**3.1%**	**6.1%**
Custom International Equity Index	7.6%	5.5%	6.6%	3.2%	5.9%
Commodities	**13.0%**	**(3.0%)**	**(5.2%)**	**n/a**	**(3.1%)**
Custom Commodity Index	7.4%	(4.5%)	(6.4%)	n/a	(4.8%)
Multi-Asset Class Strategies	**7.3%**	**0.9%**	**4.9%**	**6.5%**	**6.4%**
Custom Index	1.3%	0.3%	3.7%	4.5%	5.1%

Exhibit I-4: Annualized Rates of Return On Private Market Investments (Net of Fees)

	Internal Rates of Return			
Asset Class / Benchmark	**1 Year**	**3 Year**	**5 Year**	**Inception**
Private Equity	**14.6%**	**12.2%**	**12.6%**	**12.1%**
Russell 2000	10.4%	8.1%	11.3%	12.5%
Opportunistic Equity	**3.3%**	**9.5%**	**19.3%**	**20.8%**
Private Debt	**10.4%**	**10.8%**	**11.0%**	**11.2%**
S&P Loan Syndications and Trading Association Leveraged Loan Index + 2.5%	7.1%	7.4%	7.1%	7.2%
Opportunistic Debt	**6.1%**	**5.7%**	**6.6%**	**9.4%**
Real Estate	**7.6%**	**10.9%**	**11.9%**	**8.4%**
NFI-ODCE Index	6.7%	9.4%	10.5%	7.2%
Farmland and Timber	**2.2%**	**2.6%**	**n/a**	**2.9%**
CPI (excl. food & energy) + 3.5%	5.7%	5.7%	n/a	5.6%
Infrastructure	**21.9%**	**13.7%**	**n/a**	**11.7%**
CPI (excl. food & energy) + 3.5%	5.7%	5.7%	n/a	5.6%

Exhibit I-5: Equity Sub-Sector Allocation
June 30, 2018
(Dollars in thousands)

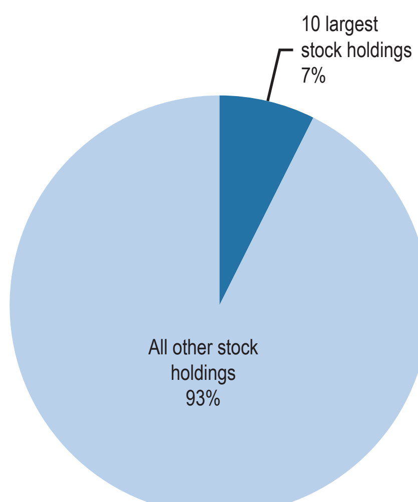
Sub-Sector	% of Equity Portfolio	Fair Value
US equity:		
US large cap	33.77%	$ 7,544,651
US mid cap	5.49%	1,225,892
US small cap	5.29%	1,182,186
Public Opportunistic equity	0.05%	10,221
Total US equity	44.60%	9,962,950
International - developed markets	30.14%	6,733,765
Commingled - int'l emerging markets	8.09%	1,806,657
Private equity	15.92%	3,556,460
Opportunistic equity	1.25%	280,054
Total equity	100.00%	$ 22,339,886



Note: Schedule does not include securities lending collateral investments.

Exhibit I-6: Ten Largest Stock Holdings
June 30, 2018
(Dollars in thousands)

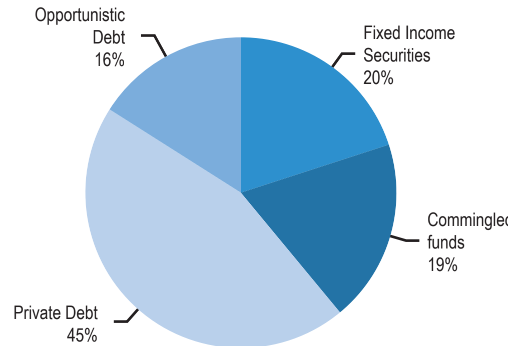
Company	Shares	Fair Value
Apple Inc	1,207,393	$ 223,501
Microsoft Corp	1,926,024	189,924
Amazon.Com Inc	100,300	170,490
Facebook Inc A	604,240	117,416
Jpmorgan Chase + Co	941,217	98,075
Berkshire Hathaway Inc Cl B	501,488	93,603
Exxon Mobil Corp	1,115,045	92,247
Alphabet Inc Cl C	74,622	83,252
Alphabet Inc Cl A	73,370	82,849
Johnson + Johnson	675,801	82,002
Total	7,219,500	$ 1,233,359



Note: A detail listing of investments is available upon request.
Direct inquiries to: ASRS, 3300 North Central Avenue, Phoenix, AZ 85012

Exhibit I-7: Fixed Income Sub-Sector Allocation
June 30, 2018
(Dollars in thousands)

Sub-Sector	% of Equity Portfolio		Fair Value
Fixed Income Securities			
Core U.S. fixed income	16.69%	$	1,776,036
High Yield U.S. fixed income	2.71%		288,760
Total US Fixed Income	19.40%		2,064,796
Commingled funds - Fixed Income	18.96%		2,016,945
Private Debt funds	45.33%		4,823,529
Opportunistic Debt funds	16.31%		1,735,688
Total Fixed Income	100.00%	$	10,640,958



Note: Schedule does not include securities lending collateral investments.

Exhibit I-8: Ten Largest Bond Holdings
Year Ended June 30, 2018
(Dollars in thousands)

Holding	Coupon	Maturity	Rating		Par Value		Fair Value
US TREASURY N/B	2.75	11/15/2023	AA+	$	48,000	$	47,993
US TREASURY N/B	4.75	2/15/2041	AA+		23,200		30,056
US TREASURY N/B	1	11/15/2019	AA+		30,000		29,413
FNMA POOL AV0691	4	12/1/2043	AA+		28,026		28,772
US TREASURY N/B	1.625	7/31/2020	AA+		27,000		26,494
US TREASURY N/B	2.75	2/15/2028	AA+		25,000		24,785
US TREASURY N/B	2.125	1/31/2021	AA+		25,000		24,703
US TREASURY N/B	2.625	2/28/2023	AA+		20,000		19,920
US TREASURY N/B	1	11/30/2019	AA+		20,000		19,595
FNMA POOL MA3210	3.5	12/1/2047	AA+		19,323		19,244
Total				$	265,549	$	270,975

Note: A detail listing of investments is available upon request.

Direct inquiries to: ASRS, 3300 North Central Avenue, Phoenix, AZ 85012

Exhibit I-9: Domestic Equity Trades

Year Ended June 30, 2018

(Dollars and shares in thousands)

Broker Name	Dollar Amount of Trades	Number of Shares	Average Commission Per Share	Dollar Amount of Commission
Merrill Lynch,Pierce,Fenner & Smith Inc.	$ 3,443,554	87,131	$ 0.0086	$ 752
Northern Trust Brokerage Institution	1,749,371	38,466	0.0085	327
Morgan Stanley Co Incorporated	1,538,363	24,760	0.0099	246
Instinet LLC	1,710,843	28,959	0.0072	210
Barclays Capital Inc./Le	779,209	15,561	0.0098	153
Itg Inc.	351,782	10,996	0.0100	110
J.P. Morgan Clearing Corp.	487,483	8,101	0.0101	82
Jefferies + Company Inc	123,794	3,864	0.0097	37
Investment Technology Group Inc.	122,348	3,501	0.0101	35
Goldman Sachs + Co	166,963	2,620	0.0109	29
Credit Suisse Securities (Usa) LLC	45,299	1,864	0.0125	23
Deutsche Bank Securities Inc	81,033	1,287	0.0165	21
Citigroup Global Markets Inc	92,388	1,631	0.0110	18
J.P. Morgan Securities LLC	46,434	1,488	0.0092	14
Icbcfs LLC	38,977	1,291	0.0100	13
Ubs Securities LLC	45,254	1,074	0.0111	12
Pershing LLC	18,127	707	0.0139	10
Cowen And Company, LLC	12,172	373	0.0222	8
Deutsche Bank Ag London	16,172	58	0.1392	8
Barclays Capital Le	28,071	943	0.0085	8
Isi Group Inc	21,197	684	0.0111	8
Wells Fargo Securities, LLC	27,137	849	0.0080	7
Rbc Capital Markets, LLC	16,083	480	0.0126	6
Convergex LLC	12,608	436	0.0075	3
Bnp Paribas Prime Brokerage, Inc.	13,883	228	0.0100	2
Weeden + Co.	12,076	160	0.0117	2
Various Other Brokers	119,855	17,624	0.0457	805
Total	$ 11,120,476	255,136	$ 0.0116	$ 2,949

Note: A detailed listing of broker commissions is available upon request.

Direct inquiries to: ASRS, 3300 North Central Avenue, Phoenix, AZ 85012

Schedule of Broker Commissions

Exhibit I-10: Foreign Equity Trades

Year Ended June 30, 2018

(Dollars and shares in thousands)

Broker Name	Dollar Amount of Trades	Number of Shares	Average Commission Per Share	Dollar Amount of Commission
Goldman Sachs International	$ 1,750,489	140,862	$ 0.0047	$ 658
Citigroup Global Markets Limited	683,007	38,318	0.0075	288
Ubs Ag	584,274	48,969	0.0053	261
Merrill Lynch International	389,935	42,824	0.0036	153
Deutsche Bank Ag London	287,225	44,286	0.0033	145
Morgan Stanley And Co. International	279,719	60,143	0.0020	118
JP Morgan Securities PLC	225,366	19,178	0.0054	103
Morgan Stanley Co Incorporated	203,386	12,051	0.0076	92
Instinet U.K. Ltd	121,099	7,459	0.0097	72
Citigroup Global Markets Inc.	122,398	16,975	0.0037	64
Credit Suisse Securities (Europe) Ltd	121,212	31,081	0.0019	59
Ubs Securities Asia Ltd	103,259	5,473	0.0107	59
Ubs Limited	94,376	6,215	0.0094	58
Societe Generale London Branch	79,025	3,258	0.0142	46
Goldman Sachs + Co	65,117	11,859	0.0034	40
Clsa Singapore Pte Ltd.	60,204	20,968	0.0017	37
Barclays Capital	53,569	4,354	0.0079	34
Sanford C. Bernstein Ltd	45,351	1,704	0.0167	28
Deutsche Bank Securities Inc	26,486	2,370	0.0119	28
Internal Swap	65,296	7,737	0.0036	28
Macquarie Bank Limited	46,457	12,779	0.0021	27
Daiwa Securities America Inc	24,455	1,021	0.0258	26
Jefferies + Company Inc	20,714	753	0.0322	24
Credit Suisse Securities (Usa) LLC	25,063	1,441	0.0163	23
Mizuho Securities Usa Inc	20,461	668	0.0325	22
Jefferies International Ltd	22,306	4,917	0.0040	20
Kepler Equities Paris	22,432	1,483	0.0129	19
J P Morgan Securities Inc	30,292	1,506	0.0114	17
Investment Technology Group Ltd	35,797	2,748	0.0056	15
Various Other Brokers	357,331	52,837	0.0054	288
Total	$ 5,966,101	606,237	$ 0.0047	$ 2,852

Note: A detailed listing of broker commissions is available upon request.

Direct inquiries to: ASRS, 3300 North Central Avenue, Phoenix, AZ 85012

Exhibit I-11: Schedule of Investment Fees

Year Ended June 30, 2018

(Dollars in thousands)

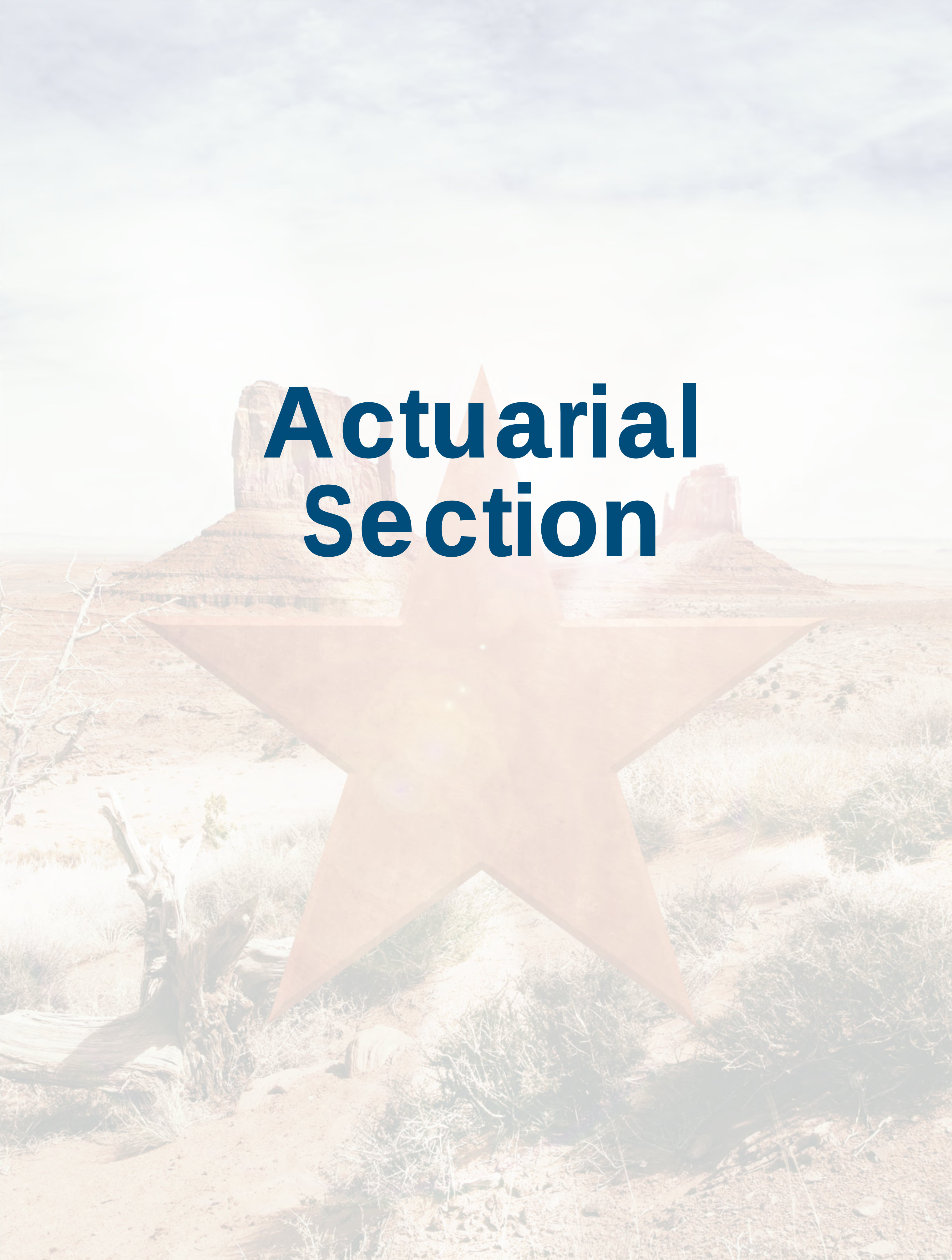
Asset Class	Assets Managed at Fair Value, as of June 30[1]	Management Fees[2]	Performance Fees[2]	Total
Equity:				
Public equity	$ 18,503,372	$ 16,000	$ —	$ 16,000
Private equity	3,556,460	54,007	107,052	161,059
Opportunistic equity	280,054	825	2,379	3,204
Total equity	22,339,886	70,832	109,431	180,263
Fixed income:				
Public fixed income	4,081,741	1,951	—	1,951
Opportunistic debt	1,735,688	16,039	41,575	57,614
Private debt	4,823,529	42,137	43,065	85,202
Total fixed income	10,640,958	60,127	84,640	144,767
Real estate	4,315,988	35,874	31,945	67,819
Commodities	—	1,264	—	1,264
Multi-asset	1,236,267	23,325	—	23,325
Infrastructure	373,428	3,580	5,896	9,476
Farmland and timber	189,792	2,391	—	2,391
Total	$ 39,096,319	$ 197,393	$ 231,912	$ 429,305

[1] Does not include Short-term investments.

[2] The Investment fee schedule above identifies investment manager fees and performance fees (carried interest and incentive) that are readily separable from investment income.

Public market investment managers, and some private market investment managers, are paid directly for fees. Private market investment managers, whose fees are not paid directly, report account valuations on a net of fee basis. The ASRS made a good faith effort to identify these fees by requesting a confirmation of fees from the managers and reviewing investment capital account statements. Investment manager fees have been reported separately from other investing activity on the Statement of Changes in Fiduciary Net Position, however performance fees are reported net with the appreciation in the fair value of investments. In addition to the fees listed above, the ASRS also incurred other fees of approximately $97 thousand.

Actuarial Section



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October 12, 2018

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

Re: Arizona State Retirement System Actuarial Certification for 401(a) Portion of the Plan

Members of the Board:

At the request of the Arizona State Retirement System (ASRS), Gabriel Roeder Smith & Company (GRS) has performed the actuarial valuation of the benefits associated with the 401(a) (Retirement) portion of the ASRS defined benefit pension plan (the Plan). The information in the Actuarial Section is based on our annual actuarial valuation reports, with the most recent valuations conducted as of June 30, 2017, and is intended to be used in conjunction with the full reports.

This letter and the schedules listed below represent GRS' certification of the funded status as required for the financial report for the fiscal year ended June 30, 2018. GRS prepared the following schedules (information prior to 2016 was provided by ASRS):

- Exhibit F-24: Net Pension Liability of Employers
- Exhibit F-26: Discount Rate Sensitivity - Pension
- Exhibit F-32: Schedule of Changes in the Net Pension Liability - Retirement
- Exhibit F-33: Schedule of Net Pension Liability - Retirement
- Exhibit F-34: Schedule of Employer Contributions - Retirement
- Exhibit A-15: Schedule of Retirees Added to and Removed from Rolls - Retirement
- Exhibit A-17: Schedule of Funding Progress - Retirement and HBS
- Exhibit A-18: Solvency Test - Retirement
- Exhibit A-20: Analysis of Financial Experience - Retirement
- Exhibit S-4: Retired Members by Type of Benefit
- Exhibit S-7: Average Benefit Payments - Retirement

Data

The valuation was based upon information as of June 30, 2017, furnished by ASRS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ASRS staff.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on October 27, 2017 based on the Report on the Actuarial Experience Study covering a five-year period from July 1, 2011 to June 30, 2016, dated October 18, 2017. The notable assumption and method changes reflected in this actuarial valuation include:

- Changing the actuarial cost method to the Entry Age Normal actuarial cost method,
- Lowering nominal investment return assumption to 7.50%,
- Establishing an explicit administrative expense assumption of 0.25% of payroll,
- Reflecting the potential for future PBI's in the funding calculations, and
- Updating the healthy retiree mortality to the 2017 State Retirees of Arizona mortality table with generational mortality improvements using the Ultimate MP scales.

We believe the assumptions are internally consistent and are reasonable, based on the actual experience of ASRS.

The actuarial assumptions and methods used to develop the Net Pension Liability of Employers, Discount Rate Sensitivity, Schedule of Changes in the Net Pension Liability, and Schedule of Net Pension Liability, noted above, meet the parameters set forth in the disclosures presented in the Financial Section by Government Accounting Standards Board Statement No. 67.

The results of the actuarial valuation are dependent upon the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. A review of the impact of a different set of assumptions on the funded status of ASRS is outside the scope of this actuarial valuation.

The current actuarial assumptions are outlined in the section titled "Statement of Actuarial Methods and Assumptions - Retirement and HBS."

Benefits

There were no changes to the plan provisions during the past year. The current benefit provisions are outlined in the section titled "Summary of the Benefit Provisions - Retirement and HBS."

Funding Policy and Objectives

The financial objectives of the Plan are to: (1) maintain reasonably stable contribution rates, and (2) achieve an ultimate funded status of 100%. In order to achieve these objectives, the Board has adopted a closed 30-year amortization period with level-dollar payments for the 401(a) portion of the Plan. Furthermore, the Board made the policy decision to phase in the impact to the contribution of the assumption changes over a five year period. This policy provides for a smooth transition to the ultimate contribution rates over a reasonable period of time.

The actuarial valuation includes a calculation of the contribution rates payable by members and participating employers. These rates, when applied to payroll, yield contribution amounts sufficient to fund the normal cost plus the amortization of the unfunded actuarial accrued liability. Contribution rates are set annually, based on the valuation of the preceding year. The rate calculated in this report for the 401(a) benefits (22.82% of payroll) will apply in the fiscal year beginning July 1, 2018. The rate calculated as part of the prior valuation (22.24% of payroll) applied in the fiscal year that began July 1, 2017. Employers and employees share equally in the combined 401(a) and 410(h) contribution rate determined as part of the valuation.

The unfunded actuarial accrued liability (UAAL) of ASRS for the 401(a) benefits increased from $10.27 billion as of June 30, 2016 to $15.35 billion as of June 30, 2017. Additionally, the funded ratio of ASRS for the 401(a) benefits—actuarial value of assets divided by the actuarial accrued liability—decreased from 77.0% to 69.7% as of June 30, 2017. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Governmental Accounting Standards Board, the Internal Revenue Code and ERISA.

The signing actuaries are independent of the plan sponsor. Ryan Falls and Joe Newton are Enrolled Actuaries, Fellows of the Society of Actuaries, and Members of the American Academy of Actuaries and Paul Wood is an Associate of the Society of Actuaries and a Member of the American Academy of Actuaries. All three meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

R. Ryan Falls, FSA, EA, MAAA
Senior Consultant

Joseph P. Newton, FSA, EA, MAAA
Senior Consultant

Paul T. Wood, ASA, FCA, MAAA
Consultant

GRS Retirement Consulting

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October 12, 2018

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

Re: Arizona State Retirement System Actuarial Certification for 401(h) Portion of the Plan

Members of the Board:

At the request of the Arizona State Retirement System (ASRS), Gabriel Roeder Smith & Company (GRS) has performed the actuarial valuation of the benefits associated with the 401(h) (Health Benefit Supplement) portion of the ASRS defined benefit pension plan (the Plan). The information in the Actuarial Section is based on our annual actuarial valuation reports, with the most recent valuations conducted as of June 30, 2017, and is intended to be used in conjunction with the full reports.

This letter and the schedules listed below represent GRS' certification of the funded status as required for the financial report for the fiscal year ended June 30, 2018. GRS prepared the following schedules (information prior to 2016 was provided by ASRS):

- Exhibit F-27: Net OPEB Liability of Employers - HBS
- Exhibit F-31: Discount Rate Sensitivity - HBS
- Exhibit F-36: Schedule of Changes in the Net OPEB Liability - HBS
- Exhibit F-37: Schedule of Net OPEB Liability - HBS
- Exhibit F-38: Schedule of Employer Contributions - HBS
- Exhibit A-16: Schedule of Retirees Added to and Removed from Rolls - HBS
- Exhibit A-17: Schedule of Funding Progress - Retirement and HBS
- Exhibit A-19: Solvency Test - HBS
- Exhibit A-21: Analysis of Financial Experience - HBS

Data

The valuation was based upon information as of June 30, 2017, furnished by ASRS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ASRS staff.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on October 27, 2017 based on the Report on the Actuarial Experience Study covering a five-year period from July 1, 2011 to June 30, 2016, dated October 18, 2017. The notable assumption and method changes reflected in this actuarial valuation include:

- Changing the actuarial cost method to the Entry Age Normal actuarial cost method,
- Lowering nominal investment return assumption to 7.50%,
- Establishing an explicit administrative expense assumption of 0.25% of payroll, and
- Updating the healthy retiree mortality to the 2017 State Retirees of Arizona mortality table with generational mortality improvements using the Ultimate MP scales.

We believe the assumptions are internally consistent and are reasonable, based on the actual experience of ASRS.

The results of the actuarial valuation are dependent upon the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. A review of the impact of a different set of assumptions on the funded status of ASRS is outside the scope of this actuarial valuation.

The current actuarial assumptions are outlined in the section titled "Statement of Actuarial Methods and Assumptions - Retirement and HBS."

Benefits

There were no changes to the plan provisions during the past year. The current benefit provisions are outlined in the section titled "Summary of the Benefit Provisions - Retirement and HBS."

Funding Policy and Objectives

The financial objectives of the Plan are to: (1) maintain reasonably stable contribution rates, and (2) achieve an ultimate funded status of 100%. In order to achieve these objectives, the Board has adopted a closed 15-year amortization period with level-dollar payments for the 401(h) portion of the Plan. Furthermore, the Board made the policy decision to phase in the impact to the contribution of the assumption changes over a five year period. This policy provides for a smooth transition to the ultimate contribution rates over a reasonable period of time.

The actuarial valuation includes a calculation of the contribution rates payable by members and participating employers. These rates, when applied to payroll, yield contribution amounts sufficient to fund the normal cost plus the amortization of the unfunded actuarial accrued liability. Contribution rates are set annually, based on the valuation of the preceding year. The rate calculated in this report for the 401(h) benefits (0.46% of payroll) will apply in the fiscal year beginning July 1, 2018. The rate calculated as part of the prior valuation (0.44% of payroll) applied in the fiscal year that began July 1, 2017.

Employers and employees share equally in the combined 401(a) and 410(h) contribution rate determined as part of the valuation.

The unfunded actuarial accrued liability (UAAL) of ASRS for the 401(h) benefits decreased from $78.4 million as of June 30, 2016 to $31.5 million as of June 30, 2017. Additionally, the funded ratio of ASRS for the 401(h) benefits—actuarial value of assets divided by the actuarial accrued liability—increased from 95.0% to 98.0% as of June 30, 2017. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Governmental Accounting Standards Board, the Internal Revenue Code and ERISA.

The signing actuaries are independent of the plan sponsor. Ryan Falls and Joe Newton are Enrolled Actuaries, Fellows of the Society of Actuaries, and Members of the American Academy of Actuaries and Paul Wood is an Associate of the Society of Actuaries and a Member of the American Academy of Actuaries. All three meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

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Senior Consultant

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Funding Adequacy

The financial objectives of the Plan are to: (1) maintain reasonably stable contribution rates, and (2) achieve an ultimate funded status of 100%. In order to achieve these objectives, the ASRS Board has adopted a closed 30-year amortization period with level percent of pay payments for the 401(a) portion of the plan and a 15-year period for the 401(h) portion. Furthermore, the ASRS Board made the policy decision to phase in the impact to the contribution of the assumption changes over a five-year period. This policy provides for a smooth transition to the ultimate contribution rates over a reasonable period of time.

The actuarial valuation includes a calculation of the contribution rates payable by members and participating employers. These rates, when applied to payroll, yield contribution amounts sufficient to fund the normal cost plus the amortization of the unfunded actuarial accrued liability. Contribution rates are set annually, based on the valuation of the preceding year. The rate calculated in this report (23.28% of payroll) will apply in the fiscal year beginning July 1, 2018. The rate calculated as part of the prior valuation (22.68% of payroll) applied in the fiscal year that began July 1, 2017. Employers and employees share equally in the contribution rate determined as part of the valuation.

The unfunded actuarial accrued liability (UAAL) of the ASRS increased from $10.3 billion as of June 30, 2016 to $15.4 billion as of June 30, 2017. Additionally, the funded ratio of the ASRS – actuarial value of assets divided by the actuarial accrued liability – decreased from 77.6% to 70.5% as of June 30, 2017. Both of these changes were almost entirely due to the change in actuarial assumptions.

As of fiscal year 2008, statutory changes require annual actuarial valuations, not the biannual valuation required by a prior statutory change effective in 1998. The rates determined by the Plan, System and HBS (combined) valuations do not include contributions to the LTD program.

Asset Valuation

The ASRS actuary determines the actuarial value of assets by recognizing investment gains and losses over a 10-year period. The gradual recognition of investment gains and losses reduces volatility in the year-to-year level of contribution rates.

Actuarial Schedules

A copy of the June 30, 2017 actuarial valuation report is available at our website, https://azasrs.gov.

Please reference the 10 year Schedule of Employer Contributions - Retirement s in Required Supplementary Information for a history of actuarially determined and actual contributions for the last 10 years..

The Arizona State Retirement System makes provision for the retirement, disability, and death and survivor benefits to all employees of the State, instrumentalities of the State and certain political subdivisions. Please refer to the Financial Section of this report for an in-depth discussion of plan provisions. The major provisions of the Plan may be summarized as follows:

A. Retirement Benefits

1. Normal Retirement Eligibility

The earliest of the following:

Exhibit A-1: Normal Retirement

Requirement	Hired before Jan. 1, 1984	Hired between Jan. 1, 1984 and June 30, 2011	Hired after July 1, 2011
80 Points (Age + credited years of service)	✔	✔	
Age 55 + 30 years of credited service			✔
Age 60 + 25 years of credited service			✔
Age 62 + 10 years of credited service	✔	✔	✔
Age 65	✔	✔	✔

2. Average Monthly Compensation

The average of the highest consecutive 36 months in the last 120 months for a member whose membership commences before July 1, 2011, and the average of the highest consecutive 60 months in the last 120 months for a member whose membership commences on or after July 1, 2011. Members who commenced membership prior to 1984 can use a 60-month average and include additional types of compensation if doing so produces a larger result.

Exhibit A-2: Benefit Multiplier

Years of Credited Service	Benefit Multiplier
Less than 20	2.10%
20.0 to 24.99	2.15%
25.0 to 29.99	2.20%
30 or more	2.30%

3. Normal Retirement Benefits

The product of the Benefit Multiplier, the member's Average Monthly Compensation, and years of total credited service and any prior service benefits to which the member was entitled under the System.

4. Early Retirement Eligibility

Age 50 with five or more years of credited service.

5. Early Retirement Benefits

Normal Retirement Benefit reduced according to the following table:

Exhibit A-3: Early Retirement Benefit Reduction Rates, Members Hired before July 1, 2011

	Age At Date Of Retirement															
Years of Service	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**
5-9.99	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	88%	91%	94%	97%	100%
10-19.99	44%	49%	54%	59%	64%	69%	74%	79%	84%	89%	94%	97%	100%	100%	100%	100%
20	50%	55%	60%	65%	70%	75%	80%	91%	94%	97%	100%	100%	100%	100%	100%	100%
21	50%	55%	60%	65%	70%	75%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%
22	50%	55%	60%	65%	70%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%
23	50%	55%	60%	65%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%
24	50%	55%	60%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25	50%	55%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
26	50%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
27	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
28	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
29	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30+	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

If a member has at least 77 points, but less than 80 points, the reduction will be 3% for each unit below 80 for members hired before July 1, 2011.

Exhibit A-4: Early Retirement Benefit Reduction Rates, Members Hired on or after July 1, 2011

	Age At Date Of Retirement															
Years of Service	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**
5-9.99	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	88 %	91 %	94 %	97 %	100 %
10-24.99	44 %	49 %	54 %	59 %	64 %	69 %	74 %	79 %	84 %	89 %	94 %	97 %	100 %	100 %	100 %	100 %
25-29.99	44 %	49 %	54 %	59 %	64 %	69 %	74 %	79 %	84 %	89 %	100 %	100 %	100 %	100 %	100 %	100 %
30+	44 %	49 %	54 %	59 %	64 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

6. Forms of Payment

The normal form of payment is a benefit payable for the life of the member with any remaining member account balance paid at time of death. Joint and contingent, period certain and partial lump sum options are available on an actuarially equivalent basis.

7. Minimum Benefit

The minimum monthly benefit payable to a retired member who is at least age 75 and who has 20 or more years of service is $600.

B. Vesting of Benefits

1. Eligibility

A member is fully vested in his or her accrued benefit.

2. Benefits

Exhibit A-5: Benefits for Vested Members

A fully vested member is entitled to either:

Type of Benefit	Members who are eligible
Enhanced Refund Option	Members hired before July 1, 2011, OR members hired on or before July 1, 2011 that are terminated due to Employer Reduction in Force or position elimination.
Refund Option	Members hired on or after July 1, 2011
Retirement	Members who have reached normal retirement at the date of a member's termination.

The enhanced refund option allows members who terminate prior to eligibility for retirement to receive a refund of their member contributions with interest. In addition, if a member has at least five years of service, he or she is also entitled to a share of the employer contributions with interest. The share is 25% for members with five years of service and increases 15% for each additional year of service up to a maximum of 100% for 10 or more years of service. The ASRS Board reduced the interest rate to be credited on refund of contributions from 8% to 4%, effective June 30, 2005, and from 4% to 2% effective June 30, 2013.

The refund option is the same as the enhanced refund option except it does not include any shares of the employer contributions with interest.

C. Disability Benefits (for disability after June 30, 1988)

1. Long Term Disability Benefit

Monthly benefit equal to two-thirds of monthly compensation, reduced by percentages of other income received payable commencing six months after date of disability until the earlier of:

- Date of cessation of total disability, or
- Normal retirement date.

This benefit is paid by the separate LTD plan.

2. Disability Payments if Member Remains Disabled Through Normal Retirement Date

Monthly benefit member would have received if service had continued to normal retirement date assuming the member's salary remained at the level it was at his or her date of disability, also provided that the amount of total credited service is limited to 30 years unless he or she had more than 30 years at date of disability.

3. Minimum Benefit

The minimum monthly benefit payable to a disabled participant is $50.

D. Pre-retirement Death Refund Alternative

1. Eligibility

Death prior to retirement.

2. Benefits

Any one of the following, at the option of the beneficiary:

Exhibit A-6: Pre-retirement Death Refund Alternatives

Type of Benefit	Description
Lump Sum	Lump sum will equal a) the sum of the member's employee and employer balance plus any service purchase payments, and b) the sum of the member's employee and employer balance plus any supplemental credits transferred from the System to the Plan, with interest.
Retirement	The beneficiary may elect to receive a monthly income, in the single life form, which is actuarially equivalent to the lump sum at 7.5%.

E. Health Insurance Premium Benefit Supplement (HBS)

1. Eligibility

Retirement or disability after five years of credited service and covered by an employer-sponsored group insurance program for which the retired or disabled member must pay part of the cost. Members who elect a refund option are not eligible for this benefit.

2. Benefits

The benefit is payable only with respect to allowable health insurance premiums for which the member is responsible. The maximum benefits for members with 10 or more years of service are:

Exhibit A-7: Premium Benefits, Members with 10 Years of Service

Premium Benefit Payable	Coverage
$ 150	Member Under 65
$ 100	Member 65 and Over
$ 260	Member and Dependents Under 65
$ 170	Member and Dependents 65 and Over
$ 215	Member Over 65, Dependents Under 65
$ 215	Member Under 65, Dependents Over 65

For members with five to nine years of service, the benefits are the same dollar amounts as above multiplied by a vesting fraction equal to 10% for each completed year of service (i.e., 50% to 90%).

F. Automatic Benefits Adjustments Based on Excess Investment Earnings

1. Permanent Benefit Increase (PBI)

Retirees who have been retired one year are eligible for a PBI up to a maximum of a 4% increase. The PBI is paid from a reserve of "Excess Investment Earnings." If there are no "Excess Investment Earnings" in reserve, then no PBI is paid.

2. Permanent Benefit Increase Enhancement (Enhanced PBI)

Provides retired members with at least 10 years of service who have been retired five or more years an additional benefit. For each complete five-year period the member has been retired, an incremental benefit is paid if monies to pay the benefit are available. This benefit is funded by an interest credit of 8.0% of the reserve for future PBIs.

PBI and enhanced PBI benefits are reflected in the valuation as soon as they are awarded. Future PBI and enhanced PBI are not included in the valuation.

Due to legislation enacted in the 2013 legislative session, PBIs and enhanced PBIs will not be awarded to members hired on or after September 13, 2013.

G. Employee and Employer Contributions

The contribution rate for the fiscal year beginning on July 1st is based on the results of the most recent actuarial valuation as of the last day of the preceding plan year. The member's contribution rate is equal to the required employer contribution rate. The contribution rate for fiscal year 2018 is 11.34% for each member and each employer, based on the 2016 actuarial valuation. The member's contribution rate for fiscal year 2019 will be 11.64% based on this valuation. Interest is credited at 8.00%; however, interest is credited at 4% from July 1, 2005 and 2% from July 1, 2013 for return of contributions upon withdrawal.

Please refer to the *Schedule of Employer Contributions – Retirement* in Required Supplementary Information for a history of actuarially determined and actual contributions for the last 10 years.

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on October 27, 2017 based on the Report on the Actuarial Experience Study covering a five-year period from July 1, 2011 to June 30, 2016, dated October 18, 2017.

The ASRS retained Gabriel Roeder Smith & Company for its June 30, 2017 and June 30, 2016 funding valuations.

A. Valuation Date

The valuation date is June 30 of each year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

B. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the total contribution rate is the sum of (i) the normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.50%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

The contributions required to support the benefits of the Plan are determined following a level funding approach and consist of a normal cost contribution and an unfunded accrued liability contribution, plus a component to cover administrative expenses.

The normal contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution, which, if applied to the compensation of each new participant during the entire period of his anticipated covered service, would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf.

The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability. Amortization bases are established each year and amortized based on the funding policy. The current year amortization base is determined by taking the current unfunded liability less the outstanding amounts of prior year bases.

C. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a ten-year phase-in of actual investment return in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment-related expenses.

D. Actuarial Assumptions

1. Investment Return

The investment return rate is 7.5% per year, net of administrative and investment-related expenses (composed of an assumed 2.3% inflation rate and a 5.2% real rate of return). This rate is the same as the rate used to discount the actuarial accrued liability.

2. Mortality Decrements

Service Retirees, Beneficiaries, and Inactive Members

Rates are based on the 2017 State Retirees of Arizona (SRA) mortality table. Generational mortality improvements in accordance with the Ultimate MP (U-MP) scales are projected from the year 2017.

Disability Retirees

Rates are based on the RP-2014 Disabled Retiree Mortality. Generational mortality improvements in accordance with the Ultimate MP scales are projected from the year 2014.

Active Members

Rates are based on the RP-2014 Active Member Mortality table. Generational mortality improvements in accordance with the U-MP scales are projected from the year 2014.

Exhibit A-8: Monthly Decrements

	Males			Females		
Age	Non-disabled	Disabled	Employee	Non-disabled	Disabled	Employee
20	0.000394	0.006899	0.000394	0.000157	0.002165	0.000157
25	0.000470	0.008224	0.000470	0.000168	0.002312	0.000168
30	0.000439	0.007680	0.000439	0.000212	0.002914	0.000212
35	0.000507	0.008887	0.000507	0.000278	0.003822	0.000278
40	0.000609	0.010670	0.000609	0.000384	0.005292	0.000384
45	0.000944	0.016533	0.000944	0.000637	0.008780	0.000637
50	0.001636	0.019789	0.001636	0.001069	0.011553	0.001069
55	0.002705	0.022675	0.002705	0.001623	0.014049	0.001623
60	0.004489	0.025814	0.004549	0.002369	0.016494	0.002369
65	0.007957	0.030744	0.008031	0.004912	0.020240	0.003586
70	0.014104	0.039148	0.013443	0.009209	0.027365	0.006122
75	0.024999	0.052675	0.022499	0.017263	0.039826	0.010448
80	0.044311	0.074340	0.037658	0.032361	0.059223	0.017834

3. Salary Increases

A select and ultimate salary scale made up of a merit component and general salary increase component as follows:

Exhibit A-9: Salary Increases

Years of Service	Merit Component	Total Salary Increase
1	4.50%	7.20%
2	3.50%	6.20%
3	2.75%	5.45%
4	2.25%	4.95%
5	2.00%	4.70%
6	1.75%	4.45%
7	1.50%	4.20%
8	1.10%	3.80%
9	1.00%	3.70%
10	0.90%	3.60%
11	0.80%	3.50%
12	0.70%	3.40%
13	0.60%	3.30%
14	0.50%	3.20%
15	0.40%	3.10%
16	0.30%	3.00%
17	0.20%	2.90%
18	0.20%	2.90%
19	0.10%	2.80%
20 or more	—%	2.70%

[1] Total salary increase rate is equal to wage inflation (or growth) rate (2.70%) plus merit component.

4. Disability Rates

Exhibit A-10: Disability Retirement Decrements

Age	Annual Unisex Rates per 100 Members
20	0.0454
25	0.0502
30	0.0606
35	0.0925
40	0.1468
45	0.2271
50	0.3384
55	0.3970
60	0.4317

5. Termination Decrements for Reasons Other Than Death or Retirement

Termination rates for members not eligible for service retirement, based on years of completed service (rates are zero for members eligible for service retirement):

Exhibit A-11: Rate of Decrement Due to Withdrawal Based on Years of Completed Service

	Entry Age Less Than or Equal to 35		Entry Age Greater Than 35	
Year of Service	Males	Females	Males	Females
0	23.00%	24.30%	17.50%	21.10%
1	18.80%	20.00%	14.80%	17.40%
2	15.70%	16.90%	12.60%	14.60%
3	13.60%	14.70%	11.00%	12.60%
4	11.90%	13.00%	9.80%	11.10%
5	10.50%	11.70%	8.80%	9.90%
6	9.40%	10.50%	8.00%	8.80%
7	8.40%	9.50%	7.20%	7.90%
8	7.50%	8.60%	6.60%	7.10%
9	6.70%	7.80%	6.00%	6.40%
10	6.00%	7.00%	5.50%	5.70%
11	5.30%	6.40%	5.10%	5.10%
12	4.70%	5.80%	4.60%	4.60%
13	4.20%	5.20%	4.20%	4.10%
14	3.70%	4.70%	3.80%	3.60%
15	3.20%	4.20%	N/A	N/A
16	2.70%	3.70%	N/A	N/A
17	2.30%	3.30%	N/A	N/A
18	1.90%	2.90%	N/A	N/A
19	1.50%	2.50%	N/A	N/A
20+	1.10%	2.10%	N/A	N/A

6. Service Retirement Decrements

Select and ultimate retirement rates are used. Rates at representative ages and years of service are shown on the following schedules.

Exhibit A-12: Retirement Rates - Members Hired before July 1, 2011

	Years of Service					
Age	5	10	15	20	25	30
50	6.00%	6.00%	6.00%	6.00%	6.00%	25.00%
55	7.00%	7.00%	7.00%	7.00%	20.00%	25.00%
60	10.00%	10.00%	10.00%	10.00%	15.00%	25.00%
62	15.00%	25.00%	25.00%	25.00%	25.00%	25.00%
65	30.00%	30.00%	30.00%	30.00%	30.00%	25.00%
70	25.00%	27.50%	25.00%	27.50%	25.00%	25.00%
75	27.50%	27.50%	27.50%	27.50%	27.50%	25.00%
80	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Exhibit A-13: Retirement Rates - Members Hired on or after July 1, 2011

	Years of Service						
Age	5	10	15	20	25	30	35
50	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
55	7.00%	7.00%	7.00%	7.00%	7.00%	50.00%	90.00%
60	10.00%	10.00%	10.00%	10.00%	40.00%	65.00%	25.00%
62	15.00%	25.00%	25.00%	25.00%	40.00%	25.00%	25.00%
65	30.00%	30.00%	30.00%	30.00%	30.00%	25.00%	25.00%
70	25.00%	27.50%	25.00%	25.00%	25.00%	25.00%	25.00%
75	27.50%	27.50%	27.50%	27.50%	27.50%	25.00%	25.00%
80	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

7. Withdrawal of Employee Contributions

Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity. If the member is assumed to elect the enhanced refund option, then it is also assumed that the member forfeits the health insurance premium supplement. We assume that members who elect a single life annuity will receive accumulated benefit payments equal to their contributions after three years of being in receipt.

8. Future Retirees Eligible for the Health Insurance Premium Benefit Supplement (HBS)

It is assumed that 60% of future retirees will be eligible to receive the post-retirement health insurance premium supplement and that 40% of those retirees will be eligible for the dependent premium supplement. These assumptions also apply to members who have been retired less than one year.

9. Beneficiary Characteristics

We assume that 100% of the members are married. We also assume that the husband is three years older than the wife.

10. Census Data and Assets

- The valuation was based on members of ASRS as of June 30, 2017 and does not take into account future members.
- All census data was supplied by ASRS and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by ASRS.

11. Other Actuarial Valuation Procedures

- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.
- Valuation payroll (earnings applied to the current valuation year) is the expected payroll for the fiscal year following the valuation date.
- Optional Form Load – A load of 0.174% has been added to the non-retired 401(a) liabilities to account for the election of optional forms other than a single life annuity.
- Alternate Contribution Rate – The past service contribution rate is adjusted to consider alternate contribution rate payments. We reduce the amortization amount by the anticipated amount of alternate contributions, and adjust for interest.
- Adjustment for Contribution Timing – Contribution rates are increased by ½ of a year's interest to reflect the fact that contributions are made throughout the fiscal year and are further adjusted to reflect the one year lag.
- Future Permanent Benefit Increases (PBIs) – Future PBIs are assumed to be 0.30% per year.

Exhibit A-14: Schedule of Active Member Valuation Data - Retirement

Last 10 Years

				Contributing Active Members	
Valuation as of June 30,	Number of Participating Employers	Active Members	Annual Payroll	Annual Average Pay	Increase in Average Pay
2017	574	206,055	$ 9,598,270,045	46,581	2.7%
2016	578	204,162	9,263,859,477	45,375	1.7%
2015	577	203,252	9,072,376,682	44,636	1.8%
2014	585	203,201	8,908,620,792	43,841	1.5%
2013	585	202,693	8,752,783,004	43,182	-0.7%
2012	593	203,994	8,868,678,184	43,475	0.3%
2011	595	208,939	9,060,630,604	43,365	-1.7%
2010	599	213,530	9,419,951,810	44,115	-0.2%
2009	599	222,515	9,834,810,345	44,198	3.1%
2008	586	226,415	9,708,352,896	42,879	4.8%

Exhibit A-15: Schedule of Retirees Added to and Removed from Rolls - Retirement

Last 10 Years

	Retirants and Beneficiaries Added to Rolls		Retirants and Beneficiaries Removed from Rolls		Retirants and Beneficiary Rolls End of Year			
Valuation as of June 30,	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances[1]	% Increase in Annual Allowance	Average Annual Allowances
2017	9,616	$ 200,106,997	3,525	$ 56,592,938	142,117	$ 2,844,042,213	5.3%	$ 20,012
2016	7,887	155,932,683	3,397	54,560,473	136,026	2,700,528,154	3.9%	19,853
2015	8,695	169,138,375	3,414	52,490,287	131,536	2,599,155,944	4.7%	19,760
2014	8,385	160,478,869	3,005	45,575,405	126,255	2,482,507,856	4.9%	19,663
2013	9,489	175,974,484	3,045	47,326,711	120,875	2,367,604,392	5.7%	19,587
2012	9,227	171,972,274	2,792	41,695,405	114,431	2,238,956,619	6.2%	19,566
2011	9,288	179,066,507	2,599	38,511,310	107,996	2,108,679,750	7.1%	19,526
2010	9,360	176,419,906	2,477	35,666,261	101,307	1,968,124,553	7.7%	19,427
2009	7,958	153,218,995	2,490	30,033,184	94,424	1,827,370,908	7.2%	19,353
2008	7,784	148,885,733	2,422	33,418,979	88,956	1,704,185,097	7.3%	19,158

[1] PBIs included here.

Exhibit A-16: Schedule of Retirees Added to and Removed from Rolls - HBS

Last 8 Years[1]

Valuation as of June 30,	Retirants and Beneficiaries Added to Rolls No.	Retirants and Beneficiaries Added to Rolls Annual Allowances	Retirants and Beneficiaries Removed from Rolls No.	Retirants and Beneficiaries Removed from Rolls Annual Allowances	Retirants and Beneficiaries Rolls End of Year No.	Retirants and Beneficiaries Rolls End of Year Annual Allowances	% Increase in Annual Allowance	Average Annual Allowances
2017	9,895	$ 17,824,796	5,831	$ 11,688,084	81,262 [6]	$ 105,731,896	6.2%	1,301
2016	8,132	12,166,768	2,430	10,554,272	77,198 [5]	99,595,184	1.6%	1,290
2015	7,429	15,954,804	3,119	7,965,132	71,496 [4]	97,982,688	8.9%	1,370
2014	5,609	8,620,656	3,350	8,597,436	67,186 [3]	89,993,016	—%	1,339
2013	5,861	9,434,508	4,159	9,127,908	64,927 [2]	89,969,796	0.3%	1,386
2012	5,867	9,754,788	3,285	8,936,184	63,225	89,663,196	0.9%	1,418
2011	6,047	10,459,392	3,199	7,707,744	60,643	88,844,592	3.2%	1,465
2010	5,689	10,358,376	1,821	6,487,680	57,795	86,092,944	4.7%	1,490

[1] Information not available for prior years.

[2] Includes 627 System members receiving HBS benefits and 1,516 members receiving LTD benefits and HBS benefits.

[3] Includes 608 System members receiving HBS benefits and 1,383 members receiving LTD benefits and HBS benefits.

[4] Includes 595 System members receiving HBS benefits and 1,280 members receiving LTD benefits and HBS benefits.

[5] Includes 562 System members receiving HBS benefits and 1,110 members receiving LTD benefits and HBS benefits.

[6] Includes 526 System members receiving HBS benefits and 1,003 members receiving LTD benefits and HBS benefits.

Exhibit A-17: Schedule of Funding Progress - Retirement and HBS

Last 10 Years

Year Ended June 30,	Actuarial Value of Assets (a)	Actuarial Accrued Liabilities (AAL) (b)	Unfunded Actuarial Accrued Liabilities (UAAL) (b - a)	Assets as a % of Accrued Liabilities (a / b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b - a) / c)
2017	$ 36,806,856,334	$ 52,189,000,274	$ 15,382,143,940	70.5%	$ 9,598,270,045	160.3%
2016	35,761,373,386	46,104,924,533	10,343,551,147	77.6%	9,263,859,477	111.7 %
2015	34,559,692,891	44,573,559,015	10,013,866,124	77.5%	9,072,376,682	110.4 %
2014	32,922,116,667	42,826,013,931	9,903,897,264	76.9%	8,908,620,792	111.2 %
2013	31,435,228,262	41,396,575,487	9,961,347,225	75.9%	8,752,783,004	113.8 %
2012	30,229,577,272	39,952,371,191	9,722,793,919	75.7%	8,868,678,184	109.6%
2011	29,230,960,267	38,555,369,013	9,324,408,746	75.8%	9,060,630,604	102.9%
2010	28,823,144,688	37,557,862,066	8,734,717,378	76.7%	9,419,951,810	92.7%
2009	28,360,159,450	35,742,538,572	7,382,379,122	79.3%	9,834,810,345	75.1%
2008	27,851,825,730	33,870,864,745	6,019,039,015	82.2%	9,708,352,896	62.0%

Exhibit A-18: Solvency Test - Retirement

Last 10 Years

Year Ended June 30,	Aggregate Accrued Liabilities for: Active Member Contributions (1)	Retirees and Beneficiaries (2)	Active Members (Employer Financed Portion) (3)	Actuarial Value of Assets Available for Benefits	Portion of Actuarial Accrued Liabilities Covered by Assets Available for Benefits (1)	(2)	(3)
2017	$ 13,581,097,101	$ 29,520,334,512	$ 7,517,329,299	$ 35,268,099,197	100%	73.0%	—%
2016	12,699,053,783	26,593,566,522	5,242,386,763	34,269,819,276	100%	81.0%	—%
2015	11,714,896,096	25,757,665,962	5,495,566,397	33,112,994,638	100%	83.1%	—%
2014	10,780,693,824	24,689,077,682	5,879,545,497	31,547,987,085	100%	84.1%	—%
2013	9,917,301,188	23,684,426,598	6,310,027,446	30,110,632,566	100%	85.3%	—%
2012	9,110,894,718	21,699,459,353	7,639,934,669	28,948,010,913	100%	91.4%	—%
2011	8,374,149,814	20,541,081,742	8,135,947,783	27,983,517,225	100%	95.5%	—%
2010[1]	7,704,328,621	19,246,476,421	9,121,714,675	27,571,999,406	100%	100%	6.8%
2009	7,054,925,502	17,455,947,713	9,779,242,657	27,093,788,614	100%	100%	26.4%
2008	6,256,502,949	16,357,773,654	9,810,200,566	26,612,440,139	100%	100%	40.8%

[1] 2010 and subsequent years results include System liabilities and assets for members who retired or will retire on or after July 1, 1981.

Exhibit A-19: Solvency Test - HBS

Last 10 Years

Year Ended June 30,	Aggregate Accrued Liabilities for: Active Member Contributions (1)	Retirees and Beneficiaries (2)	Active Members (Employer Financed Portion) (3)	Actuarial Value of Assets Available for Benefits	Portion of Actuarial Accrued Liabilities Covered by Assets Available for Benefits (1)	(2)	(3)
2017	$ —	$ 863,850,246	$ 706,389,116	$ 1,538,757,137	100%	100%	96.0%
2016	—	802,948,944	766,968,521	1,491,554,110	100%	100%	90.0%
2015	—	833,901,538	771,529,022	1,446,698,253	100%	100%	79.4%
2014	—	734,450,033	742,246,895	1,374,129,582	100%	100%	86.2%
2013	—	738,731,217	746,089,038	1,324,596,696	100%	100%	78.5%
2012	—	674,713,116	827,369,335	1,281,566,359	100%	100%	73.3%
2011	—	669,593,178	834,596,496	1,247,433,042	100%	100%	69.2%
2010	—	652,876,059	832,466,290	1,251,145,282	100%	100%	71.9%
2009	—	627,536,754	824,885,946	1,266,370,836	100%	100%	77.4%
2008	—	619,808,594	826,578,982	1,239,385,591	100%	100%	75.0%

Exhibit A-20: Analysis of Financial Experience - Retirement

Last 10 Years

(Dollars in millions)

Year Ended June 30,[3]	Unfunded Actuarial Accrued Liability (UAAL) Prior Year	Normal Cost for the Year	Contributions for the Year	Interest at 8% on UAAL	Interest at 8% on Normal Cost[2]	Interest at 8% on Contributions	Total Interest	Expected UAAL	Actual UAAL	Gain (Loss) for the Year[1]
2017	$ 10,265.19	$ 1,191.16	$ (2,094.15)	$ 821.22	$ 95.29	$ (83.77)	$ 832.74	$10,194.94	$15,350.66	$ 5,155.72
2016	9,855.13	1,128.18	(2,028.74)	788.41	90.25	(81.15)	797.52	9,752.08	10,265.19	(513.11)
2015	9,801.33	1,161.38	(2,056.69)	784.11	46.46	(82.27)	748.30	9,654.32	9,855.13	(200.81)
2014	9,801.12	1,143.11	(1,961.18)	784.09	45.72	(78.45)	751.36	9,734.41	9,801.33	(66.92)
2013	9,502.28	1,164.58	(1,859.21)	760.18	93.17	(74.37)	778.98	9,586.63	9,801.12	(214.49)
2012	9,067.66	1,170.47	(1,758.02)	725.41	93.64	(70.32)	748.73	9,228.84	9,502.28	(273.44)
2011	8,500.52	1,215.14	(1,619.79)	680.04	97.21	(64.79)	712.46	8,808.33	9,067.66	(259.33)
2010	7,196.33	1,234.67	(1,571.82)	575.71	98.77	(62.87)	611.61	7,470.79	8,500.52	(1,029.73)
2009	5,812.04	1,205.10	(1,598.33)	464.96	96.41	(63.93)	497.44	5,916.24	7,196.33	(1,280.08)
2008	5,080.59	1,165.17	(1,616.67)	406.45	93.21	(64.67)	434.99	5,064.08	5,812.04	(747.96)

[1] Gain/Loss includes assumption and plan changes.

[2] Middle of year in 2014 and 2015, beginning of year otherwise.

[3] Values shown for valuation dates on or after June 30, 2010, for the above two schedules, include System assets and liabilities for members who retired or will retire on or after July 1, 1981.

Exhibit A-21: Analysis of Financial Experience - HBS

Last 10 Years

(Dollars in millions)

Year Ended June 30,[3]	Unfunded Actuarial Accrued Liability (UAAL) Prior Year	Normal Cost for the Year	Contributions for the Year	Interest at 8% on UAAL	Interest at 8% on Normal Cost[2]	Interest at 8% on Contributions	Total Interest	Expected UAAL	Actual UAAL	Gain (Loss) for the Year[1]
2017	$ 78.36	$ 30.87	$ (51.05)	$ 6.27	$ 2.47	$ (2.04)	$ 6.70	$ 64.87	$ 31.48	$ 33.39
2016	158.73	30.95	(51.14)	12.70	2.48	(2.05)	13.13	151.67	78.36	73.31
2015	102.57	33.27	(73.56)	8.20	1.33	(2.14)	7.39	69.67	158.74	(89.07)
2014	160.23	34.05	(53.40)	12.82	1.36	(2.14)	12.04	152.92	102.57	50.35
2013	220.51	35.54	(57.16)	17.64	2.84	(2.28)	18.20	217.09	160.23	56.86
2012	256.75	38.42	(54.46)	20.54	3.07	(2.18)	21.43	262.14	220.51	41.63
2011	234.20	40.28	(51.05)	18.74	3.22	(2.04)	19.92	243.35	256.75	(13.40)
2010	186.05	41.88	(59.39)	14.88	3.35	(2.38)	15.85	184.39	234.20	(49.81)
2009	207.00	46.38	(90.48)	16.56	3.71	(3.62)	16.65	179.55	186.05	(6.50)
2008	438.39	53.73	(99.03)	35.07	4.30	(3.96)	35.41	428.50	207.00	221.50

[1] Gain/Loss includes assumption and plan changes.

[2] Middle of year in 2014 and 2015, beginning of year otherwise.

[3] Values shown for valuation dates on or after June 30, 2010, for the above two schedules, include System assets and liabilities for members who retired or will retire on or after July 1, 1981.

GRS Retirement Consulting

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October 15, 2018

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

Re: Arizona State Retirement System Actuarial Certification for the Long Term Disability Program

Members of the Board:

At the request of the Arizona State Retirement System (ASRS), Gabriel Roeder Smith & Company (GRS) has performed the actuarial valuation of the benefits associated with the ASRS Long Term Disability Program (LTD Program) as of June 30, 2017. The information in the Actuarial Section is based on our annual actuarial valuation reports, with the most recent valuations conducted as of June 30, 2017, and is intended to be used in conjunction with the full reports.

This letter and the schedules listed below represent GRS' certification of the funded status as required for the financial report for the fiscal year ended June 30, 2018. GRS prepared the following schedules (information prior to 2016 was provided by ASRS):

- Exhibit F-28: Net OPEB Liability of Employers - LTD
- Exhibit F-31: Discount Rate Sensitivity - LTD
- Exhibit F-40: Schedule of Changes in the Net OPEB Liability - LTD
- Exhibit F-41: Schedule of Net OPEB Liability - LTD
- Exhibit F-42: Schedule of Employer Contributions - LTD
- Exhibit A-24: Schedule of Benefit Recipients Added to and Removed from Rolls - LTD
- Exhibit A-25: Schedule of Funding Progress - LTD
- Exhibit A-26: Solvency Test - LTD
- Exhibit A-27: Analysis of Financial Experience - LTD

Data

The valuation was based upon information as of June 30, 2017, furnished by ASRS staff, concerning system benefits, financial transactions, plan provisions, active members, and benefit recipients. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by ASRS staff.

The active member data used for the LTD Program valuation is the same as the active member data used in the June 30, 2017 actuarial valuation of the ASRS Plan.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on October 27, 2017 based on the Report on the Actuarial Experience Study covering a five-year period from July 1, 2011 to June 30, 2016, dated October 18, 2017. The notable assumption and method changes reflected in this actuarial valuation include:

- Changing the actuarial cost method to the Entry Age Normal actuarial cost method,
- Lowering nominal investment return assumption to 7.50%,
- Updating the recovery rates to a version of the 2012 Group Long Term Disability Valuation Table (2012 GLDT)
- Updating the offset methodology for current LTD recipients to assume members will have a minimum offset of 30% within three years of initial receipt of LTD benefits. Offsets due to overpayments will apply until the overpayments are expected to be fully recovered based on the data received from the plan administrator.
- Updating the offset methodology for future LTD recipients such that the benefits, after all applicable offsets, are 60% of the benefits before the offsets.

We believe the assumptions are internally consistent and are reasonable, based on the actual experience of ASRS.

Furthermore, the assumption for administrative expenses included in the normal cost was updated to $174,000 to reflect the most recent fee schedule.

The results of the actuarial valuation are dependent upon the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. A review of the impact of a different set of assumptions on the funded status of ASRS is outside the scope of this actuarial valuation.

The current actuarial assumptions are outlined in the section titled “Statement of Actuarial Methods and Assumptions - LTD.”

Benefits

There were no changes to the plan provisions during the past year. The current benefit provisions are outlined in the section titled “Summary of the Benefit Provisions - LTD.”

Funding Policy and Objectives

The financial objectives of the LTD Program are to: (1) maintain reasonably stable contribution rates, and (2) achieve an ultimate funded status of 100%. In order to achieve these objectives, the Board has adopted a closed 15-year amortization period with level-dollar payments. Furthermore, the Board made the policy decision to phase in the impact to the contribution of the assumption changes over a five year period. This policy provides for a smooth transition to the ultimate contribution rates over a reasonable period of time.

The actuarial valuation includes a calculation of the contribution rates payable by members and participating employers. These rates, when applied to payroll, yield contribution amounts sufficient to fund the normal cost plus the amortization of the unfunded actuarial accrued liability. Contribution rates are set annually, based on the valuation of the preceding year. The rate calculated in this report (0.32% of payroll) will apply in the fiscal year beginning July 1, 2018. The rate calculated are part of the prior valuation (0.32% of payroll) applied in the fiscal year that began July 1, 2017. Employers and employees share equally in the contribution rate determined as part of the valuation. The primary source of increase in the total contribution rate is the demographic losses on the disabled members which include emerging benefit offsets that are reducing the benefit less than currently assumed in the valuation.

The unfunded actuarial accrued liability (UAAL) of the LTD Program decreased from $95.4 million as of June 30, 2016 to $48.5 million as of June 30, 2017. Additionally, the funded ratio—actuarial value of assets divided by the actuarial accrued liability—increased from 70.1% to 80.4% as of June 30, 2017. The funded status is one of many metrics used to show trends and develop future expectations about the health of an advanced funded program. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Governmental Accounting Standards Board, the Internal Revenue Code and ERISA.

The signing actuaries are independent of the plan sponsor. Ryan Falls and Joe Newton are Enrolled Actuaries, Fellows of the Society of Actuaries, and Members of the American Academy of Actuaries and Paul Wood is an Associate of the Society of Actuaries and a Member of the American Academy of Actuaries. All three meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

R. Ryan Falls, FSA, EA, MAAA
Senior Consultant

Joseph P. Newton, FSA, EA, MAAA
Senior Consultant

Paul T. Wood, ASA, FCA, MAAA
Consultant

The ASRS LTD Program began on July 1, 1995. The program covers ASRS LTD Program participants who become disabled on or after July 1, 1995. The ASRS members who were receiving LTD benefits prior to July 1, 1995, were transferred to the program on October 1, 1995. Contributions began July 1, 1995, and are paid 50% by employers and 50% by active members.

Participation

To be eligible, members must be actively at work and engaged to work at least 20 weeks in a fiscal year and at least 20 hours each week. Coverage is contingent on payment of premiums.

Member and Employer Contributions

The contribution rate for the fiscal year beginning on July 1st is based on the results of the most recent actuarial valuation as of the last day of the preceding plan year. The member's contribution rate is equal to the required employer contribution rate. The contribution rate for fiscal year 2018 is 0.16% for each member and each employer, based on the 2016 actuarial valuation.

Monthly Compensation

The member's monthly compensation as of the date of disability is determined based on the contributions remitted to the ASRS.

Qualifications for Benefit

Monthly benefits are not payable until a member has been totally disabled for a period of six consecutive months. Monthly benefits are not payable to a member whose disability is due to the following:

- an intentionally self-inflicted injury,
- war, whether declared or not,
- an injury incurred while engaged in a felonious criminal act or enterprise,
- for employees hired on or after July 1, 1998, any injury, sickness, or pregnancy for which you received medical treatment within three months prior to the effective date coverage began under the LTD Income Plan. Except for any employee who becomes an active contributing member on or after July 1, 2008 and receives medical treatment within six months prior to the date coverage begins under the LTD Income Plan. This exclusion does not apply to a disability commencing after a person has been an active contributing member of a participating employer for twelve continuous months.

Monthly benefits are not payable to a member who is receiving retirement benefits from the ASRS.

Totally Disabled

A member is considered totally disabled if:

- during the first 30 months of a period of disability, the member is unable to perform all duties of the position held by the member when the member became totally disabled; and
- for a member who has received monthly benefits for 24 or more total months, that a member is unable to perform any work for compensation or gain for which the member is reasonably qualified by education, training, or experience.

Benefit Amount

Benefits payable from the LTD Fund equal two-thirds of a member's monthly compensation at the time of disability. Benefits are offset by:

- 85% of social security disability benefits that the member or the member's dependents are eligible to receive;
- 85% of social security retirement benefits that the member is eligible to receive;
- all of any worker's compensation benefits;
- all of any payments for a veteran's disability if both of the following apply:

- the veteran's disability payment is for the same condition or a condition related to the condition currently causing the member's total disability; and
- the veteran's disability is due to service in the armed forces of the United States;

- all of any other benefits by reason of employment that are financed partly or wholly by an employer, including payments for sick leave; and
- 50% of any salary, wages, commissions, or similar pay that the member receives or is entitled to receive from any gainful employment in which the member engages.

Benefit Period

Monthly benefits cease to be payable to a member at the earliest of the following:

- the date the member ceases to be totally disabled;
- the date the member ceases to be under the direct care of a doctor or refuses to undergo any medical examination requested by the company selected by the Board to administer the LTD Program;
- the date the member withdraws employee contributions with interest and ceases to be a member; and
- the later of following:
  - the member's normal retirement date;
  - the month following 60 months of payments if disability occurs before age 65;
  - the month following attainment of age 70 if disability occurs at age 65 or after but before age 69; or
  - the month following 12 months of payments if disability occurs at or after age 69.

Administrative Expenses

Administrative Expenses associated with the operation of the LTD Program are payable by the LTD Program. The fee schedule is as follows:

Exhibit A-22: LTD Program Fees

Account Management Fee:	$174,000 per year
New Claims Fee:	$364 per claim
Claims Management Fee:	$26 per claim per month

A. Valuation Date

The valuation date is June 30 of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

B. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the total contribution rate is the sum of (i) the normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.50%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

The contributions required to support the benefits of the LTD Program are determined following a level funding approach and consist of a normal cost contribution and an unfunded accrued liability contribution, plus a component to cover administrative expenses.

The normal contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each new participant during the entire period of his anticipated covered service, would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf.

The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability. Amortization bases are established each year and amortized based on the funding policy. The current year amortization base is determined by taking the current unfunded liability less the outstanding amounts of prior year bases.

C. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a ten-year phase-in of actual investment return in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of investment-related expenses.

D. Actuarial Assumptions

1. Investment Return

7.50% per year, net of investment related expenses (composed of an assumed 2.3% inflation rate and a 5.2% real rate of return).

2. Decrement Timing

All decrements are assumed to occur at the middle of the valuation year.

3. Disability Retirement Decrements

Exhibit A-23: Disability Retirement Decrements

	Annual Rates per 100 Members
Age	**Unisex**
20	0.0454
25	0.0502
30	0.0606
35	0.0925
40	0.1468
45	0.2271
50	0.3384
55	0.3970
60	0.4317

4. Termination of Claims in Payment Due to Death or Recovery

The 2012 Group Long Term Disability Valuation Table (2012 GLDT) as proposed by the Society of Actuaries' Group Disability Experience Committee for use by the National Association of Insurance Commissioners. Specifically, rates applicable to plans with a six-month elimination period, "Own Occupation" definition of disability, initial maximum guaranteed benefit of $2,000 for active members and actual initial maximum guaranteed benefit for current LTD recipients , "No Diagnosis" cause of disability, 15% margin for recovery, 27% margin for deaths.

5. Offsets for Disabled Members

Members will have a minimum offset of 30% within three years of initial receipt of LTD benefits. Offsets due to overpayments will apply until the overpayments are expected to be fully recovered based on the data received from the plan administrator.

6. Offsets for Active Members

The valuation assumes that LTD Program benefits, after all applicable offsets, are 60% of the benefits before the offsets.

7. Incurred But Not Reported (IBNR)

The liability for new LTD recipients was loaded by 20% to reflect IBNR.

8. Census Data and Assets

- The valuation was based on members of ASRS as of June 30, 2017 and does not take into account future members.
- All census data was supplied by ASRS and was subject to reasonable consistency checks.
- Asset data was supplied by ASRS.

9. Administrative Expenses

Administrative expenses, based on the amounts outlined in the Plan Provisions, are incorporated into the normal cost and actuarial accrued liability as follows:

- The account management fee is explicitly included with the normal cost,
- The new claims fee is included in the active member liability, and
- The claims management fee is included in both the active member liability and the reserve for open claims.

10. Other Actuarial Valuation Procedures

- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.
- Valuation payroll (earnings applied to the current valuation year) is the expected payroll for the fiscal year following the valuation date.
- Adjustment for Contribution Timing – Contribution rates are increased by ½ of the year's interest to reflect the fact that contributions are made throughout the fiscal year and are further adjusted to reflect the one year lag.

Exhibit A-24: Schedule of Benefit Recipients Added to and Removed from Rolls - LTD

Last 10 Years

Valuation as of June 30,	Members Added to Rolls No.	Members Added to Rolls Annual Allowances[1]	Members Removed from Rolls No.	Members Removed from Rolls Annual Allowances[2]	Members Rolls End of Year No.	Members Rolls End of Year Annual Allowances[1]	% Increase in Annual Allowance	Average Annual Allowances
2017	461	$ 11,239,256	724	$ 12,619,897	3,534	$ 59,915,860	(2.3)%	$ 16,954
2016	538	11,688,516	743	13,500,123	3,797	61,296,501	(2.9)%	16,143
2015	522	10,914,070	726	13,155,382	4,002	63,108,108	(3.4)%	15,769
2014	658	13,947,128	759	14,675,124	4,206	65,349,420	(1.1)%	15,537
2013	735	15,094,316	868	17,168,470	4,307	66,077,416	(3.0)%	15,342
2012	709	14,394,030	878	16,419,214	4,440	68,151,570	(2.9)%	15,349
2011	752	15,000,150	867	18,071,429	4,609	70,176,754	(4.2)%	15,226
2010	789	17,200,407	777	15,066,829	4,724	73,248,033	3.0 %	15,506
2009	723	15,966,067	893	13,502,776	4,712	71,114,455	3.6 %	15,092
2008	640	12,610,021	829	16,270,484	4,882	68,651,164	(5.1)%	14,062

[1] Reflects actual, but not assumed, benefit offsets. Does not include overpayment offsets.

[2] Includes changes in benefit amounts.

Exhibit A-25: Schedule of Funding Progress - LTD

Last 10 Years

(Dollars in thousands)

Year Ended June 30,	Actuarial Value of Assets (a)	Actuarial Accrued Liabilities (AAL) (b)	Unfunded Actuarial Accrued Liabilities (UAAL) (b - a)	Assets as a % of Accrued Liabilities (a / b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b - a) / c)
2017	$ 198,883	$ 247,356	$ 48,473	80.40%	$ 9,598,270	0.50%
2016	223,464	318,840	95,376	70.10%	9,263,859	1.00%
2015	253,470	320,624	67,154	79.06%	9,072,377	0.70%
2014	279,560	328,928	49,368	84.99%	8,908,621	0.60%
2013	285,018	332,597	47,579	85.69%	8,752,783	0.50%
2012	295,786	439,706	143,920	67.27%	8,868,678	1.60%
2011	307,537	455,695	148,158	67.49%	9,060,631	1.60%
2010	319,308	477,266	157,958	66.90%	9,419,952	1.70%
2009	311,232	476,276	165,044	65.35%	9,834,810	1.70%
2008	274,902	553,185	278,283	49.69%	9,708,353	2.90%

Exhibit A-26: Solvency Test - LTD

Last 10 Years

(Dollars in thousands)

	Aggregate Accrued Liabilities for:				Portion of Actuarial Accrued Liabilities Covered by Assets Available for Benefits		
Year End June 30,	Active Member Contributions (1)	Retirees and Beneficiaries (2)	Active Members (Employer Financed Portion) (3)	Actuarial Value of Assets Available for Benefits	(1)	(2)	(3)
2017	$ —	$ 194,328	$ 53,028	$ 198,883	100%	100%	9%
2016	—	189,940	128,900	223,464	100%	100%	26%
2015	—	193,129	127,495	253,470	100%	100%	47%
2014	—	202,999	125,929	279,560	100%	100%	61%
2013	—	207,331	125,265	285,018	100%	100%	62%
2012	—	224,090	215,616	295,786	100%	100%	33%
2011	—	234,155	221,540	307,537	100%	100%	33%
2010	—	242,098	235,168	319,308	100%	100%	33%
2009	—	235,921	240,355	311,232	100%	100%	31%
2008	—	233,871	319,315	274,902	100%	100%	13%

Exhibit A-27: Analysis of Financial Experience - LTD

Last 10 Years

(Dollars in thousands)

Year Ended June 30,	Unfunded Actuarial Accrued Liability (UAAL) Prior Year	Normal Cost for the Year[1]	Contributions for the Year	Interest at 8% on UAAL	Interest at 8% on Normal Cost	Interest at 8% on Contributions	Total Interest	Expected UAAL	Actual UAAL	Gain (Loss) for the Year[2]
2017	$ 95,375	$ 17,985	$ (26,948)	$ 7,630	$ 1,439	$ (1,078)	$ 7,991	$ 94,403	$ 48,473	$ 45,930
2016	67,154	16,188	(22,153)	5,372	1,295	(886)	5,781	66,970	95,376	(28,406)
2015	49,368	16,377	(21,624)	3,950	655	(865)	3,740	47,861	67,154	(19,293)
2014	47,579	15,925	(42,779)	3,806	637	(1,711)	2,732	23,457	49,368	(25,911)
2013	143,920	25,723	(42,217)	11,514	2,058	(1,689)	11,883	139,309	47,579	91,730
2012	148,158	28,165	(41,997)	11,853	2,253	(1,680)	12,426	146,752	143,920	2,832
2011	157,958	30,456	(43,379)	12,637	2,437	(1,735)	13,339	158,374	148,158	10,216
2010	165,044	33,520	(71,877)	13,204	2,682	(2,875)	13,011	139,698	157,958	(18,260)
2009	278,283	46,424	(94,425)	22,263	3,714	(3,777)	22,200	252,482	165,044	87,438
2008	372,800	47,774	(94,342)	29,824	3,822	(3,774)	29,872	356,104	278,283	77,821

[1] Middle of year in 2014 and 2015, beginning of year otherwise.

[2] Includes plan or assumption changes as well as the gain/(loss) due to the difference between the expected and actual benefit payments. The cumulative net gain since July 1, 2004 is $219,458 thousand. This gain/(loss) calculation does not include administrative expenses.

Legislated Plan Changes Enacted by the 2017 Legislature of the State of Arizona

HB2167 (2017) establishes Internal Revenue Code conforming language to A.R.S. § 38-738 for the purposes of employer credits and contributions not withheld. Additionally, stipulates that a member who previously received a return of contribution may only receive an adjustment of employer contributions or service credits for qualifying employment and compensation occurring after the member's most recent return of contributions. *Effective Date: August 9, 2017*

SB1052 (2017) requires the ASRS to withhold any overpayments and federally required taxes from a member's Partial Lump Sum distribution or return of contributions before distributing funds to the member. *Effective Date: August 9, 2017*

Statistical Section

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Overview

The Statistical Section presents detailed information as a context for understanding what the information in the financial statements, note disclosures, and required summary information says about the ASRS' overall financial health.

Financial Trends Information

The following schedules contain trend information to help the reader understand how the ASRS' Financial Performance has changed over the past 10 years.

- Fiduciary Net Position – *Last Ten Fiscal Years*
- Changes in Fiduciary Net Position – *Last Ten Fiscal Years*

Revenues Information

These schedules contain information to help the reader understand the ASRS' funding over the last 10 years.

- Actual Contribution Rates – *Last Ten Fiscal Years*

Operating Information

These schedules contain information about the ASRS' Operations.

- Retired Members by Type of Benefit
- HBS Recipients by Benefit Amount
- LTD Recipients by Benefit Amount
- Average Benefit Payments – Retirement – *Last Ten Fiscal Years*
- Average Benefit Payments – HBS – *Last Ten Fiscal Years*
- Average Benefit Payments – LTD – *Last Ten Fiscal Years*
- Principal Participating Employers – *Current Year and Nine Years Ago*

Exhibit S-1: Fiduciary Net Position

Last 10 Fiscal Years

(Dollars in thousands)

Retirement Fund	2018	2017	2016	2015
Assets				
Cash, Receivables, and Prepaids	$ 550,205	$ 415,862	$ 975,712	$ 261,074
Investments	38,133,864	35,888,458	32,387,540	33,469,479
Securities Lending Cash Collateral	104,082	166,870	275,684	301,892
Total Assets	**38,788,151**	**36,471,190**	**33,638,936**	**34,032,445**
Liabilities				
Investments Payable	43,406	35,202	469,063	40,795
Securities Lending Payable	104,082	166,870	275,684	301,892
Other Payables	148,714	66,362	34,398	44,112
Total Liabilities	**296,202**	**268,434**	**779,145**	**386,799**
Net position restricted for benefits	**$ 38,491,949**	**$ 36,202,756**	**$ 32,859,791**	**$ 33,645,646**
HBS Fund				
Assets				
Cash, Receivables, and Prepaids	$ 155,594	$ 35,777	$ 56,133	$ 48,294
Investments	1,657,666	1,677,892	1,509,046	1,528,013
Securities Lending Cash Collateral	4,524	7,274	11,805	12,838
Total Assets	**1,817,784**	**1,720,943**	**1,576,984**	**1,589,145**
Liabilities				
Investments Payable	1,887	1,534	20,226	1,709
Securities Lending Payable	4,524	7,274	11,805	12,838
Other Payables	20,566	19,577	886	1,303
Total Liabilities	**26,977**	**28,385**	**32,917**	**15,850**
Net position restricted for benefits	**$ 1,790,807**	**$ 1,692,558**	**$ 1,544,067**	**$ 1,573,295**
LTD Fund				
Assets				
Cash, Receivables, and Prepaids	$ 7,283	$ 9,780	$ 8,450	$ 7,807
Investments	176,825	187,148	198,281	239,711
Securities Lending Cash Collateral	483	—	—	—
Total Assets	**184,591**	**196,928**	**206,731**	**247,518**
Liabilities				
Investments Payable	201	—	—	—
Securities Lending Payable	483	—	—	—
Other Payables	463	230	337	245
Total Liabilities	**1,147**	**230**	**337**	**245**
Net position restricted for benefits	**$ 183,444**	**$ 196,698**	**$ 206,394**	**$ 247,273**
Total				
Assets				
Cash, Receivables, and Prepaids	$ 713,082	$ 461,419	$ 1,040,295	$ 317,175
Investments	39,968,355	37,753,498	34,094,867	35,237,203
Securities Lending Cash Collateral	109,089	174,144	287,489	314,730
Total Assets	**40,790,526**	**38,389,061**	**35,422,651**	**35,869,108**
Liabilities				
Investments Payable	45,494	36,736	489,289	42,504
Securities Lending Payable	109,089	174,144	287,489	314,730
Other Payables	169,743	86,169	35,621	45,660
Total Liabilities	**324,326**	**297,049**	**812,399**	**402,894**
Net position restricted for benefits	**$ 40,466,200**	**$ 38,092,012**	**$ 34,610,252**	**$ 35,466,214**

Exhibit S-1: Fiduciary Net Position (Continued)

Last 10 Fiscal Years

(Dollars in thousands)

2014	2013	2012	2011	2010	2009
$ 593,804	$ 1,062,311	$ 1,006,349	$ 1,056,204	$ 975,021	$ 867,888
33,830,285	29,210,762	26,200,038	27,067,837	22,360,742	20,103,858
14,784	14,812	47,958	843,461	2,259,400	3,275,929
34,438,873	**30,287,885**	**27,254,345**	**28,967,502**	**25,595,163**	**24,247,675**
693,459	1,172,209	747,257	1,242,985	1,144,791	1,037,199
14,784	14,812	47,958	843,461	2,259,400	3,275,929
36,925	75,434	57,036	41,833	44,012	54,094
745,168	**1,262,455**	**852,251**	**2,128,279**	**3,448,203**	**4,367,222**
$ 33,693,705	**$ 29,025,430**	**$ 26,402,094**	**$ 26,839,223**	**$ 22,146,960**	**$ 19,880,453**
$ 60,353	$ 75,951	$ 79,217	$ 52,196	$ 48,532	$ 45,385
1,527,258	1,313,601	1,175,794	1,199,182	1,000,042	900,023
643	648	2,112	37,432	101,132	146,694
1,588,254	**1,390,200**	**1,257,123**	**1,288,810**	**1,149,706**	**1,092,102**
30,095	51,288	32,910	55,162	51,242	46,445
643	648	2,112	37,432	101,132	146,694
1,274	2,930	19,282	1,487	1,737	1,770
32,012	**54,866**	**54,304**	**94,081**	**154,111**	**194,909**
$ 1,556,242	**$ 1,335,334**	**$ 1,202,819**	**$ 1,194,729**	**$ 995,595**	**$ 897,193**
$ 6,864	$ 7,254	$ 7,172	$ 6,371	$ 6,808	$ 11,998
278,932	255,636	250,594	274,734	243,823	215,151
—	—	—	—	—	—
285,796	**262,890**	**257,766**	**281,105**	**250,631**	**227,149**
—	—	—	—	—	—
—	—	—	—	—	—
280	270	443	250	252	4,341
280	**270**	**443**	**250**	**252**	**4,341**
$ 285,516	**$ 262,620**	**$ 257,323**	**$ 280,855**	**$ 250,379**	**$ 222,808**
$ 661,021	$ 1,145,516	$ 1,092,738	$ 1,114,771	$ 1,030,361	$ 925,271
35,636,475	30,779,999	27,626,426	28,541,753	23,604,607	21,219,032
15,427	15,460	50,070	880,893	2,360,532	3,422,623
36,312,923	**31,940,975**	**28,769,234**	**30,537,417**	**26,995,500**	**25,566,926**
723,554	1,223,497	780,167	1,298,147	1,196,033	1,083,644
15,427	15,460	50,070	880,893	2,360,532	3,422,623
38,479	78,634	76,761	43,570	46,001	60,205
777,460	**1,317,591**	**906,998**	**2,222,610**	**3,602,566**	**4,566,472**
$ 35,535,463	**$ 30,623,384**	**$ 27,862,236**	**$ 28,314,807**	**$ 23,392,934**	**$ 21,000,454**

Exhibit S-2: Changes in Fiduciary Net Position

Last 10 Fiscal Years

(Dollars in thousands)

Retirement Fund	2018	2017	2016	2015
Additions				
Member Contributions	$ 1,099,663	$ 1,079,257	$ 1,036,714	$ 1,031,954
Employer Contributions	1,085,033	1,053,198	1,015,974	1,004,747
Purchased Service/Transfers	22,411	14,649	25,466	20,702
Net Investment Income (Loss)	3,414,623	4,406,942	222,906	849,160
Total Additions (Reductions)	**5,621,730**	**6,554,046**	**2,301,060**	**2,906,563**
Deductions				
Benefits	$ 3,045,450	$ 2,931,860	$ 2,804,531	$ 2,671,496
Refunds and Transfers	259,776	250,578	259,323	256,243
Administration and Other	27,311	28,643	23,061	26,883
Total Deductions	**3,332,537**	**3,211,081**	**3,086,915**	**2,954,622**
Net change	**2,289,193**	**3,342,965**	**(785,855)**	**(48,059)**
Fiduciary net position, beginning of year	36,202,756	32,859,791	33,645,646	33,693,705
Net position restricted for benefits	**$ 38,491,949**	**$ 36,202,756**	**$ 32,859,791**	**$ 33,645,646**
HBS Fund				
Additions				
Employer Contributions	$ 42,976	$ 53,914	$ 46,046	$ 53,586
Other Income	2,225	—	8,455	31,507
Net Investment Income (Loss)	150,380	191,591	12,024	39,022
Total Additions (Reductions)	**195,581**	**245,505**	**66,525**	**124,115**
Deductions				
Benefits	96,098	95,720	94,754	105,913
Administration and Other	1,234	1,294	999	1,149
Total Deductions	**97,332**	**97,014**	**95,753**	**107,062**
Net change	**98,249**	**148,491**	**(29,228)**	**17,053**
Fiduciary net position, beginning of year	1,692,558	1,544,067	1,573,295	1,556,242
Net position restricted for benefits	**$ 1,790,807**	**$ 1,692,558**	**$ 1,544,067**	**$ 1,573,295**
LTD Fund				
Additions				
Member Contributions	$ 15,512	$ 13,342	$ 10,990	$ 10,725
Employer Contributions	15,902	13,606	11,162	10,899
Net Investment Income (Loss)	14,760	22,021	(387)	3,722
Total Additions (Reductions)	**46,174**	**48,969**	**21,765**	**25,346**
Deductions				
Benefits	57,664	56,525	60,065	61,045
Administration and Other	1,764	2,140	2,579	2,544
Total Deductions	**59,428**	**58,665**	**62,644**	**63,589**
Net change	**(13,254)**	**(9,696)**	**(40,879)**	**(38,243)**
Fiduciary net position, beginning of year	196,698	206,394	247,273	285,516
Net position restricted for benefits	**$ 183,444**	**$ 196,698**	**$ 206,394**	**$ 247,273**
Total				
Additions				
Member Contributions	$ 1,115,175	$ 1,092,599	$ 1,047,704	$ 1,042,679
Employer Contributions	1,143,911	1,120,718	1,073,182	1,069,232
Other Income	2,225	—	8,455	31,507
Purchased Service/Transfers	22,411	14,649	25,466	20,702
Net Investment Income (Loss)	3,579,763	4,620,554	234,543	891,904
Total Additions (Reductions)	**5,863,485**	**6,848,520**	**2,389,350**	**3,056,024**
Deductions				
Benefits	$ 3,199,212	$ 3,084,105	$ 2,959,350	$ 2,838,454
Refunds and Transfers	259,776	250,578	259,323	256,243
Administration and Other	30,309	32,077	26,639	30,576
Total Deductions	**3,489,297**	**3,366,760**	**3,245,312**	**3,125,273**
Net change	**2,374,188**	**3,481,760**	**(855,962)**	**(69,249)**
Fiduciary net position, beginning of year	38,092,012	34,610,252	35,466,214	35,535,463
Net position restricted for benefits	**$ 40,466,200**	**$ 38,092,012**	**$ 34,610,252**	**$ 35,466,214**

Exhibit S-2: Changes in Fiduciary Net Position (Continued)

Last 10 Fiscal Years

(Dollars in thousands)

2014	2013	2012	2011	2010	2009
$ 995,284	$ 948,004	$ 905,968	$ 833,287	$ 808,908	$ 844,540
965,969	911,300	852,167	786,662	763,099	754,044
33,485	72,023	53,659	70,812	73,973	72,436
5,514,246	3,393,599	322,870	5,406,714	2,872,297	(4,433,461)
7,508,984	**5,324,926**	**2,134,664**	**7,097,475**	**4,518,277**	**(2,762,441)**
2,566,372	2,445,341	2,327,678	2,190,728	2,057,591	1,919,309
247,116	219,332	212,313	186,975	165,599	126,395
27,221	36,917	31,802	27,509	28,580	28,589
2,840,709	**2,701,590**	**2,571,793**	**2,405,212**	**2,251,770**	**2,074,293**
4,668,275	**2,623,336**	**(437,129)**	**4,692,263**	**2,266,507**	**(4,836,734)**
29,025,430	26,402,094	26,839,223	22,146,960	19,880,453	24,717,187
$ 33,693,705	**$ 29,025,430**	**$ 26,402,094**	**$ 26,839,223**	**$ 22,146,960**	**$ 19,880,453**
$ 53,405	$ 57,154	$ 54,463	$ 51,048	$ 59,393	$ 90,490
29,848	25,826	35,473	—	—	—
240,538	146,737	13,439	240,994	128,258	(192,303)
323,791	**229,717**	**103,375**	**292,042**	**187,651**	**(101,813)**
101,746	95,763	93,915	91,699	87,983	87,723
1,137	1,439	1,370	1,209	1,266	1,257
102,883	**97,202**	**95,285**	**92,908**	**89,249**	**88,980**
220,908	**132,515**	**8,090**	**199,134**	**98,402**	**(190,793)**
1,335,334	1,202,819	1,194,729	995,595	897,193	1,087,986
$ 1,556,242	**$ 1,335,334**	**$ 1,202,819**	**$ 1,194,729**	**$ 995,595**	**$ 897,193**
$ 21,151	$ 20,881	$ 20,998	$ 21,689	$ 35,939	$ 47,213
21,628	21,336	20,998	21,689	35,939	47,213
44,950	29,540	2,419	56,744	27,661	(47,726)
87,729	**71,757**	**44,415**	**100,122**	**99,539**	**46,700**
62,044	63,613	65,190	66,124	69,148	65,781
2,789	2,847	2,757	3,522	2,820	3,282
64,833	**66,460**	**67,947**	**69,646**	**71,968**	**69,063**
22,896	**5,297**	**(23,532)**	**30,476**	**27,571**	**(22,363)**
262,620	257,323	280,855	250,379	222,808	245,171
$ 285,516	**$ 262,620**	**$ 257,323**	**$ 280,855**	**$ 250,379**	**$ 222,808**
$ 1,016,435	$ 968,885	$ 926,966	$ 854,976	$ 844,847	$ 891,753
1,041,002	989,790	927,628	859,399	858,431	891,747
29,848	25,826	35,473	—	—	—
33,485	72,023	53,659	70,812	73,973	72,436
5,799,734	3,569,876	338,728	5,704,452	3,028,216	(4,673,490)
7,920,504	**5,626,400**	**2,282,454**	**7,489,639**	**4,805,467**	**(2,817,554)**
$ 2,730,162	$ 2,604,717	$ 2,486,783	$ 2,348,551	$ 2,214,722	$ 2,072,813
247,116	219,332	212,313	186,975	165,599	126,395
31,147	41,203	35,929	32,240	32,666	33,128
3,008,425	**2,865,252**	**2,735,025**	**2,567,766**	**2,412,987**	**2,232,336**
4,912,079	**2,761,148**	**(452,571)**	**4,921,873**	**2,392,480**	**(5,049,890)**
30,623,384	27,862,236	28,314,807	23,392,934	21,000,454	26,050,344
$ 35,535,463	**$ 30,623,384**	**$ 27,862,236**	**$ 28,314,807**	**$ 23,392,934**	**$ 21,000,454**

Exhibit S-3: Actual Contribution Rates

Last 10 Fiscal Years

Retirement Contribution Rates[1]	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Member	11.34%	11.34%	11.35%	11.48%	11.30%	10.90%	10.50%	9.60%	9.00%	8.95%
Employer	10.90%	10.78%	10.85%	10.89%	10.70%	10.25%	9.87%	9.01%	8.34%	7.99%

HBS Contribution Rates	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Employer	0.44%	0.56%	0.50%	0.59%	0.60%	0.65%	0.63%	0.59%	0.66%	0.96%

LTD Contribution Rates	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Member	0.16%	0.14%	0.12%	0.12%	0.24%	0.24%	0.24%	0.25%	0.40%	0.50%
Employer	0.16%	0.14%	0.12%	0.12%	0.24%	0.24%	0.24%	0.25%	0.40%	0.50%

[1] Retirement contribution rates do not include System retirees.

Exhibit S-4: Retired Members by Type of Benefit

As of June 30, 2017

	Number of retirees by Benefit Option						
Amount of monthly benefit	1	2	3	4	5	6	7
Under $300	12,998	137	177	411	2,823	232	782
$300 - $499	9,346	177	221	417	2,289	273	749
$500 - $999	18,813	397	613	875	4,438	716	1,712
$1,000 - $1,499	12,809	284	478	595	3,479	807	1,611
$1,500 - $1,999	9,120	207	327	460	2,856	835	1,430
$2,000 - $2,499	7,258	156	270	385	2,569	742	1,376
$2,500 - $2,999	5,691	126	242	359	2,141	608	1,079
$3,000 - $3,499	4,566	90	190	281	1,829	570	920
$3,500 - $3,999	3,038	51	108	203	1,306	424	617
$4,000 & Over	5,269	131	444	953	2,223	844	1,164
Totals	88,908	1,756	3,070	4,939	25,953	6,051	11,440

Options:

1. Life Annuity	Refund provision
2. Life Annuity	5 year certain and life
3. Life Annuity	10 years certain and life
4. Life Annuity	15 years certain and life
5. Joint Annuity	100 percent to contingent survivor
6. Joint Annuity	66 2/3 percent to contingent survivor
7. Joint Annuity	50 percent to contingent survivor

Note: The 2017 actuarial valuation report is the most recent report available.

Source: 2017 actuarial valuation report.

Exhibit S-5: HBS Recipients by Benefit Amount

As of June 30, 2018

HBS Monthly Benefits	Members Receiving Benefits
$1-199	61,664
$200-299	13,878
$300-399	756
$400 & Over	0
Total	76,298

Source: ASRS pension administration system

Exhibit S-6: LTD Recipients by Benefit Amount

As of June 30, 2018

LTD Monthly Benefits	Members Receiving Benefits
<$299	402
$300-499	204
$500-999	803
$1,000-1,499	745
$1,500-1,999	497
$2,000 & over	837
Total	3,488

Note: Amounts are based on gross benefits, before social security income adjustments.

Source: Long term disability program administrator

Exhibit S-7: Average Benefit Payments - Retirement

Last 10 Fiscal Years

		Years of Credited Service									
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45+
2017	Average Monthly Benefit	$ 146	$ 362	$ 741	$ 1,131	$ 1,728	$ 2,515	$ 3,453	$ 4,092	$ 4,861	$ 5,533
	Number of Retirees	6,250	20,057	24,117	19,648	24,271	22,914	20,556	3,598	628	78
2016	Average Monthly Benefit	$ 140	$ 357	$ 734	$ 1,123	$ 1,717	$ 2,498	$ 3,432	$ 4,077	$ 4,829	$ 5,454
	Number of Retirees	6,003	19,379	23,074	18,709	23,192	21,882	19,652	3,473	590	72
2015	Average Monthly Benefit	$ 136	$ 354	$ 730	$ 1,119	$ 1,711	$ 2,486	$ 3,424	$ 4,049	$ 4,769	$ 5,340
	Number of Retirees	5,801	18,799	22,279	18,076	22,431	21,166	19,002	3,357	559	66
2014	Average Monthly Benefit	$ 131	$ 347	$ 723	$ 1,116	$ 1,702	$ 2,478	$ 3,411	$ 4,048	$ 4,744	$ 5,344
	Number of Retirees	5,626	18,060	21,325	17,327	21,563	20,332	18,199	3,235	526	62
2013	Average Monthly Benefit	$ 125	$ 344	$ 721	$ 1,113	$ 1,694	$ 2,468	$ 3,397	$ 4,022	$ 4,809	$ 5,229
	Number of Retirees	5,422	17,223	20,406	16,637	20,540	19,522	17,448	3,121	495	61
2012	Average Monthly Benefit	$ 124	$ 341	$ 718	$ 1,112	$ 1,685	$ 2,464	$ 3,383	$ 3,980	$ 4,768	$ 5,224
	Number of Retirees	4,864	16,228	19,419	15,867	19,447	18,547	16,564	2,979	458	58
2011	Average Monthly Benefit	$ 121	$ 339	$ 716	$ 1,111	$ 1,681	$ 2,457	$ 3,368	$ 3,944	$ 4,661	$ 5,134
	Number of Retirees	4,420	15,231	18,329	15,157	18,371	17,557	15,608	2,840	426	57
2010	Average Monthly Benefit	$ 119	$ 338	$ 714	$ 1,108	$ 1,674	$ 2,445	$ 3,342	$ 3,900	$ 4,533	$ 5,040
	Number of Retirees	4,011	14,223	17,233	14,418	17,150	16,581	14,549	2,691	399	52
2009	Average Monthly Benefit	$ 195	$ 339	$ 715	$ 1,105	$ 1,663	$ 2,435	$ 3,321	$ 3,862	$ 4,453	$ 4,845
	Number of Retirees	3,385	13,236	16,321	13,658	15,995	15,587	13,314	2,499	380	49
2008	Average Monthly Benefit	$ 122	$ 339	$ 717	$ 1,106	$ 1,655	$ 2,425	$ 3,273	$ 3,776	$ 4,422	$ 4,760
	Number of Retirees	2,952	12,530	15,527	13,045	14,970	14,789	12,392	2,347	361	43

Notes:

This schedule does not include System retirees.

Average final salary information is not available.

The 2017 actuarial valuation report is the most recent report available.

Source: Historical actuarial valuation reports.

Exhibit S-8: Average Benefit Payments - HBS

Last 10 Fiscal Years

		Years of Credited Service					
		5	6	7	8	9	10+
2018	Average Monthly Benefit	$ 53	$ 57	$ 63	$ 70	$ 74	$ 106
	Number of HBS Participants	1,547	1,209	1,240	1,318	1,217	69,767
2017	Average Monthly Benefit	$ 53	$ 57	$ 63	$ 70	$ 75	$ 106
	Number of HBS Participants	1,545	1,207	1,245	1,318	1,215	69,853
2016	Average Monthly Benefit	$ 52	$ 57	$ 61	$ 68	$ 72	$ 103
	Number of HBS Participants	1,619	1,251	1,355	1,440	1,337	72,525
2015	Average Monthly Benefit	$ 57	$ 62	$ 68	$ 74	$ 81	$ 116
	Number of HBS Participants	1,580	1,286	1,356	1,399	1,299	70,703
2014	Average Monthly Benefit	$ 58	$ 63	$ 71	$ 77	$ 83	$ 116
	Number of HBS Participants	1,463	1,151	1,188	1,205	1,122	65,159
2013	Average Monthly Benefit	$ 64	$ 72	$ 79	$ 85	$ 95	$ 152
	Number of HBS Participants	1,402	1,120	1,130	1,161	1,074	64,354
2012	Average Monthly Benefit	$ 64	$ 74	$ 78	$ 96	$ 100	$ 144
	Number of HBS Participants	1,352	1,074	1,087	1,094	1,045	62,706
2011	Average Monthly Benefit	$ 59	$ 67	$ 75	$ 87	$ 92	$ 126
	Number of HBS Participants	1,252	1,018	999	1,057	983	58,656
2010	Average Monthly Benefit	$ 61	$ 67	$ 76	$ 86	$ 97	$ 127
	Number of HBS Participants	1,149	941	928	998	924	54,589
2009	Average Monthly Benefit	$ 61	$ 70	$ 78	$ 89	$ 100	$ 130
	Number of HBS Participants	1,123	941	916	951	906	53,198

Source: ASRS pension administration system

Exhibit S-9: Average Benefit Payments - LTD

Last 10 Fiscal Years

		Years of Credited Service
		N/A
2018	Average Monthly Benefit	$ 1,434
	Number of LTD Participants	3,488
2017	Average Monthly Benefit	$ 1,413
	Number of LTD Participants	3,583
2016	Average Monthly Benefit	$ 1,297
	Number of LTD Participants	4,032
2015	Average Monthly Benefit	$ 1,295
	Number of LTD Participants	4,107
2014	Average Monthly Benefit	$ 1,260
	Number of LTD Participants	4,313
2013	Average Monthly Benefit	$ 1,244
	Number of LTD Participants	4,443
2012	Average Monthly Benefit	$ 1,240
	Number of LTD Participants	4,646
2011	Average Monthly Benefit	$ 1,931
	Number of LTD Participants	4,785
2010	Average Monthly Benefit	$ 1,966
	Number of LTD Participants	4,797
2009	Average Monthly Benefit	$ 1,886
	Number of LTD Participants	4,672

Note: Long term disability payments are based on salary and not years of credited service.

Source: Long term disability program administrator

Exhibit S-10: Principal Participating Employers

Current Year and Nine Years Ago

	2018			2009		
Participating Employer	Covered Employees	Rank	Percent of Membership	Covered Employees	Rank	Percent of Membership
State of Arizona	26,145	1	12.44%	29,120	1	13.04%
Maricopa County	9,182	2	4.37%	8,931	2	4.00%
Mesa Unified School District 4	8,214	3	3.91%	8,357	3	3.74%
University of Arizona	7,547	4	3.59%	7,029	5	3.15%
Tucson Unified School District 1	6,243	5	2.97%	7,597	4	3.40%
Arizona State University	6,138	6	2.92%	5,470	8	2.45%
Maricopa County Community College District	5,622	7	2.68%	6,169	6	2.76%
Pima County	4,787	8	2.28%	5,700	7	2.55%
Chandler Unified School District 80	4,729	9	2.25%	-		-
Gilbert Public Schools	4,171	10	1.98%	4,954	9	2.22%
Maricopa County Special Health Care District	-		-	3,967	10	1.78%
All other	127,357		60.61%	136,029		60.91%
Total	210,135		100.00%	223,323		100.00%

	2018	2009
Total employer units	568	551
Total employers	673	709

Note: All participating employers participate in the Retirement, HBS and LTD plans.

Source: ASRS pension administration system

Arizona State Retirement System

A component unit of the State of Arizona

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