Director Siegfried's links to the annual comprehensive financial statements for the 4-10-23 Pension Committee Meeting:

PERSI acfr top 10 page also attached.

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ARIZONA STATE
RETIREMENT SYSTEM

2021 Annual Comprehensive Financial Report

A component unit of the State of Arizona • For fiscal year ended June 30, 2021

An agency of the State of Arizona

ARIZONA STATE RETIREMENT SYSTEM | Delivering service with

P R I D E

OUR VALUES

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

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

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

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

Excellence
A commitment to service excellence will permeate the organization.

OUR VISION

For the benefit of 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.**

An agency of the State of Arizona

ARIZONA STATE RETIREMENT SYSTEM

A component unit of the State of Arizona

Mr. Clark Partridge, Chair
Paul Matson, Executive Director

Report prepared by the staff of the Arizona State Retirement System

Annual Comprehensive Financial Report for fiscal year ended June 30, 2021

2021

An agency of the State of Arizona

Figures and graphics in the background of the cover and subsequent separation pages are used for stylistic purposes only

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Investment Section

Actuarial Section

Retirement and Health Benefit Supplement (HBS)

Long Term Disability (LTD)

Statistical Section

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

Introductory Section

An agency of the State of Arizona

ARIZONA STATE RETIREMENT SYSTEM
MAILING ADDRESS: PO Box 33910, Phoenix, AZ 85067-3910 | DIRECTOR: Paul Matson
STREET ADDRESS: 3300 North Central Avenue, Phoenix, AZ 85012
PHONE: 602.240.2000 | TOLL FREE: 1.800.621.3778 | ONLINE: AzASRS.gov

November 1, 2021

To: The Arizona State Retirement System Board of Trustees

We are pleased to present, on behalf of the ASRS staff, the Annual Comprehensive Financial Report of the Arizona State Retirement System (ASRS), a component unit of the State of Arizona, for the fiscal year ended June 30, 2021.

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.

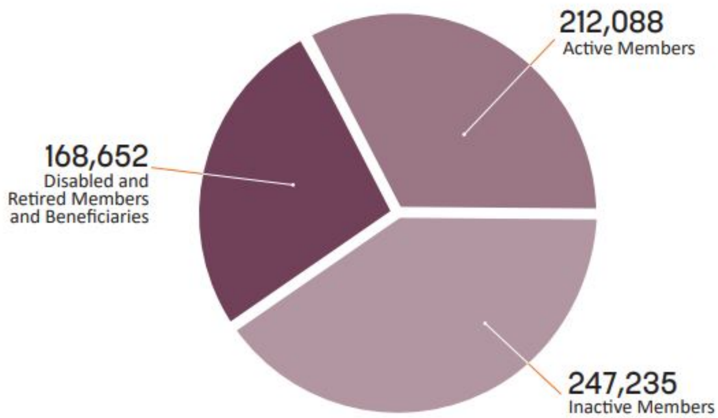
CliftonLarsonAllen LLP has issued an unmodified ("clean") opinion on the ASRS financial statements for the year ended June 30, 2021. The Independent Auditors' Report is located at the front of the Financial Section of this report.

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.

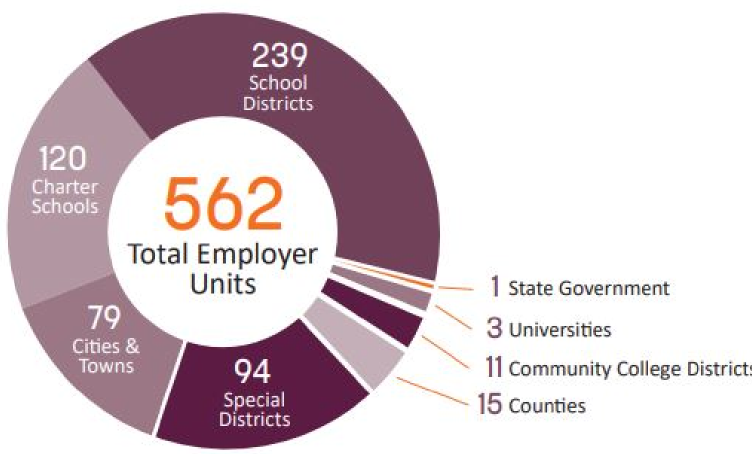
History and Overview

The ASRS was established in 1953 to provide defined contribution retirement benefits to employees of the State of Arizona, Arizona universities and political subdivisions. Over the years, the ASRS has grown and developed to include Arizona public schools and provide additional benefits including the addition of a defined benefit plan, health insurance premium benefits and long term disability benefits.

At June 30, 2021, total ASRS membership was 627,975, including active (a contributing member), inactive (a non-retired member that has an account balance but is no longer contributing), disabled and retired members, which is broken down in the chart below.



There are 562 employer units participating in the ASRS, including school districts, charter schools, state colleges and universities, and local, county and state governments, which are broken out as follows:



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. Active members also receive long term disability insurance coverage up to two-thirds of pay at the time of disablement.

During fiscal year 2021, 168,652 retired annuitants, their survivors, and 2,905 disabled members received approximately $3.6 billion in benefits. As of June 30, 2021, there were 45,855 members and their families enrolled in the ASRS-sponsored medical program.

Major Initiatives for Fiscal Year 2021

Investments

Custody Bank Change:

- In fiscal year 2021, the ASRS evaluated proposals for custody bank services, a project undertaken approximately every 10 years. Bank of New York Mellon was awarded the contract effective July 1, 2021. The Investment and Financial Services Divisions have coordinated the movement of over $49 billion in plan assets.

Administration

Communications:

- A new electronic newsletter was introduced, *Futures*. *Futures* is a monthly publication sent to all active members with an email address on file. The content is designed to provide members with pertinent pieces of educational information that, over a career, will help prepare the member for their eventual retirement.

Technology:

- Disaster Recovery was successfully migrated to the cloud, replacing the Tucson data center for all essential functions in a disaster. A full migration of all daily operations to the cloud is underway to replace the Phoenix data center.
- Completed the 7 year Oracle Modernization Project which migrated all pension administration systems to web pages and off desktop forms.

Service:

- Beginning in the spring of 2020, and continuing through fiscal year 2021, the ASRS has operated predominantly in remote work status. The ASRS was not only able to quickly convert to this status, but it has also been successful in continuing to deliver services and meet its performance targets for the duration.
- The ASRS reduced the amount of floor space needed at the Tucson office by moving to a new, smaller location for appointments.
- The ASRS has started a project to self-insure non-Medicare medical insurance participants in order to lower premium costs for members.

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

	1 Year	3 Year	5 Year	10 Year	Since Inception (June 30, 1975)
Total Fund	25.1 %	10.3 %	10.9 %	8.9 %	9.8 %

The ASRS has implemented investment guidelines for its internal and external investment managers, which include a set of policies, procedures and compliance requirements, as well as oversight by the internal Investment Management Division to ensure that investment assets are prudently managed. Both internal and external generated compliance procedures are in place. Details of the ASRS investment policies and investments are contained in the Investment Section of this report.

Funding

The funding objective of the ASRS is to ensure long-term full funding in a manner consistent with capital market, demographic, risk tolerance and other parameters.

The Arizona Revised Statutes require the ASRS to conduct an annual actuarial valuation of its plan assets and liabilities. According to the most recently available actuarial valuation, dated June 30, 2020, the total actuarial value of the retirement fund and the HBS fund assets was $42,410 million. The total actuarial accrued liability of these funds was $58,266 million. The unfunded actuarial accrued liability of $15,856 million results in an actuarial funding ratio of 72.8% for the total plan, which is an increase from 72.3% at June 30, 2019.

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

Contribution Rate Projections

The ASRS has taken numerous steps over past years to significantly mitigate contribution rate volatility, while ensuring that contribution rates plus investment earnings continue to fund the pension, health, and disability benefits earned. By amortizing unfunded actuarial accrued liabilities over a 25 year period for the pension plan (and over a 15 year period for the health insurance and long term disability plans), by allocating investment gains and losses over a ten year period, by phasing in significant assumption changes including lower economic growth expectations, and by developing a very diversified investment portfolio, the ASRS has been able to obtain greater stability in contribution rates while funding the benefits earned. In addition, the ASRS has recently completed the 2021 Experience Study, which will result in changes to the assumptions used in the June 30, 2021 actuarial valuation. Consequently, contribution rates are expected to continue to increase, but only gradually each year, before flattening and then 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 Comprehensive Annual Financial Report for the fiscal year ended June 30, 2020. The ASRS has received this prestigious award in each of the last 32 years. It should be noted that beginning in 2021, the GFOA encouraged members to adopt the name Annual Comprehensive Financial Report. All references to reports prior to 2021 will be to the Comprehensive Annual Financial Report and for 2021 and thereafter, will be to the Annual Comprehensive Financial Report.

To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized Annual Comprehensive Financial Report 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 presented the ASRS with the Award for Outstanding Achievement for its June 30, 2020, 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 qualify for the Award for Outstanding Achievement, a government must have received the Certificate of Achievement for Excellence for its Annual Comprehensive Financial Report for the previous year or current year. This is the ninth year the ASRS has received this award.

In addition, the Public Pension Coordinating Council bestowed the Pension Standards Award for 2021 to the ASRS for meeting professional standards, plan design and administration. To qualify for 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 17th 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

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, 2020

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, 2020. This was the 32nd consecutive year that the Arizona State Retirement System has received this prestigious award.

Public Pension Coordinating Council

Public Pension Standards Award
For Funding and Administration
_2021_

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.

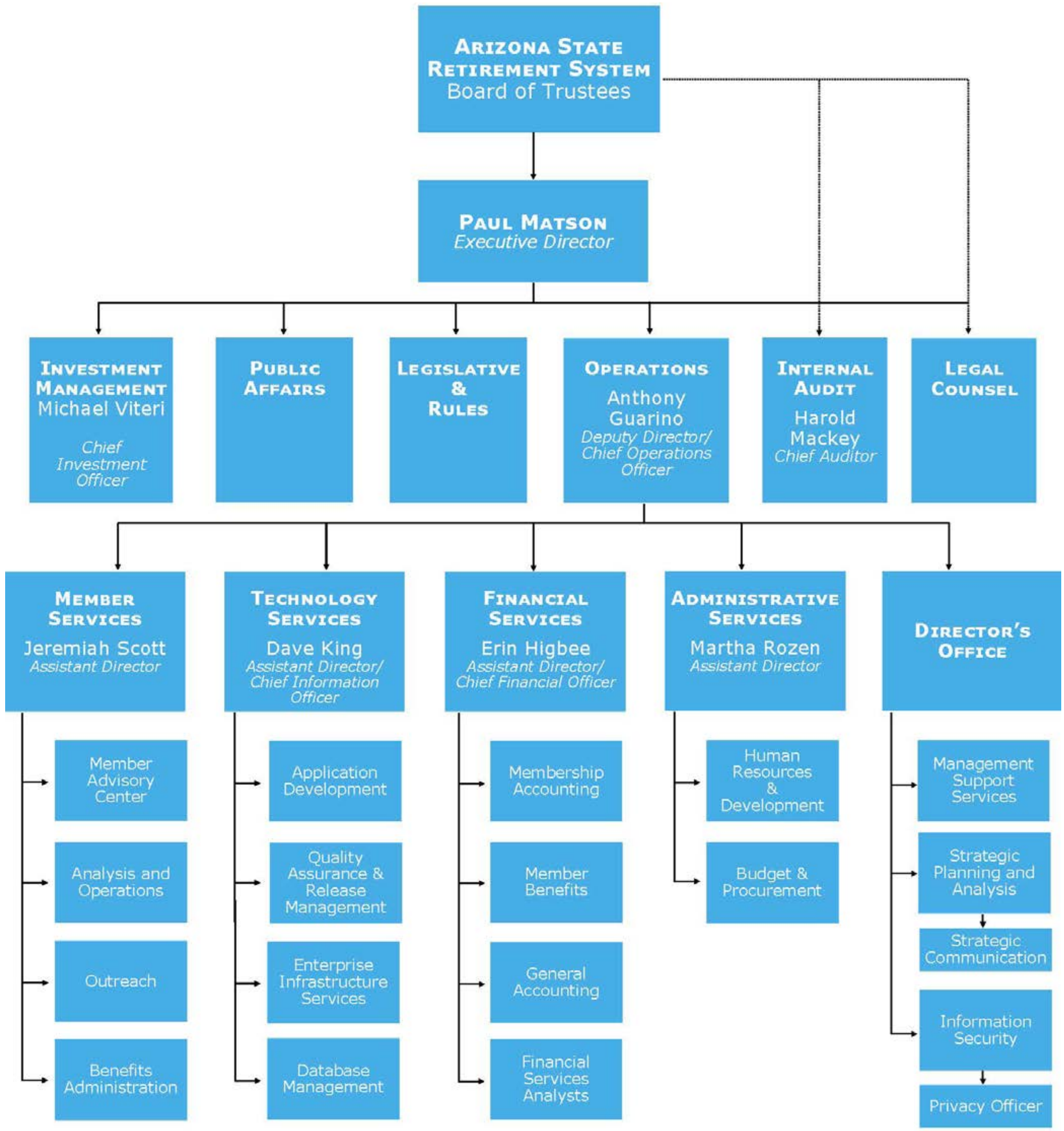
Presented by the Public Pension Coordinating Council, a confederation of

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

Alan H. Winkle
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 2021. 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 17th consecutive year that the Arizona State Retirement System has received this prestigious award.

Organizational Chart



Organizational Chart is as of June 30, 2021

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 85 in the Investment Section, and the Schedule of Investment Fees on page 87 in the Investment Section.

Paul Matson
Executive Director

Anthony Guarino
Deputy Director,
Chief Operations Officer

Michael Viteri
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
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
Private Credit Consultant	**AKSIA** New York, NY

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Financial Section

An agency of the State of Arizona

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, 2021, 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 fiduciary net position of the ASRS as of June 30, 2021, and the changes in its fiduciary net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

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

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 basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic 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 basic financial statements, and other knowledge we obtained during our audit of the basic 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 basic 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 basic financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated November 1, 2021 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, 2021

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, 2021. It is presented as a narrative overview and analysis. The discussion and analysis should be read in conjunction with the letter of transmittal, the basic financial statements, and notes to the basic financial statements presented in the financial section of the ASRS Annual Comprehensive Financial Report.

Financial Highlights

During fiscal year 2021, the net position of the ASRS increased, as actual investment returns significantly exceeded expected returns. This was primarily a result of fiscal and monetary actions and the subsequent increase in market valuations.

- At June 30, 2021, the ASRS held investments of $50,076 million (excluding securities lending balances), an increase of $7,885 million from fiscal year 2020.
- The combined investment portfolio experienced a time-weighted rate of return (net of fees) of 25.1%, compared to 0.8% in fiscal year 2020.

Overview of the Financial Statements

The MD&A is intended to serve as an introduction and overview of the financial section of the Annual Comprehensive Financial Report, 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, 2021. 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, 2021, 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, 2021. 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, 2021. 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 23-44 of this report.

Required Supplementary Information – The schedules included in the required supplementary information section present information about the changes in the net pension and other postemployment benefits (OPEB) liabilities, 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 Retirement Fiduciary Net Position, and Changes in Retirement 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 allocated according to actuarially determined contribution rates.

Fiduciary Net Position – The ASRS' total fiduciary net position held in trust for benefits at June 30, 2021 was $50,536 million, a 23.0% increase from $41,096 million at June 30, 2020. The retirement fund's fiduciary net position was $48,202 million compared to $39,168 million last year, a 23.1% increase. The HBS fund's net position was $2,140 million at year end compared to $1,767 million at fiscal year 2020, a 21.1% increase. The LTD fund's fiduciary net position was $194 million at year end compared to $161 million last year, an 20.5% increase. Additionally, payables for investment purchases decreased 99% at fiscal year end due to a change in investment strategy executed at the end of the prior fiscal year which was not replicated in the current fiscal year given the change in custody bank. Securities Lending decreased 99% at fiscal year end as the program was wound down as of June 30, 2021 at the current custody bank prior to the transition to the new custody bank as of July 1, 2021.

The increase in the total fiduciary net position and the fiduciary net position of the retirement, HBS and LTD funds was because the combination of actuarially determined contributions and investment earnings exceeded benefits paid.

Changes in Fiduciary Net Position - For the 2021 fiscal year, member and employer contributions totaled $2,716 million, a 3.8% increase compared to $2,616 million for fiscal year 2020. Multiple factors attributed to the increase in contribution revenue, including an increase in covered payroll and a slight increase in contribution rates. While the number of active plan members decreased by 1.3%, covered payroll increased by 3.0%**.** Retirement and HBS combined employer and employee contribution rates were 23.69% and 0.39%, respectively, in fiscal year 2021, and 23.39% and 0.49%, respectively, in 2020. LTD combined employer and employee contribution rates were 0.36% in fiscal year 2021, and 0.34% in fiscal year 2020. For employers, the alternate contribution rate decreased from 10.41% in fiscal year 2020, to 10.21% in fiscal year 2021.

For fiscal year 2021, the ASRS recognized total net investment income of $10,537 million. The time-weighted rate of return on investment assets was 25.1%.

Other Income increased by $18.5 million due to the payment of the Retrospective Rate Agreement rebate that the ASRS did not receive in the prior fiscal year.

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 2021 fiscal year, retirement, disability, health insurance and survivor benefits totaled $3,583 million, an increase of 3.2% over the $3,472 million paid during fiscal year 2020. The increase is attributed to an increase in total members and beneficiaries receiving retirement benefits from 163,069 in fiscal year 2020, to 168,652 in fiscal year 2021.

Refunds and transfers to other plans totaled $232.8 million in fiscal year 2021, a 4.3% decrease from the $243.2 million paid out in fiscal year 2020. In fiscal year 2021, the cost of administering the ASRS benefits totaled $30.48 million, a decrease of 0.2% from the $30.55 million paid in fiscal year 2020. In the current year, despite an increased focus on IT security and remote work technology, the administrative expenses of the organization were roughly unchanged in the current year.

The following chart and tables show the ASRS fiduciary net position for fiscal year 2021 and the condensed summary of fiduciary net position and changes in fiduciary net position for fiscal years 2021 and 2020:

Exhibit F-1: ASRS Fiduciary Net Position by Fund

As of June 30, 2021

(Dollars in thousands)

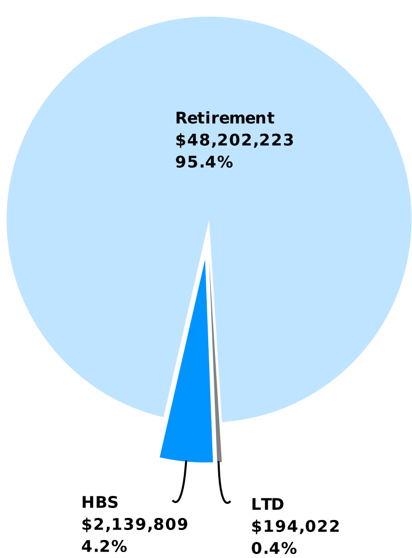

Exhibit F-2: Condensed Summary of Fiduciary Net Position

(Dollars in thousands)

	2021	2020	Change	% Change
Assets				
Cash and receivables	$ 482,626	$ 191,559	$ 291,067	151.9 %
Investments	50,076,331	42,191,703	7,884,628	18.7 %
Securities lending	958	103,249	(102,291)	(99.1)%
Total assets	50,559,915	42,486,511	8,073,404	19.0 %
Liabilities				
Payables and other liabilities	22,903	1,287,511	(1,264,608)	(98.2)%
Securities lending	958	103,249	(102,291)	(99.1)%
Total liabilities	23,861	1,390,760	(1,366,899)	(98.3)%
Fiduciary Net Position Restricted for Pension/OPEB Benefits	$ 50,536,054	$ 41,095,751	$ 9,440,303	23.0 %

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

(Dollars in thousands)

	2021	2020	Change	% Change
Additions				
Member contributions	$ 1,341,472	$ 1,290,249	$ 51,223	4.0 %
Employer contributions	1,374,197	1,325,419	48,778	3.7 %
Other income	18,581	16	18,565	116,031.3 %
Service credit purchase and transfers in	14,991	13,403	1,588	11.8 %
Investment and security lending income	10,739,093	579,107	10,159,986	1,754.4 %
Investment and security lending expense	(201,772)	(206,567)	4,795	(2.3)%
Total additions	13,286,562	3,001,627	10,284,935	342.6 %
Deductions				
Retirement and disability benefits	3,510,392	3,418,602	91,790	2.7 %
Survivor benefits	72,554	52,949	19,605	37.0 %
Refunds and transfers	232,830	243,214	(10,384)	(4.3)%
Administration and other	30,483	30,553	(70)	(0.2)%
Total deductions	3,846,259	3,745,318	100,941	2.7 %
Net Change	9,440,303	(743,691)	10,183,994	(1,369.4)%
Fiduciary Net Position Restricted for Pension/OPEB Benefits				
Net position beginning of year	41,095,751	41,839,442	(743,691)	(1.8)%
Net position end of year	$ 50,536,054	$ 41,095,751	$ 9,440,303	23.0 %

Funded Status - GASB 67 and 74 require public employee pension and OPEB plans that 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 difference between the two actuarial valuations is the assets are valued at market value for financial reporting purposes and a smoothed value is used for funding purposes.

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, 2020, and rolled it forward to June 30, 2021. 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.

A detailed discussion of the funded status of the retirement fund, the HBS fund and the LTD fund, based on the ASRS funding methodology, is contained in the Actuarial Section of this report.

Exhibit F-4: Pension Valuation For Financial Reporting Purposes

Funded Status - Retirement	2021	2020
Retirement fiduciary net position as a percentage of total pension liability	78.58 %	69.33 %

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, 2020, and rolled it forward to June 30, 2021. The notes to the basic financial statements as well as the required supplementary information disclose more detailed information about the HBS and LTD funds' net OPEB liability.

Exhibit F-5: OPEB Valuation For Financial Reporting Purposes

Funded Status - HBS	2021	2020
HBS program assets as a percentage of total HBS OPEB liability	130.24 %	104.33 %

Funded Status - LTD	2021	2020
LTD fund fiduciary net position as a percentage of total LTD liability	90.38 %	68.01 %

Investments - During the fiscal year 2021, the ASRS investments were broadly diversified in equities, credit and interest rate sensitive instruments, real estate investments and cash equivalent instruments. A few highlights of the year are as follows:

- As of June 30, 2021, the fund held investments of $50,076 million (excluding securities lending balances), an increase of $7,885 million from the prior year.
- The combined investment portfolio generated approximately $10,537 million in net investment earnings during the year.
- The combined investment portfolio experienced a time-weighted rate of return of 25.1% compared to the Interim Total Fund Benchmark return of 26.8%.
- The increase in investments during the year is primarily a result of monetary and fiscal actions taken, and the subsequent increase in market valuations.

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, 2021
(Dollars in thousands)

	Retirement Fund	Health Benefit Supplement Fund	Long Term Disability Fund	Combined
Assets				
Cash	$ 265,557	$ 11,554	$ 1,025	$ 278,136
Receivables				
Accrued Interest and Dividends	31,231	1,359	120	32,710
Securities Sold	7,693	335	30	8,058
Futures Contracts	3,917	170	15	4,102
Contributions	90,131	1,298	1,205	92,634
Due From Other Funds	—	3,374	1,007	4,381
Investment Receivables	33,676	1,465	130	35,271
Other Receivables	2,028	18,539	6,767	27,334
Total Receivables	168,676	26,540	9,274	204,490
Investments				
Cash and Short-term Investments	922,093	63,266	3,548	988,907
Equity	25,981,977	1,130,480	99,982	27,212,439
Fixed Income - Interest Rate Sensitive	3,463,349	150,691	13,327	3,627,367
Fixed Income - Credit	9,881,544	429,947	38,025	10,349,516
Real Estate	7,540,974	328,109	29,019	7,898,102
Total investments	47,789,937	2,102,493	183,901	50,076,331
Securities Lending Collateral	914	40	4	958
Total Assets	48,225,084	2,140,627	194,204	50,559,915
Liabilities				
Securities Purchased	5,409	235	21	5,665
Securities Lending Collateral	914	40	4	958
Futures Contracts	3,087	134	12	3,233
Due To Other Funds	4,381	—	—	4,381
Other	9,070	409	145	9,624
Total Liabilities	22,861	818	182	23,861
Net Position Restricted For Pension/OPEB Benefits	$ 48,202,223	$ 2,139,809	$ 194,022	$ 50,536,054

The accompanying notes are an integral part of these statements.

Combined Statements of Changes in Fiduciary Net Position

For the Year Ended June 30, 2021

(Dollars in thousands)

	Retirement Fund	Health Benefit Supplement Fund	Long Term Disability Fund	Combined
Additions				
Contributions				
Member Contributions	$ 1,321,694	$ —	$ 19,778	$ 1,341,472
Employer Contributions	1,311,380	42,816	20,001	1,374,197
Transfers From Other Plans	745	—	—	745
Purchased Service	14,176	49	21	14,246
Total Contributions	2,647,995	42,865	39,800	2,730,660
Investment Activity				
Investment Activity Income:				
Net Appreciation In Fair Value of Investments	9,847,982	427,826	37,880	10,313,688
Interest	53,209	2,352	206	55,767
Dividends	327,018	14,206	1,260	342,484
Other Income	23,414	1,018	91	24,523
Total Investment Activity Income	10,251,623	445,402	39,437	10,736,462
Investment Activity Expense:				
Management Fees	(179,936)	(7,816)	(694)	(188,446)
Custody Fees	(1,991)	(87)	(8)	(2,086)
Consultant and Legal Fees	(7,464)	(325)	(29)	(7,818)
Internal Investment Activity Expense	(4,363)	(190)	(17)	(4,570)
Total Investment Activity Expenses	(193,754)	(8,418)	(748)	(202,920)
Net Income From Investment Activities	10,057,869	436,984	38,689	10,533,542
Securities Lending Activities:				
Securities Lending Income	2,512	109	10	2,631
Interest Rebate	1,510	66	6	1,582
Management Fees	(414)	(18)	(2)	(434)
Net Income From Securities Lending Activities	3,608	157	14	3,779
Total Net Investment Income	10,061,477	437,141	38,703	10,537,321
Other Income	102	18,479	—	18,581
Total Additions	12,709,574	498,485	78,503	13,286,562
Deductions				
Retirement and Disability Benefits	3,341,868	124,382	44,142	3,510,392
Survivor Benefits	72,554	—	—	72,554
Refunds To Withdrawing Members, Including Interest	232,537	—	—	232,537
Administrative Expenses	27,104	1,179	1,497	29,780
Transfers To Other Plans	293	—	—	293
Other	581	—	122	703
Total Deductions	3,674,937	125,561	45,761	3,846,259
Net Increase In Net Position	9,034,637	372,924	32,742	9,440,303
Net Position Restricted For Pension/OPEB Benefits				
Beginning Of Year	39,167,586	1,766,885	161,280	41,095,751
End Of Year	$ 48,202,223	$ 2,139,809	$ 194,022	$ 50,536,054

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 Internal Revenue Code (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 Benefit 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 a trust 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, who 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) rebate. 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 rebate for revenue and claims expense activity that occurred during fiscal year 2021. The RRA rebate was for approximately $18.5 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, 2021, the required contribution rate for employers for their active members was 0.39% of covered payroll. There were 80,311 retired members or beneficiaries receiving benefits as of June 30, 2021.

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 up 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, 2021, the required contribution rate for employers and active members was 0.18% of covered payroll. There were 2,905 disabled members receiving long term disability benefits as of June 30, 2021.

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, 2021 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	168,652	80,311	2,905
Inactive plan members entitled to, but not yet receiving benefits	247,235	38,979	—
Active plan members	212,088	212,088	212,088
Total membership	627,975	331,378	214,993

[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	239
Charter schools	120
Cities and towns	79
Counties	15
Special districts	94
Community college districts	11
Universities	3
State government	1
Total employer units	562

Note: The 562 employer units represent 664 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 to 19.99	2.10 %
20.00 to 24.99	2.15 %
25.00 to 29.99	2.20 %
30.00 or more years	2.30 %

<u>Permanent Benefit Increase (PBI)</u> – Pursuant to A.R.S. § 38-767, 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 yield rate on the actuarial value of ASRS assets for the fiscal year that ended June 30 of the year prior to the year for which an increase would be paid exceeds 8% . Funds are reserved when the yield rate on the actuarial value of ASRS assets for the fiscal year that ended June 30 of the year prior to the year for which an increase would be paid exceeds 8%. If there are no excess investment earnings in the reserve, then no additional benefit increase is paid. As of June 30, 2021, there is a $125.0 million balance in the reserve for future PBIs however, this amount will not create a PBI in the current year per the above statute.

<u>Enhanced Permanent Benefit Increase (EPBI)</u> – Pursuant to A.R.S. § 38-767, 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 $260, 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 up 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 $32.6 million were received during the 2021 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 2021:

Exhibit F-10: Contribution Rates

Contribution Rates	Employer	Member
Retirement	11.65 %	12.04 %
Health benefit supplement	0.39 %	0.00 %
Long term disability	0.18 %	0.18 %
Total required	12.22 %	12.22 %

Exhibit F-11: Alternate Contribution Rates

Alternate Contribution Rates	Employer	Member
ACR Retirement	10.14 %	0.00 %
ACR Health benefit supplement	0.00 %	0.00 %
ACR Long term disability	0.07 %	0.00 %
Total ACR required	10.21 %	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 may consist of futures contracts, 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 estimated current values based on acceptable industry practices. 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.

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, 2021, 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.

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, 2020 actuarial valuation, which was rolled forward to June 30, 2021. 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 the 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 fair 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 external 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 $8.1 million and a payable for securities purchased of $5.7 million at June 30, 2021.

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 and in place as of June 30, 2021:

Exhibit F-14: Target Asset Allocation

Asset Class	Target Allocation
Equity	50 %
Credit	20 %
Interest Rate Sensitive	10 %
Real Estate	20 %
Total	100 %

Rate of Return – For the year ended June 30, 2021, 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 25.07%, 25.08% and 25.19%, 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. As of June 30, 2021, the ASRS was in compliance with this policy.

The following table presents the fixed income investments at June 30, 2021, 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		Fair Value	Fair Value as a Percent of Total Debt Securities Investments
AAA[1]	$	1,340,776	69.13 %
AA		116,211	5.99 %
A		231,948	11.96 %
BBB		250,061	12.89 %
Not rated		551	0.03 %
Total	$	1,939,547	100.00 %
Commingled Funds - Fixed Income[2]		1,692,120	
Private Market Investments		10,348,965	
Total Fixed Income Investments	$	13,980,632	

[1] Includes $3.7 million of U.S. Treasury Bills classified as short-term investments on the Statements of Fiduciary Net Position

[2] The fair value and fund level credit quality ratings as reported by the commingled fund managers are as follows: $1,163,172--AA; $529,301--A; ($353)--Not rated.

Note: Excluded from the table above are investments in commingled funds - fixed income (see footnote 2) and private market fixed income investments. Although private market investments are exposed to credit risk, credit rating information for these funds is not available.

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, however it does set more restrictive requirements in its contracts with external money managers.

Exhibit F-16 presents the weighted average maturity on fixed income securities. The weighted average maturity method measures the interest rate sensitivity of fixed income securities. Longer periods indicate a higher degree of interest rate risk due to the longer period of exposure the portfolio will experience.

The following table shows the weighted average maturity by investment type as of June 30, 2021:

Exhibit F-16: Interest Rate Risk

Fixed Income Securities
(Dollars in thousands)

Fixed Income Security Type	Fair Value	Weighted Average Maturity (in years)
Commercial Mortgage Backed Securities	$ 40,282	28.1
Government Mortgage Backed Securities	526,143	25.8
Government Related	5,487	18.9
Corporate Bonds	553,474	11.1
Government Agencies	51,236	9.6
Asset Backed Securities	11,707	9.3
Municipal/Provincial Bonds	31,515	8.8
Government Bonds[1]	719,703	8.5
Commingled Funds - Fixed Income	1,692,120	8.3
Total	$ 3,631,667	
Private Market Fixed Income Investments	10,348,965	
Total Fixed Income Investments	$13,980,632	

[1] Includes $3.7 million of U.S.Treasury Bills is presented as short-term investments on the Statements of Fiduciary Net Position.

Note: Excluded from the table above are private market fixed income investments. While such investments are exposed to interest rate risk, weighted average maturity information for these funds is not available.

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, 2021:

Currency Type	Short-term Investments	Equity Securities	Private Equity	Real Estate	Total
Australian Dollar	$ 950	$ 424,540	$ —	$ —	$ 425,490
Brazilian Real	51	—	—	—	51
Canadian Dollar	1,731	626,904	—	—	628,635
Danish Krone	387	139,363	—	—	139,750
Euro Currency	3,460	1,775,548	418,424	—	2,197,432
Hong Kong Dollar	380	166,392	—	—	166,772
Japanese Yen	8,720	1,358,400	—	—	1,367,120
Mexican Peso	—	—	—	527	527
New Israeli Sheqel	673	34,116	—	—	34,789
New Taiwan Dollar	376	—	—	—	376
New Zealand Dollar	212	19,427	—	—	19,639
Norwegian Krone	296	51,781	—	—	52,077
Pound Sterling	1,407	847,612	—	—	849,019
Singapore Dollar	938	65,597	—	—	66,535
Swedish Krona	656	245,022	—	—	245,678
Swiss Franc	1,120	515,117	—	—	516,237
Total	$ 21,357	$ 6,269,819	$ 418,424	$ 527	$ 6,710,127

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 the matrix pricing technique. Matrix pricing is used to value securities based on the securities' relationship to benchmark quoted prices, including U.S. Treasury Bills contained in the Interest Rate Sensitive Portfolio.

Real estate investments classified in Level 1 are valued using prices quoted in active markets. 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 and short-term investment funds (STIF). These investments are reported at cost.

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 schedule on the following page 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, 2021.

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

(Dollars in thousands)

		Fair Value Measurements Using		
Investments by Fair Value Level	**As of June 30, 2021**	**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	$ 9,353,481	$ 9,353,481	$ —	$ —
U.S. Mid Cap	1,591,075	1,591,075	—	—
U.S. Small Cap	1,398,215	1,397,733	476	6
International - Developed Markets Large Cap	5,347,186	5,346,757	429	—
International - Developed Markets Small Cap	958,433	958,132	300	1
Total equity securities	18,648,390	18,647,178	1,205	7
Interest Rate Sensitive[1]	1,938,996	—	1,938,996	—
Public Credit	551	—	551	—
Real estate	499,590	455,340	—	44,250
Total investments by fair value level	21,087,527	19,102,518	1,940,752	44,257
Investments not subject to fair value leveling				
(at cost or amortized cost)				
Cash and short-term instruments[2]	985,158			
Total Investments not subject to fair value leveling	985,158			
Investments measured at the net asset value (NAV)				
Commingled funds - international emerging markets	2,720,961			
Commingled funds - interest rate sensitive	1,692,120			
Private equity funds	5,843,088			
Distressed debt funds	1,476,905			
Private debt funds	7,323,541			
Real estate funds	7,398,512			
Other credit funds	1,548,519			
Total investments measured at the NAV	28,003,646			
Total investments	$ 50,076,331			

[1] $3.7 million of U.S. Treasury Bills classified as short-term investments on the Statements of Fiduciary Net Position are presented in Interest Rate Sensitive.

[2] 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 at June 30, 2021	Unfunded Commitments	Redemption Frequency (if Currently Eligible)	Redemption Notice Period
Real estate funds	$ 7,398,512	$ 4,846,755	N/A	N/A
Private debt funds	7,323,541	3,148,418	N/A	N/A
Private equity funds	5,843,088	2,338,942	N/A	N/A
Commingled funds - international emerging markets	2,720,961	—	Daily	1 - 2 days
Commingled funds - interest rate sensitive	1,692,120	—	Daily	2 days
Other credit funds	1,548,519	782,012	N/A	N/A
Distressed debt funds	1,476,905	1,036,226	N/A	N/A
Total investments measured at the NAV	$ 28,003,646	$ 12,152,353		

Commingled Funds – The types of strategies within commingled funds can 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 are daily. There are no plans to liquidate the total portfolio.

Private Equity and Distressed Debt Funds – Private Equity and Distressed Debt 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 Other Credit – Private Debt and Other Credit 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 student 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.

Note 5. Securities Lending Program

The Arizona Revised Statutes § 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 105% of the fair value of the loaned securities and maintains collateral at no less than 100% for the duration of the loan. At year end, the ASRS had limited counter party risk to borrowers because the collateral held by the ASRS for each loan exceeded the fair 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, 2021, the fair value of securities on loan was $120.9 thousand, of which $88.4 thousand was cash collateralized loans. Cash of $958.0 thousand received as collateral for securities loaned was reinvested and had a net asset value of $960.3 thousand as of June 30, 2021. The securities lending payable at June 30, 2021, was $958.0 thousand. The balances at year end are reflective of the winding down of the securities lending program at the former custody bank and will resume in the next year at the new custody bank.

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, 2021, classified by type, and the changes in fair value of derivative instruments for the year then ended as reported in the June 30, 2021, financial statements are as follows:

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

	Changes in Fair Value[1]		At June 30, 2021		
Investment Derivatives	**Classification**	**Amount[2]**	**Classification**	**Fair Value**	**Notional Value**
Foreign Currency Forwards	Net Appreciation in Fair Value	(47)	Futures Receivable	—	—
Index Futures Long	Net Appreciation in Fair Value	109,408	Not Applicable	—	176,676
Index Futures Short	Net Appreciation in Fair Value	(14,555)	Not Applicable	—	—
Rights	Net Appreciation in Fair Value	(168)	Equity Securities	103	—
Warrants	Net Appreciation in Fair Value	301	Equity Securities	369	—
Total		$ 94,939		$ 472	$ 176,676

[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 Reuters' 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, 2021, investing activity in derivative futures consisted of exchange traded contracts. The ASRS did not have any over-the-counter investment derivative instruments as of June 30, 2021. Accordingly, the ASRS was not exposed to loss in case of default of all counterparties of over-the-counter positions as of June 30, 2021.

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.

As noted in Exhibit F-21: Derivative Instruments Highly Sensitive to Interest Rate Changes, the ASRS did not have any derivative instruments highly sensitive to interest rate changes as of the year ended June 30, 2021.

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 as of June 30, 2021.

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

Asset ID	Asset Description	Interest Rate	Fair Value	Total Exposure
As of June 30, 2021, the ASRS did not hold any derivative instruments that were highly sensitive to interest rate changes.				

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

Currency Name	Options	Total Exposure
Australian Dollar	$ 4	$ 4
Euro Currency	92	92
Singapore Dollar	7	7
Total	$ 103	$ 103

Note 7. Expected Long-Term Rate of Return

The expected long-term 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 expected long-term rate of return by weighting the expected future real rates of return by the target asset allocation percentage.

On June 29, 2018, the ASRS Board approved updated strategic asset allocation targets that were implemented 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 Implemented July 1, 2018	Real Return Geometric Basis	Long-term Contribution to Expected Real Return
Equity	50 %	4.90 %	2.45 %
Fixed Income - Credit	20 %	5.20 %	1.04 %
Fixed Income - Interest Rate Sensitive	10 %	0.70 %	0.07 %
Real estate	20 %	5.70 %	1.14 %
Total	100 %		4.70 %

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, 2021, were as follows:

Exhibit F-24: Net Pension Liability of Employers

(Dollars in thousands)

Net Pension Liability	
Total pension liability	$ 61,341,779
Retirement fiduciary net position	(48,202,223)
Employers' net pension liability	$ 13,139,556
Retirement fiduciary net position as a percentage of total pension liability	78.58 %

Actuarial Assumptions – The total pension liability was determined by an actuarial valuation as of June 30, 2020, and rolled forward to June 30, 2021, 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, 2020
Actuarial roll forward date	June 30, 2021
Actuarial cost method	Entry age normal
Asset valuation	Fair value
Discount rate	7.0 %
Projected salary increases	2.9 - 8.4%
Inflation	2.3 %
Permanent benefit increase	Included
Mortality rates	2017 SRA Scale U-MP

These actuarial assumptions that 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 the 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. A new experience study, adopted in July of 2021 will be utilized in the roll forward of the actuarial valuation in the current year and in future years. Details of the assumptions resulting from the experience study performed as of June 30, 2016, and June 30, 2020 appear in the Actuarial Section beginning on page 91.

Discount rate – The discount rate used to measure the total pension liability was 7.0%. The rate has been lowered in the roll forward from 7.5% which was used for the actuarial assumptions at the valuation date. 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 7.0%, as well as the employers' net pension liability if it were calculated using a discount rate that is 1% lower (6.0%) or 1% higher (8.0%) than the current rate at June 30, 2021.

Exhibit F-26: Discount Rate Sensitivity - Pension
(Dollars in thousands)

1% Decrease (6.00)%	Current Discount Rate (7.00)%	1% Increase (8.00)%
$ 20,667,421	$ 13,139,556	$ 6,863,399

Note 9. Net OPEB Liability of Employers

The components of the net OPEB liability of the participating employers at June 30, 2021 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	$ 1,610,980
HBS program assets	(2,098,188)
Employers' net HBS program OPEB liability (asset)	$ (487,208)
HBS program assets as a percentage of total HBS OPEB liability	130.24 %
Reconciliation of HBS Program Assets to HBS Fund fiduciary Net Position:	
HBS program assets	$ 2,098,188
Health insurance RRA rebate assets [1]	41,621
HBS Fund fiduciary net position	$ 2,139,809

[1] Represents premium rebates returned to ASRS held for future benefit of members. Assets excluded from HBS Plan assets for valuation purposes, as the assets are not restricted for use to pay HBS Program benefits. See page 24 for further details.

The components of the net OPEB liability of participating employers at June 30, 2021, 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	$ 214,665
LTD fiduciary net position	(194,022)
Employers' net LTD OPEB liability	$ 20,643
LTD fund fiduciary net position as a percentage of total LTD OPEB liability	90.38 %

Actuarial Assumptions – The total OPEB liabilities were determined by an actuarial valuation as of June 30, 2020, and rolled forward to June 30, 2021, 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, 2020
Actuarial roll forward date	June 30, 2021
Actuarial cost method	Entry Age Normal
Asset valuation method	Fair Value
Inflation	2.3 %
Investment Rate of Return	7.0 %
Mortality rates	2017 SRA Scale U-MP
Healthcare Trend Rates	N/A

Exhibit F-30: Actuarial Assumptions - LTD

Assumptions	
Actuarial valuation date	June 30, 2020
Actuarial roll forward date	June 30, 2021
Actuarial cost method	Entry Age Normal
Asset valuation method	Fair Value
Inflation	2.3 %
Investment Rate of Return	7.0 %
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 7.0%, as well as the employers' net HBS and LTD OPEB liabilities (assets) if they were calculated using a discount rate that is 1% lower (6.0%) or 1% higher (8.0%) than the current rate at June 30, 2021:

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

	1% Decrease (6.00)%	Current Single Assumption Discount Rate (7.00)%	1% Increase (8.00)%
HBS	$ (322,583)	$ (487,208)	$ (627,194)
LTD	26,879	20,643	14,608

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, resulting from 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, private debt, distressed debt, real estate and other credit 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. Other Postemployment Benefits

In fiscal year 2018, the Arizona Department of Administration (ADOA) implemented GASB Statement No. 75 - Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions. The ADOA maintains medical and accident benefits for retired state employees and their dependents. The ASRS participates in the plan, and the ASRS' proportionate share of the state's OPEB liability is included in the state's Annual Comprehensive Financial Report. The liability has not been included in these financial statements as it is insignificant to the ASRS plans.

Note 15. Subsequent Events

The ASRS has evaluated subsequent events through November 1, 2021, the date the financial statements were available to be issued. Events or transactions occurring after June 30, 2021, but prior to November 1, 2021, that provided additional evidence about conditions that existed at June 30, 2021, have been recognized in the financial statements for the year ended June 30, 2021. Events or transactions that provided evidence about conditions that did not exist at June 30, 2021, 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, 2021.

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

Fiscal Years Ended June 30,
(Dollars in thousands)

	2021	2020	2019	2018
Total Pension Liability:				
Service cost	$ 1,451,224	$ 1,396,954	$ 1,356,048	$ 1,360,306
Interest	4,216,447	4,056,330	3,905,584	3,764,172
Differences between expected and actual experience[1]	216,628	188,086	108,006	576,321
Changes of assumptions[1]	2,610,333	—	—	(1,738,368)
Benefit payments	(3,646,959)	(3,523,569)	(3,431,763)	(3,304,808)
Net change in total pension liability	4,847,673	2,117,801	1,937,875	657,623
Total pension liability - beginning	56,494,106	54,376,305	52,438,430	51,780,807
Total pension liability - ending (a)	61,341,779	56,494,106	54,376,305	52,438,430
Retirement Fiduciary Net Position:				
Contributions - employers	$ 1,311,380	$ 1,254,651	$ 1,180,966	$ 1,085,033
Contributions - employees	1,321,694	1,272,080	1,194,100	1,099,663
Net investment income	10,061,477	354,195	2,398,937	3,414,623
Benefit payments, including refunds of member contributions	(3,646,959)	(3,523,569)	(3,431,763)	(3,304,808)
Administrative expenses	(27,104)	(26,845)	(26,802)	(26,878)
Other	14,149	11,932	17,755	21,560
Net change in retirement fiduciary net position	9,034,637	(657,556)	1,333,193	2,289,193
Retirement fiduciary net position - beginning	39,167,586	39,825,142	38,491,949	36,202,756
Retirement fiduciary net position - ending (b)	48,202,223	39,167,586	39,825,142	38,491,949
Retirement net pension liability - ending (a) - (b)	$ 13,139,556	$ 17,326,520	$ 14,551,163	$ 13,946,481

[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 and 2017. 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.

Figure F-32: Schedule of Changes in the Net Pension Liability - Retirement (Continued)

Fiscal Years Ended June 30,
(Dollars in thousands)

2017	2016	2015	2014
$ 1,137,270	$ 1,144,436	$ 1,013,854	$ 966,705
3,883,789	3,906,808	3,832,255	3,607,440
(43,772)	(967,522)	(1,187,231)	1,078,966
984,132	(1,242,164)	—	—
(3,181,407)	(3,062,846)	(2,927,102)	(2,812,573)
2,780,012	(221,288)	731,776	2,840,538
49,000,795	49,222,083	48,490,307	45,649,769
51,780,807	49,000,795	49,222,083	48,490,307
$ 1,053,197	$ 1,015,974	$ 1,004,747	$ 965,969
1,079,256	1,036,714	1,031,954	995,284
4,406,943	222,906	849,160	5,514,246
(3,181,407)	(3,062,846)	(2,927,102)	(2,812,573)
(27,895)	(22,965)	(26,400)	(26,107)
12,871	24,362	19,582	31,456
3,342,965	(785,855)	(48,059)	4,668,275
32,859,791	33,645,646	33,693,705	29,025,430
36,202,756	32,859,791	33,645,646	33,693,705
$ 15,578,051	$ 16,141,004	$ 15,576,437	$ 14,796,602

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

Fiscal Years Ended June 30,
(Dollars in thousands)

Net Pension Liability	2021	2020	2019	2018
Total pension liability - ending (a)	$ 61,341,779	$ 56,494,106	$ 54,376,305	$ 52,438,430
Retirement fiduciary net position - ending (b)	48,202,223	39,167,586	39,825,142	38,491,949
Retirement's net pension liability - ending (a) - (b)	$ 13,139,556	$ 17,326,520	$ 14,551,163	$ 13,946,481
Retirement fiduciary net position as a percentage of the total pension liability	78.58 %	69.33 %	73.24 %	73.40 %
Covered payroll [1]	$ 10,979,023	$ 10,663,535	$ 10,264,999	$ 9,697,173
Net pension liability as a percentage of covered payroll	119.68 %	162.48 %	141.76 %	143.82 %

[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.

Figure F-33: Schedule of Net Pension Liability - Retirement (Continued)

Fiscal Years Ended June 30,
(Dollars in thousands)

2017	2016	2015	2014
$ 51,780,807	$ 49,000,795	$ 49,222,083	$ 48,490,307
36,202,756	32,859,791	33,645,646	33,693,705
$ 15,578,051	$ 16,141,004	$ 15,576,437	$ 14,796,602
69.92 %	67.06 %	68.35 %	69.49 %
$ 9,518,309	$ 9,125,089	$ 9,226,319	$ 9,027,752
163.66 %	176.89 %	168.83 %	163.90 %

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
2021	$ 1,279,046	$ 1,279,046	$ —	$ 10,979,023	11.65 %
2020	1,220,979	1,220,979	—	10,663,535	11.45 %
2019	1,147,646	1,147,646	—	10,264,999	11.18 %
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 %

[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 and $20,789 in ACR contributions..

[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.

See Notes to Required Supplementary Information.

Exhibit F-35: Schedule of Investment Returns - Retirement

Fiscal Year Ended June 30,	Annual Money-Weighted Rate of Return, Net of Investment Expenses
2021	25.07 %
2020	0.76 %
2019	6.53 %
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

Fiscal Years Ended June 30,
(Dollars in thousands)

	2021	2020	2019	2018	2017
Total OPEB liability:					
Service cost	$ 48,084	$ 47,278	$ 46,994	$ 47,331	$ 43,540
Interest on the total OPEB liability	116,843	117,022	121,992	117,414	116,594
Changes of benefit terms	—	—	—	—	—
Differences between expected and actual experience	(78,370)	(140,870)	(8,586)	(40,460)	—
Changes of assumptions	(24,175)	—	—	84,540	—
Benefit payments, including refunds of employee contributions	(84,724)	(94,153)	(95,241)	(96,098)	(95,720)
Net change in total OPEB liability	(22,342)	(70,723)	65,159	112,727	64,414
Total OPEB liability - beginning	1,633,322	1,704,045	1,638,886	1,526,159	1,461,745
Total OPEB liability - ending (a)	1,610,980	1,633,322	1,704,045	1,638,886	1,526,159
Plan Fiduciary Net Position:					
Contributions - employers	$ 42,816	$ 52,371	$ 47,386	$ 42,976	$ 53,914
Contributions - employees	—	—	—	—	—
OPEB plan net investment income	437,100	15,364	105,788	148,652	190,870
Benefit payments, including refunds of employee contributions	(84,724)	(94,154)	(95,240)	(96,098)	(95,720)
OPEB plan administrative expenses	(1,179)	(1,163)	(1,161)	(1,234)	(1,294)
Other	53	23	13	—	—
Net change in plan fiduciary net position	394,066	(27,559)	56,786	94,296	147,770
Plan fiduciary net position - beginning	1,704,122	1,731,681	1,674,895	1,580,599	1,432,829
Plan fiduciary net position - ending (b)	2,098,188	1,704,122	1,731,681	1,674,895	1,580,599
Net OPEB liability (asset) - ending (a) - (b)	$ (487,208)	$ (70,800)	$ (27,636)	$ (36,009)	$ (54,440)

Note: This schedule is intended to show information for 10 years. Additional years will be displayed as they become available.
Retrospective Rate Adjustment assets are not included in this table.

See Notes to Required Supplementary Information.

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

Fiscal Years Ended June 30,
(Dollars in thousands)

Net OPEB Liability	2021	2020	2019	2018	2017
Total OPEB liability - ending (a)	$ 1,610,980	$ 1,633,322	$ 1,704,045	$ 1,638,886	$ 1,526,159
Plan fiduciary net position - ending (b)	2,098,188	1,704,122	1,731,681	1,674,895	1,580,599
Net OPEB liability (asset) - ending (a) - (b)	$ (487,208)	$ (70,800)	$ (27,636)	$ (36,009)	$ (54,440)
Plan fiduciary net position as a percentage of the total OPEB liability	130.24 %	104.33 %	101.62 %	102.20 %	103.57 %
Covered payroll [1]	$ 10,979,023	$ 10,663,535	$ 10,264,999	$ 9,697,173	$ 9,518,309
Net OPEB liability as a percentage of covered payroll	(4.44) %	(0.66) %	(0.27) %	(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

(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
2021	$ 42,812	$ 42,812	$ —	$ 10,979,023	0.39 %
2020	52,207	52,207	—	10,663,535	0.49 %
2019	47,190	47,190	—	10,264,999	0.46 %
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

Fiscal Year Ended June 30,	Annual Money-Weighted Rate of Return, Net of Investment Expenses
2021	25.08 %
2020	0.76 %
2019	6.52 %
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

Fiscal Years Ended June 30,
(Dollars in thousands)

	2021	2020	2019	2018	2017
Total OPEB Liability:					
Service cost	$ 32,155	$ 30,883	$ 28,477	$ 27,713	$ 27,792
Interest on the total OPEB liability	18,472	18,162	18,372	18,288	19,349
Changes of benefit terms	—	—	—	—	—
Differences between expected and actual experience	517	(2,224)	7,455	1,522	—
Changes of assumptions	(29,478)	—	—	12,889	—
Benefit payments, including refunds of employee contributions	(44,142)	(49,615)	(50,063)	(57,664)	(56,525)
Net change in total OPEB liability	(22,476)	(2,794)	4,241	2,748	(9,384)
Total OPEB liability - beginning	237,141	239,935	235,694	232,946	242,330
Total OPEB liability - ending (a)	214,665	237,141	239,935	235,694	232,946
Plan Fiduciary Net Position:					
Contributions - employers	$ 20,001	$ 18,397	$ 16,633	$ 15,902	$ 13,606
Contributions - employees	19,778	18,169	16,434	15,512	13,342
OPEB plan net investment income	38,703	1,581	10,318	14,760	22,021
Benefit payments, including refunds of employee contributions	(44,142)	(49,615)	(50,063)	(57,664)	(56,525)
OPEB plan administrative expenses	(1,497)	(1,524)	(1,504)	(1,555)	(1,782)
Other	(101)	(519)	(471)	(209)	(358)
Net change in plan fiduciary net position	32,742	(13,511)	(8,653)	(13,254)	(9,696)
Plan fiduciary net position - beginning	161,280	174,791	183,444	196,698	206,394
Plan fiduciary net position - ending (b)	194,022	161,280	174,791	183,444	196,698
Net OPEB pension liability - ending (a) - (b)	$ 20,643	$ 75,861	$ 65,144	$ 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

Fiscal Years Ended June 30,
(Dollars in thousands)

Net OPEB Liability	2021	2020	2019	2018	2017
Total OPEB liability - ending (a)	$ 214,665	$ 237,141	$ 239,935	$ 235,694	$ 232,946
Plan fiduciary net position - ending (b)	194,022	161,280	174,791	183,444	196,698
Net OPEB liability - ending (a) - (b)	$ 20,643	$ 75,861	$ 65,144	$ 52,250	$ 36,248
Plan fiduciary net position as a percentage of the total OPEB liability	90.38 %	68.01 %	72.85 %	77.83 %	84.44 %
Covered payroll [1]	$ 10,979,023	$ 10,663,535	$ 10,264,999	$ 9,697,173	$ 9,518,309
Net OPEB liability as a percentage of covered payroll	0.19 %	0.71 %	0.63 %	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

(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
2021	$ 19,778	$ 19,778	$ —	$ 10,979,023	0.18 %
2020	18,169	18,169	—	10,663,535	0.17 %
2019	16,434	16,434	—	10,264,999	0.16 %
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

Fiscal Year Ended June 30,	Annual Money-Weighted Rate of Return, Net of Investment Expenses
2021	25.19 %
2020	0.75 %
2019	6.45 %
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 2021 contribution rates are described below based on the actuarial valuation study for the year ended June 30, 2019, reflecting the 2017 Experience Study results.

Exhibit F-44: Actuarial Assumptions - Retirement

Assumptions	
Actuarial valuation date	June 30, 2019
Actuarial cost method	Entry age normal
Amortization Method	2.5% growth
Remaining amortization period	30 years each new layer
Asset valuation	10-Year smoothed market
Discount rate	7.5%
Projected salary increases	2.7 - 7.2%
Inflation	2.3%
Permanent benefit increase	Included, 0.30%
Mortality rates	2017 SRA Scale U-MP

Exhibit F-45: Actuarial Assumptions - HBS

Assumptions	
Actuarial valuation date	June 30, 2019
Actuarial cost method	Entry age normal
Amortization method	2.5% growth
Asset valuation method	10-Year smoothed market
Inflation	2.3%
Investment Rate of Return	7.5%
Mortality rates	2017 SRA Scale U-MP
Healthcare Trend Rates	N/A

Exhibit F-46: Actuarial Assumptions - LTD

Assumptions	
Actuarial valuation date	June 30, 2019
Actuarial cost method	Entry age normal
Amortization method	2.5% growth
Asset valuation method	10-Year smoothed market
Inflation	2.3%
Investment Rate of Return	7.5%
Mortality rates	2017 SRA Scale U-MP
Healthcare Trend Rates	N/A

Transition to New Experience Study

The ASRS commissioned a new actuarial experience study adopted by the Board on July 30, 2021, in order to update actuarial assumptions and thereby more accurately portray its actuarial condition. The contribution rates for fiscal year 2021 were based on the 2017 Experience Study. The contribution rates for fiscal year 2022 were calculated in the June 30, 2020 actuarial valuation and were also based on the 2017 Experience Study. The contribution rates for fiscal year 2023 will be based on the updated assumptions.

The major changes in assumptions were the discount rate/assumed rate of return, wage inflation, individual merit and promotion increases, form of payment for vested deferred members and the Health Insurance Benefit (HIB) election. See Notes 8 and 9 for the assumptions used for pension and OPEB liabilities.

Significant Factors Affecting Identification of Trends

The following information is an executive summary of the 2021 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, 2015, through June 30, 2020.

The ASRS Board adopted all of the proposed assumptions at its meeting on July 30, 2021. The assumptions adopted by the ASRS Board will be included in the June 30, 2021, funding valuations. With respect to the retirement fund for GASB reporting purposes, the June 30, 2020, values were rolled forward to June 30, 2021 and adjusted for the new assumption set.

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
- Form of payment election for deferred members
- 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 return rate, 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 2021 Experience Study, adopted by the ASRS Board in its meeting on July 30, 2021, are summarized as follows:

Economic Assumptions

- We recommend decreasing the nominal investment return assumption from 7.50%. A rate of 7.00% is close to the expected return in our independent capital market analysis over a longer time horizon.
- We recommend maintaining the inflation assumption of 2.30%.
- We recommend a general wage inflation (GWI) assumption of 2.70%. 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 2.90%, made up of a 2.30% price inflation and a 0.46% for general productivity and individual merit and promotion.
- We recommend a payroll growth assumption equal to the GWI assumption of 2.70%. This is the rate amortization payments are anticipated to grow in the future.
- We recommend future PBIs continue to be reflected in the funding calculations at a rate of 0.30% per year in conjunction with a 7.00% investment return assumption.

Mortality Assumptions

- We recommend maintaining the post-retirement mortality tables for non-disabled retirees that reflect recent ASRS member experience. We also recommend maintaining the generational mortality improvement approach in accordance with the Ultimate MP scales (effective 2020) and projected from the year 2017.
- We recommend updating post-retirement mortality tables for active members and disabled retirees to the most recently published public sector tables, the Pup-10, General, Amount Weighted tables for active members and disabled lives, respectively. We also recommend maintaining the generational mortality improvement approach in accordance with the Ultimate MP scales (effective 2020) and projected from the year 2010.

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 decreases to the disability patterns for members consistent with ASRS experience and future expectations.
- We recommend updating the form of payment assumption for vested deferred members that recognizes the fact that not all members choose the most valuable option
- We recommend adjusting the participation assumption for the Health Insurance Supplement

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 with direct offsetting of unrecognized gains and losses.
- We recommend continuing the use of 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 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.

Assumptions Specific to the Long Term Disability Program

- We recommend continuing to use the recovery rates from 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 no changes to the offset methodology for current LTD recipients that 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 no changes to the offset methodology for future LTD recipients such that the benefits, after all applicable offsets, are 60% of the benefits before the offsets.

Additional Supplementary Information

Combining Schedule of Retirement Fiduciary Net Position

As of June 30, 2021
(Dollars in thousands)

	Retirement Plan	Retirement System	Total Retirement Fund
Assets			
Cash	$ 264,395	$ 1,162	$ 265,557
Receivables:			
Accrued interest and dividends	31,094	137	31,231
Securities sold	7,659	34	7,693
Futures contracts	3,900	17	3,917
Contributions	90,131	—	90,131
Investment Receivables	33,529	147	33,676
Other Receivables	2,027	1	2,028
Total receivables	168,340	336	168,676
Investments:			
Cash and short-term investments	918,059	4,034	922,093
Equity	25,868,318	113,659	25,981,977
Fixed Income - Interest Rate Sensitive	3,448,198	15,151	3,463,349
Fixed Income - Credit	9,838,317	43,227	9,881,544
Real estate	7,507,986	32,988	7,540,974
Total investments	47,580,878	209,059	47,789,937
Securities lending collateral	910	4	914
Total assets	48,014,523	210,561	48,225,084
Liabilities			
Securities purchased	5,385	24	5,409
Securities lending collateral	910	4	914
Futures contracts	3,073	14	3,087
Due to other funds	(8,923)	13,304	4,381
Other	9,005	65	9,070
Total Liabilities	9,450	13,411	22,861
Net position restricted for pension benefits	$ 48,005,073	$ 197,150	$ 48,202,223

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 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.

Additional Supplementary Information

Combining Schedule of Changes in Retirement Fiduciary Net Position

For the Year Ended June 30, 2021

(Dollars in thousands)

	Retirement Plan	Retirement System	Total Retirement Fund
Additions			
Contributions:			
Member contributions	$ 1,321,694	$ —	$ 1,321,694
Employer contributions	1,311,380	—	1,311,380
Transfers from other plans	745	—	745
Purchased Service	14,176	—	14,176
Total Contributions	2,647,995	—	2,647,995
Investment Activity:			
Investment activity income:			
Net appreciation in fair value of investments	9,801,551	46,431	9,847,982
Interest	52,955	254	53,209
Dividends	325,473	1,545	327,018
Other income	23,302	112	23,414
Total investment activity income	10,203,281	48,342	10,251,623
Investment activity expense:			
Management fees	(179,090)	(846)	(179,936)
Custody fees	(1,982)	(9)	(1,991)
Consultant and legal fees	(7,431)	(33)	(7,464)
Internal investment activity expense	(4,344)	(19)	(4,363)
Total investment activity expense	(192,847)	(907)	(193,754)
Net income from investment activities	10,010,434	47,435	10,057,869
Securities lending activities:			
Securities lending income	2,500	12	2,512
Interest rebate	1,503	7	1,510
Management fees	(412)	(2)	(414)
Net income from securities lending activities	3,591	17	3,608
Total net investment income	10,014,025	47,452	10,061,477
Other income	102	—	102
Total additions	12,662,122	47,452	12,709,574
Deductions			
Retirement and disability benefits	3,304,774	37,094	3,341,868
Survivor benefits	72,500	54	72,554
Refunds to withdrawing member, including interest	232,537	—	232,537
Administrative expenses	26,987	117	27,104
Transfers to other plans	293	—	293
Other	582	(1)	581
Total deductions	3,637,673	37,264	3,674,937
Net increase in net position	9,024,449	10,188	9,034,637
Net position restricted for pension benefits			
Beginning year	38,980,624	186,962	39,167,586
End of year	$ 48,005,073	$ 197,150	$ 48,202,223

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 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, 2021

(Dollars in thousands)

Administrative Expense		
Personnel services:		
Salaries	$	13,454
Retirement contributions		1,623
Other employee related expenses		3,693
Total personnel services		18,770
Professional services:		
Actuarial services		488
Attorney services		316
Auditing services		90
LTD administrative services		1,393
Staffing services		3,182
Other professional services		358
Total professional services		5,827
Communications:		
Telephone		483
Printing		70
Postage and mailing		194
Total communications		747
Facilities:		
Lease expense		1,578
Total facilities		1,578
Software and equipment:		
Computer supplies and software		1,819
Maintenance agreements		24
Equipment and equipment rental		237
Total software and equipment		2,080
Education, meetings, and travel:		
Professional development		47
Travel		5
Tuition reimbursement		23
Total education, meetings, and travel		75
General:		
Advertising		9
Insurance		317
Membership dues		92
Office supplies		39
Periodicals and publications		245
Miscellaneous		1
Total general		703
Total administrative expenses	$	29,780

Exhibit F-48: Schedule of Professional Consultant Fees

For the Year Ended June 30, 2021
(Dollars in thousands)

Professional/Consultant		
Actuarial services:		
Segal Co	$	226
Gabriel, Roeder, Smith & Company (GRS)		262
Total actuarial services		488
Attorney & Legal services:		
Fennemore Craig, P.C.		73
Arizona Office of the Attorney General		231
Charles W. Whetstine, P.C.		9
Atkinson-Baker, Inc.		2
Total attorney services		315
Auditing services:		
CliftonLarsonAllen, LLP		141
Total auditing services		141
LTD program administrative services:		
Broadspire Management		1,393
Total LTD program administrative services		1,393
Staffing services:		
Guidesoft Inc.		3,182
Total staffing services		3,182
Other professional services:		
Guidesoft Inc.		91
MBI Industrial Medicine, Inc.		76
Mosaic451 LLC		16
Sunshine Moving Co.		7
Arizona Department Of Administration		2
SHI International Co		116
Total other professional services		308
Total professional and consulting services	$	5,827

Exhibit F-49: Schedule of Investment Expenses

For the Year Ended June 30, 2021
(Dollars in thousands)

	Management Fees	Other Expenses	Total
Investing Activity			
Public Investments Management Fees:			
Public Equity	$ 3,037	$ —	$ 3,037
Public Interest Rate Sensitive	339	—	339
Public Credit	2	—	2
Total Public Investments Management Fees	3,378	—	3,378
Private Investments Management Fees:			
Private Equity	53,656	—	53,656
Private Debt	59,867	—	59,867
Real Estate	47,698	—	47,698
Distressed Debt	17,628	—	17,628
Other Credit	6,219	—	6,219
Total Private Investments Management Fees	185,068	—	185,068
Total Management Fees	188,446	—	188,446
Investment custodial fees:			
State Street Bank and Trust Company	—	2,086	2,086
Total investment custodial fees	—	2,086	2,086
Investment consultant fees:			
RCLCO	—	4,407	4,407
Aksia LLC	—	758	758
State Street Bank And Trust Company	—	750	750
NEPC, LLC	—	400	400
Meketa Investment Group	—	280	280
Institutional Shareholder Svcs Inc.	—	41	41
Glass, Lewis & Co.	—	17	17
Chicago Clearing Corporation	—	6	6
Total investment consultant fees	—	6,659	6,659
Outside investment legal fees:			
Foley & Lardner LLP	—	790	790
Cox, Castle & Nicholson LLP	—	266	266
Ballard Spahr LLP	—	41	41
Fried Frank Harris Shriver & Jacobson	—	30	30
Reinhart Boerne Van Deuren s.c.	—	21	21
Ropes & Gray LLP	—	11	11
Total outside investment and legal fees	—	1,159	1,159
Internal investment activity expenses - see detailed schedule	—	4,570	4,570
Total Investing Activity	$ 188,446	$ 14,474	$ 202,920
Securities Lending Activity			
Securities Lending Borrower Rebates (Income)	$ —	$ (1,582)	$ (1,582)
Securities Lending Management Fees	434	—	434
Total Securities Lending Activity Expenses (Income)	$ 434	$ (1,582)	$ (1,148)

Exhibit F-50: Schedule of Internal Investment Activity Expenses

For Year Ended June 30, 2021

(Dollars in thousands)

Expense		Total
Personnel services:		
Salaries	$	1,308
Employee Insurance		126
Retirement Contributions - ASRS		155
Other Personnel Expense		106
Total Personnel Services		1,695
Facilities:		
Lease expense		38
Total Facilities		38
Education, meetings and travel:		
Professional development		4
Tuition		2
Total Education, Meetings and Travel		6
General administrative expense:		
Research and information services		2,808
Membership dues		13
Equipment		2
Telephone		1
Miscellaneous		7
Total general administrative expense		2,831
Total internal investment activity expense	$	4,570

Investment Section

An agency of the State of Arizona

ARIZONA STATE RETIREMENT SYSTEM

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November 1, 2021

Dear Members,

It is a privilege to provide this Investment Section to the Comprehensive Annual Financial Report of the Arizona State Retirement System. In this section we discuss our investment strategy, the investment environment and our investment results. We will also discuss our commitment to compliance, governance, measurement, and transparent reporting. Finally, we provide various documents and schedules providing detailed information about the ASRS investment program.

Investment Strategy

The ASRS investment team manages the investments in accordance with a Board approved strategic asset allocation. The team then seeks to enhance returns compared to the strategic asset allocation benchmarks through both the development and implementation of its asset class implementation plans as well as tactical positioning relative to strategic targets. 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.

We believe that on average, and over longer periods of time, investment returns are rewards for risks taken. In order to mitigate aggregate risk to the fund, the ASRS has developed a highly diversified portfolio across multiple global markets including public and private equity, interest rate sensitive, private credit and real estate. The diversity of the program expands opportunities for returns while also 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. As a result, the ASRS can accept shorter-term market fluctuations in order to position the portfolio for longer-term gains. We are a value oriented investor and, at times, will buy in markets out of favor and await their expected recovery.

ASRS maintains a high level of liquidity in its portfolio, including investments which are over thirty times the net amount required to fund annual benefit payments. 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 by allowing it to provide liquidity to other market participants who may have less flexibility and more unpredictable cash needs. ASRS capitalizes on this by participating in less liquid private markets for equities, real estate and credit. These programs have also enhanced the diversification of our investments.

According to our independent investment consultant NEPC, *the combined effect of these efforts has been to place the ASRS among the top 20% of investment returns earned by U.S. public pension plans larger than $1 billion over the last ten years.*

Investment Environment

Gross Domestic Product (total value of goods and services produced within a country in a year) grew at a 6.6% annual rate in Q2 2021 and regained the level last seen in February 2020 (prior to the Coronavirus pandemic global shutdown). In the U.S., policy actions to support both individuals and business kept incomes in aggregate from falling, even though job losses were at their steepest in 70 years. Over 22 million jobs were lost in March and April of 2020, and only 15.5 million of those jobs have since been filled, leaving a deficit of 7 million jobs. The lost or unfilled jobs were spread across many industries, but the most impacted have been in certain lower-paid sectors with concentration in travel related and service sectors.

Quick and decisive action by major central banks to inject liquidity maintained order in financial markets. National governments quickly stabilized economies with very large fiscal and monetary stimulus and as a result of these actions, global financial markets quickly recovered with some equity markets moving to all-time highs.

Table 1 shows annualized market returns for the last 10 years for major public market asset classes.

TABLE 1
INDEX PERFORMANCE FOR PERIOD ENDING JUNE 30, 2021

	1 Yr	3 Yrs	5 Yrs	10 Yrs
U.S. Equity				
Russell 3000	44.2%	18.7%	17.9%	14.7%
S&P 500	40.8%	18.7%	17.7%	14.8%
Russell 2000	62.0%	13.5%	16.5%	12.3%
International Equity				
MSCI ACWI Ex USA	35.7%	9.4%	11.1%	5.5%
MSCI EAFE Net (USD)	32.4%	8.3%	10.3%	5.9%
MSCI EAFE Small Cap	41.0%	8.4%	12.0%	8.4%
MSCI Emerging Markets	40.9%	11.3%	13.0%	4.3%
Domestic Fixed Income				
Barclays Aggregate	-0.3%	5.3%	3.0%	3.4%
Barclays US High Yield	15.4%	7.4%	7.5%	6.7%
BofA ML US 3-Month T-Bill	0.1%	1.3%	1.2%	0.6%
Barclays US TIPS 1-10 Yr	6.6%	5.7%	3.6%	2.6%
Real Estate				
NCREIF ODCE Net Lagged	1.5%	4.0%	5.3%	8.7%
Wilshire REIT Index	37.5%	10.1%	6.4%	9.4%

Investment Results

Investment returns for periods ending June 30, 2021 are 25.1%, 10.3%, 10.9%, and 8.9% for the one, three, five and ten year periods were strong on an absolute basis. With the exception of the trailing one year period excess return of -1.7%, all other trailing year returns (three, five and ten year) have exceeded benchmarks returns by 0.2%, 1.2%, and 0.9%, respectively (Table 2). ASRS investments have also exceeded both the prior actuarial return of 7.5% and the newly adopted 7.0% over trailing the 1, 3, 5 and 10 year periods. On a very long run basis, ASRS has earned annual compound returns of 9.8% per year for the last 46 years.

TABLE 2

ASRS TOTAL FUND PERFORMANCE FOR PERIOD ENDING JUNE 30, 2021

	1 Yr	3 Yrs	5 Yrs	10 Yrs	Inception (July 1975)
ASRS Fund	25.1%	10.3%	10.9%	8.9%	9.8%
Benchmark	26.8%	10.1%	9.7%	8.0%	9.4%
Excess Return	-1.7%	0.2%	1.2%	0.9%	0.4%

Stated in terms of dollars, even modest differences in returns compounded over multiple years have a large impact on the value of the total fund. Over ten years, the 0.9% out performance added approximately $3.8 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 Manual and various Strategic Investment Policies and Standard Operating Procedures which have been adopted by the board and ASRS management.

The investment program is further guided by an Investment Policy Statement which incorporates formal and clear Investment Beliefs. The portfolio is structured in accordance with a Board approved Strategic Asset Allocation, which is developed by the Board’s independent external investment consultant in conjunction with ASRS staff. 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 Board’s independent external investment consultant and the Board Investment Committee. In accordance with written policies, investment decisions are made by a staff asset class committee which typically meets weekly and are documented by formal minutes and meeting materials which consist of staff reports and external consultant reports. The Board’s independent external investment consultant attends the asset class committee meetings to remain informed on investment matters and to ensure 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. In addition, the ASRS created and filled the new position of Risk and Compliance Officer, who works closely with the investment team and reports to the Executive Director.

Cost

Cost management is one of the most important ways to improve investment performance. ASRS focuses on and 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 active 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.

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 approximately 75% of private market assets.

Reporting and Performance Measurement

ASRS has implemented a comprehensive and transparent system of reports to keep the Board, Investment Committee, and 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.

ASRS believes that 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.

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,

Paul Matson, Executive Director and Interim Chief Investment Officer
Michael Viteri, 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 ASRS 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 the ASRS' aggregate investment portfolio to other public pension funds with over $1 billion of assets under management. Though the 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:

a. Complementary use of absolute and relative rates-of-return perspectives.

b. Complementary use of asset-only and asset-liability perspectives.

c. Complementary use of economic and actuarial perspectives.

Objectives

Total Fund Performance

1. Develop, implement, and maintain an Asset Allocation program that is expected to achieve a 20-year rolling average annual rate of return at or above the actuarial assumed rate.

Twenty-Year Total Fund Net Rate of Return	Twenty Years	
	Actual	Benchmark[1]
Twenty-year rolling annual total fund net rate of return	7.1 %	7.9 %

[1] The benchmark rate was 8.0% for 16 years, and 7.5% for the 4 most recent years, averaging 7.9% 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 Year	
	Actual	Benchmark	Actual	Benchmark
Rolling annual total fund net rate of return	25.1 %	26.8 %	10.3 %	10.1 %

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 Year	
	Actual	Benchmark	Actual	Benchmark
Equity	41.0 %	44.2 %	13.6%	14.1%
Interest Rate Sensitive	-0.4 %	-0.3 %	5.4%	5.3%
Credit	13.8 %	23.7 %	9.0%	6.7%
Real Estate	8.4 %	1.6 %	5.0%	3.8%

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:**

   Asset Class Valuations

   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.

   Security Valuations

   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 ASRS 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, ASRS Board Committees, and ASRS 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:

<u>Portfolio Construction Decisions:</u>

- 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 Capital Market Assumptions.
- Tactical deviation decisions are based on shorter term (less than 3-5 years) capital market expectations.

Contribution Rate Determination:

- Liabilities are discounted based upon long-term capital market expectations.
- Contribution rates are set based upon longer term (currently 10 year) investment valuation smoothing periods, and longer term (currently 25 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 ASRS 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 and Internal Audit divisions on a quarterly and annual basis. Asset class positions, and asset class performance are reported to the Investment Committee/ASRS 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 ASRS 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, ASRS 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 ASRS Board policies and provide detailed 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 2021, the ASRS asset allocation policy targets and ranges were as follows:

Asset Class	Current Allocation Target as of June 30, 2021	Policy Range as of June 30, 2021
Equity	50 %	35-65%
Credit	20 %	10-30%
Interest Rate Sensitive	10 %	0-20%
Real Estate	20 %	10-30%
Other	0 %	0-10%
Cash	0 %	0-5%
Total	100 %	

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]	$	985,158	2.0 %
Interest Rate Sensitive[3]		3,631,116	7.3 %
Credit			
Public Credit		551	0.1 %
Private Debt		7,323,541	14.5 %
Distressed Debt		1,476,905	2.9 %
Other Credit		1,548,519	3.1 %
Total Credit		10,349,516	20.6 %
Equity			
U.S. Equity		12,342,771	24.6 %
International Equity		9,026,580	18.0 %
Private Equity		5,843,088	11.7 %
Total Equity		27,212,439	54.3 %
Real Estate		7,898,102	15.8 %
Total	$	50,076,331	100 %

[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

[3] Includes $3.7M of U.S. Treasury Bills in the Interest Rate Sensitive Portfolio classified as short-term investments on the Statements of Fiduciary Net Position

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**	**Inception**
Total Fund	**25.1%**	**10.3%**	**10.9%**	**9.8%**
Interim SAA Policy Benchmark	26.8%	10.1%	9.7%	9.4%
Public Equity	**41.3%**	**13.6%**	**14.1%**	**7.9%**
Custom Total Public Equity Benchmark	41.3%	14.6%	15.0%	7.6%
Domestic Equity	**44.7%**	**17.2%**	**16.6%**	**11.7%**
Custom Domestic Equity Benchmark	44.4%	18.9%	18.0%	11.9%
International Equity	**37.1%**	**9.4%**	**11.2%**	**6.4%**
Custom International Equity Benchmark	37.2%	9.4%	11.3%	6.2%
Interest Rate Sensitive Fixed Income	**(0.4%)**	**5.4%**	**3.1%**	**7.7%**
Bloomberg Barclays US Aggregate TR	(0.3%)	5.3%	3.0%	—

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

	Money-Weighted Rates of Return[1]			
Asset Class / Benchmark	**1 Year**	**3 Year**	**5 Year**	**Inception**
Private Equity	**39.6%**	**14.0%**	**14.6%**	**12.7%**
MSCI ACWI Blended	57.7%	12.4%	14.5%	12.5%
Private Credit	**14.2%**	**9.3%**	**10.2%**	**9.8%**
S&P LSTA/Leveraged Loan Index + 2.5%	23.6%	7.1%	7.8%	7.6%
Real Estate	**8.4%**	**5.0%**	**6.6%**	**7.6%**
NCREIF ODCE	1.6%	3.8%	4.9%	5.8%

[1] Performance of private market portfolios and corresponding benchmarks are reported on a one quarter lag.

Exhibit I-5: Equity Sub-Sector Allocation

June 30, 2021
(Dollars in thousands)

Sub-Sector	% of Equity Portfolio	Fair Value
Domestic Equity		
U.S. Large Cap	34.37 %	$ 9,353,481
U.S. Mid Cap	5.85 %	1,591,075
U.S. Small Cap	5.14 %	1,398,215
Total Domestic Equity	45.36 %	12,342,771
International - Developed Markets	23.17 %	6,305,619
Commingled - Int'l Emerging Markets	10.00 %	2,720,961
Private Equity	21.47 %	5,843,088
Total Equity	100.00 %	$ 27,212,439

Note: Schedule does not include securities lending collateral investments.

Exhibit I-6: Ten Largest Stock Holdings

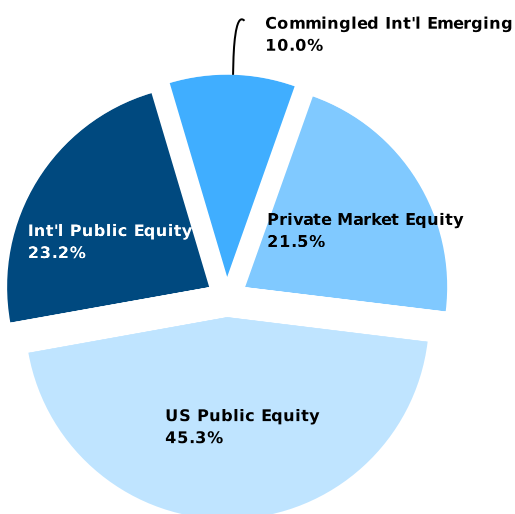
June 30, 2021
(Dollars in thousands)

Company	Shares	Fair Value
APPLE INC	4,703,611	$ 644,207
MICROSOFT CORP	2,007,486	543,828
AMAZON.COM INC	119,923	412,554
FACEBOOK INC CLASS A	673,947	234,338
ALPHABET INC CL C	82,596	207,012
ALPHABET INC CL A	84,259	205,743
TESLA INC	215,142	146,231
NVIDIA CORP	173,429	138,761
JPMORGAN CHASE + CO	854,957	132,980
JOHNSON + JOHNSON	736,491	121,330
Total	9,651,841	$ 2,786,984

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

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

Equity Allocation



Stock Holdings

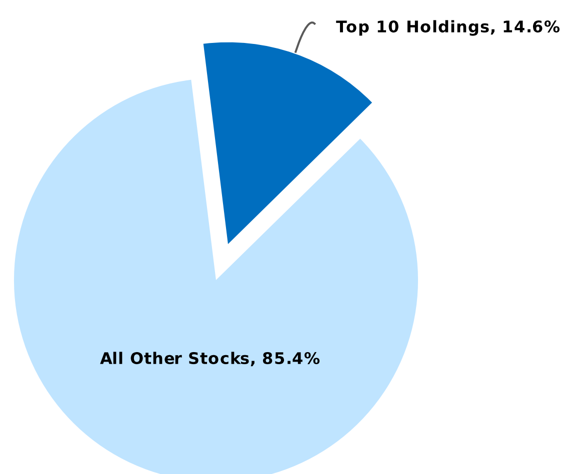


Exhibit I-7: Fixed Income Sub-Sector Allocation

June 30, 2021

(Dollars in thousands)

Sub-Sector	% of Fixed Income Portfolio	Fair Value
Fixed Income Securities		
Public Credit	0.01 %	$ 551
Public Interest Rate Sensitive	13.87 %	1,938,996
Total U.S. Fixed Income	13.88 %	1,939,547
Commingled funds - Fixed Income	12.10 %	1,692,120
Private Debt funds	52.38 %	7,323,541
Distressed Debt funds	10.56 %	1,476,905
Other Credit funds	11.08 %	1,548,519
Total Fixed Income	100.00 %	$ 13,980,632

Note: Schedule does not include securities lending collateral investments and includes in Public Interest Rate Sensitive $3.7M of U.S. Treasury Bills classified as Short Term Investments on the Statements of Fiduciary Net Position

Fixed Income Allocation

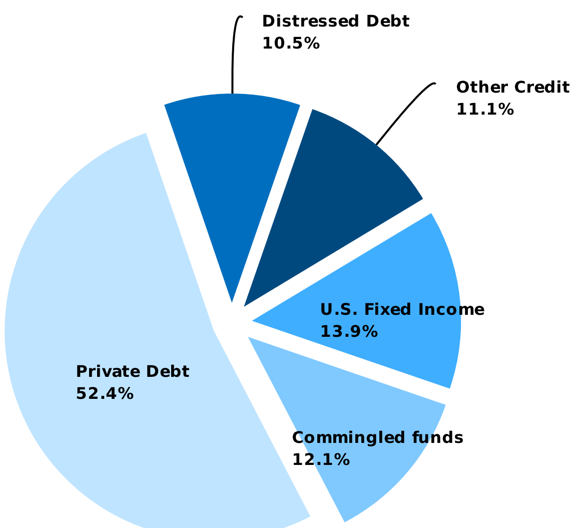


Exhibit I-8: Ten Largest Bond Holdings

Year Ended June 30, 2021
(Dollars in thousands)

Holding	Coupon	Maturity	Rating	Par Value	Fair Value
US TREASURY N/B	2.75	11/15/2023	AAA	$ 33,000	$ 34,892
US TREASURY N/B	2.5	2/28/2026	AAA	30,000	32,304
US TREASURY N/B	2.75	2/15/2028	AAA	26,000	28,649
FNMA POOL MA4100	2	8/1/2050	AAA	25,701	25,978
FNMA POOL MA4096	2.5	8/1/2050	AAA	23,078	23,870
US TREASURY N/B	2.375	5/15/2029	AAA	21,000	22,664
US TREASURY N/B	2.625	2/28/2023	AAA	20,000	20,809
US TREASURY N/B	1.375	2/15/2023	AAA	20,000	20,385
FED HM LN PC POOL QA3637	3	10/1/2049	AAA	19,487	20,312
US TREASURY N/B	2.375	8/15/2024	AAA	18,999	20,116
Total				$ 237,265	$ 249,979

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

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

Schedule of Broker Commissions

Exhibit I-9: Domestic Trade Commissions

Year Ended June 30, 2021

(Dollars and shares/instruments in thousands)

Equity Broker Name	Dollar Amount of Commission	Number of Shares	Commission per Share
GOLDMAN SACHS + CO LLC	$ 191	24,008	$ 0.0080
BOFA SECURITIES, INC.	138	20,095	0.0069
MORGAN STANLEY CO INCORPORATED	78	7,143	0.0109
INSTINET LLC	48	9,503	0.0051
PERSHING LLC	47	9,058	0.0052
PIPER JAFFRAY & CO.	38	6,736	0.0056
RAYMOND JAMES AND ASSOCIATES INC	37	1,917	0.0193
CITIGROUP GLOBAL MARKETS INC	33	1,440	0.0229
FRANK RUSSELL SEC/BROADCORT CAP CLEARING	29	3,160	0.0092
COWEN EXECUTION SERVICES LLC	21	3,369	0.0062
LIQUIDNET INC	18	1,025	0.0176
THEMIS TRADING LLC	15	2,149	0.0070
KEYBANC CAPITAL MARKETS INC	13	872	0.0149
BARCLAYS CAPITAL INC./LE	13	1,277	0.0102
WELLS FARGO SECURITIES, LLC	12	634	0.0189
EVERCORE ISI	11	503	0.0219
J.P. MORGAN SECURITIES LLC	9	230	0.0391
RBC CAPITAL MARKETS, LLC	6	322	0.0186
ROBERT W. BAIRD CO.INCORPORATED	4	213	0.0188
STIFEL NICOLAUS + CO INC	2	53	0.0377
UBS SECURITIES LLC	2	47	0.0426
CREDIT SUISSE SECURITIES (USA) LLC	2	47	0.0426
VARIOUS OTHER BROKERS[1]	4	903	0.0044
Total Equity	$ 771	94,704	$ 0.0081

Derivative Broker Name	Dollar Amount of Commission	Number of Instruments	Commission per Instrument
MORGAN STANLEY CO INCORPORATED	$ 350	$ 44	$ 7.9545
RJ O'BRIEN	93	13	7.1538
STATE STREET BANK INTERNATIONAL GMBH	21	3	7.0000
RBS SECURITIES INC.	21	2	10.5000
GOLDMAN SACHS + CO LLC	3	1	2.0000
Total Derivatives	$ 488	$ 63	$ 7.7460
Total Domestic Trade Commissions	$ 1,259	N/A	N/A

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

[1] Brokers with commissions under $1,000 have been grouped into "Various Other Brokers"

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

Exhibit I-10: Foreign Trade Commissions

Year Ended June 30, 2021

(Dollars and shares/instruments in thousands)

Equity Broker Name	Dollar Amount of Commission	Number of Shares	Commission Per Share
CLSA SINGAPORE PTE LTD.	$ 50	24,109	$ 0.0021
COWEN EXECUTION SERVICES LLC	41	10,595	0.0039
VIRTU ITG EUROPE LIMITED	35	10,787	0.0032
GOLDMAN SACHS INTERNATIONAL	19	4,502	0.0042
UBS AG	18	7,344	0.0025
GOLDMAN SACHS + CO LLC	16	3,923	0.0041
INSTINET U.K. LTD	14	3,386	0.0041
BMO NESBITT BURNS INC	11	2,673	0.0041
MACQUARIE CAPITAL SECURITIES S	10	3,905	0.0026
CREDIT SUISSE SECURITIES (EUROPE) LIMITE	9	5,226	0.0017
CLSA AUSTRALIA PTY LTD	9	6,799	0.0013
MERRILL LYNCH INTERNATIONAL	9	2,941	0.0031
J.P. MORGAN SECURITIES PLC	9	3,747	0.0024
EXANE S.A.	8	5,047	0.0016
DEUTSCHE BANK AG	8	4,700	0.0017
WINTERFLOOD SECURITIES LTD	7	5,034	0.0014
CREDIT LYONNAIS SECURITIES(ASIA)	7	17,942	0.0004
ITG AUSTRALIA LTD.	7	5,276	0.0013
UBS SWITZERLAND AG	5	1,029	0.0049
INSTINET AUSTRALIA CLEARING SRVC PTY LTD	4	4,850	0.0008
CANADIAN IMPERIAL BANK OF COMMERCE	4	910	0.0044
BARCLAYS CAPITAL	4	3,066	0.0013
CITIGROUP GLOBAL MARKETS LIMITED	3	1,909	0.0016
RBC DOMINION SECURITIES INC.	3	763	0.0039
J.P. MORGAN SECURITIES LIMITED	3	315	0.0095
UBS AG LONDON BRANCH	3	280	0.0107
VARIOUS OTHER BROKERS[1]	27	18,528	0.0015
Total Equity	$ 343	159,586	$ 0.0022

Derivative Broker Name[2]	Dollar Amount of Commission	Number of Instruments	Commission Per Instrument
SOCIETE GENERALE	$ 12	5	$ 2.4000
Total Derivatives	$ 12	5	$ 2.4000
Total Foreign Trade Commissions	$ 355	N/A	N/A

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

[1] Brokers with commissions under $3,000 have been grouped into "Various Other Brokers"

[2] Only derivative brokers with total commissions over $1,000 have been included in this table

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

Exhibit I-11: Schedule of Investment Fees

Year Ended June 30, 2021
(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	$ 21,369,351	$ 3,037	$ —	$ 3,037
Private Equity	5,843,088	53,656	434,626	488,282
Total Equity	27,212,439	56,693	434,626	491,319
Fixed Income:				
Interest Rate Sensitive	3,631,116	339	—	339
Public Credit	551	2	—	2
Private Debt	7,323,541	59,867	144,883	204,750
Distressed Debt	1,476,905	17,628	21,066	38,694
Other Credit	1,548,519	6,219	3,797	10,016
Total Fixed Income	13,980,632	84,055	169,746	253,801
Real Estate	7,898,102	47,698	68,659	116,357
Total	$ 49,091,173	$ 188,446	$ 673,031	$ 861,477

[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 fees directly.

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 including placement fees of approximately $296 thousand.

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Actuarial Section

An agency of the State of Arizona

P: 469.524.0000 | www.grsconsulting.com

October 12, 2021

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, 2020, 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, 2021. 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, 2020, 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.

5605 North MacArthur Boulevard | Suite 870 | Irving, Texas 75038-2631

Board of Trustees
October 12, 2021
Page 2

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on July 30, 2021 based on the Actuarial Experience Study covering a five-year period from July 1, 2015 to June 30, 2020. Please see the experience study presentations dated May 28, 2021 and July 30, 2021 for more information related to the economic and demographic assumptions.

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. Furthermore, the assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice.

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 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 25-year amortization period with level percent of pay 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 three-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 (24.23% of payroll) will apply in the fiscal year beginning July 1, 2021. The rate calculated as part of the prior valuation (23.69% of payroll) applied in the fiscal year that began July 1, 2020.

Board of Trustees
October 12, 2021
Page 3

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 $15.68 billion as of June 30, 2019 to $16.07 billion as of June 30, 2020. Additionally, the funded ratio of ASRS for the 401(a) benefits—actuarial value of assets divided by the actuarial accrued liability—increased from 71.3% to 71.7% as of June 30, 2020. 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
Pension Market Leader

Paul T. Wood, ASA, FCA, MAAA
Team Leader

P: 469.524.0000 | www.grsconsulting.com

October 12, 2021

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, 2020, 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, 2021. GRS prepared the following schedules (information prior to 2016 was provided by ASRS):

- Exhibit F-27: Net OPEB Liability (Asset) of Employers - HBS
- Exhibit F-31: Discount Rate Sensitivity
- 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, 2020, 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.

5605 North MacArthur Boulevard | Suite 870 | Irving, Texas 75038-2631

Board of Trustees
October 12, 2021
Page 3

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
Pension Market Leader

Paul T. Wood, ASA, FCA, MAAA
Team Leader

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 25-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 in 2017 to phase in the impact to the contribution of the assumption changes over a five-year period beginning with fiscal year 2019. 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 (24.44% of payroll) will apply in the fiscal year beginning July 1, 2021. The rate calculated as part of the prior valuation (24.08% of payroll) applied in the fiscal year that began July 1, 2020. 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 $15,559 million as of June 30, 2019, to $15,856 million as of June 30, 2020. Additionally, the funded ratio of the ASRS – actuarial value of assets divided by the actuarial accrued liability – increased from 72.3% as of June 30, 2019, to 72.8% as of June 30, 2020.

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, 2020, actuarial valuation report is available at our website, https://azasrs.gov.

Please reference Exhibit F-34 Schedule of Employer Contributions - Retirement in the 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

Normal Retirement Benefits are calculated by taking 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

A member is eligible for early retirement at age 50 with five or more years of credited service.

5. Early Retirement Benefits

Early Retirement Benefits are calculated using the 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 %
10-17.99	44 %	49 %	54 %	59 %	64 %	69 %	74 %	79 %	84 %	89 %	94 %	97 %	100 %	100 %	100 %	100 %
18	44 %	49 %	54 %	59 %	64 %	69 %	74 %	79 %	84 %	91 %	94 %	97 %	100 %	100 %	100 %	100 %
19	44 %	49 %	54 %	59 %	64 %	69 %	74 %	79 %	91 %	94 %	97 %	100 %	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 after 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	Equals the sum of a) the sum of the member's combined (member and employer) accumulated contribution balance with compound interest at a rate determined by the board through the day of the payment of the benefit, and b) the amount of the member's combined (member and employer) accumulated account, along with any supplemental credits transferred from the System to the Plan with compound interest at a rate determined by the board through the day of the payment of the benefit.
Retirement	The beneficiary may elect to receive a monthly income, in the single life form, which is actuarially equivalent to the lump sum above.

E. Health Insurance Premium Benefit Supplement (HBS)

1. Eligibility

A member is eligible HBS if the member retires or is disabled after five years of credited service and is 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 credited service are:

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

Monthly Premium Benefit Payable	Coverage
$ 150	Member Under 65
$ 100	Member 65 or Over
$ 260	Member and Dependents Under 65
$ 170	Member and Dependents 65 or 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.

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 1 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 2021 is 12.04% for each member and each employer, based on the 2019 actuarial valuation. The member's contribution rate for fiscal year 2022 will be 12.22% based on this valuation. Interest was credited at 8%, until it was lowered to 4% beginning July 1, 2005, and subsequently lowered again to 2% from July 1, 2013, for return of contributions upon withdrawal.

Please reference Exhibit F-38 Schedule of Employer Contributions – HBS in the 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, 2020, and June 30, 2019, 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. In no event will this amount exceed 130% of market value or be less than 70% of market value.

D. Actuarial Assumptions

1. Investment Return

The investment return rate is 7.50% per year, net of administrative and investment-related expenses (composed of an assumed 2.30% inflation rate and a 5.20% 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: Mortality Decrements

			Males			Females
Age	Non-disabled	Disabled	Employee	Non-disabled	Disabled	Employee
20	0.000382	0.006694	0.000382	0.000152	0.002100	0.000153
25	0.000456	0.007980	0.000456	0.000163	0.002244	0.000163
30	0.000426	0.007452	0.000426	0.000206	0.002827	0.000205
35	0.000492	0.008623	0.000492	0.000270	0.003708	0.000269
40	0.000591	0.010353	0.000591	0.000373	0.005135	0.000373
45	0.000916	0.016042	0.000916	0.000618	0.008519	0.000619
50	0.001587	0.019201	0.001587	0.001037	0.011210	0.001038
55	0.002625	0.022001	0.002625	0.001575	0.013632	0.001575
60	0.004356	0.025047	0.004414	0.002299	0.016004	0.002299
65	0.007721	0.029831	0.007793	0.004766	0.019639	0.003480
70	0.013685	0.037985	0.013043	0.008935	0.026553	0.005940
75	0.024257	0.051110	0.021831	0.016750	0.038643	0.010138
80	0.042995	0.072132	0.036540	0.031400	0.057464	0.017304

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]
0	4.50 %	7.20 %
1	3.50 %	6.20 %
2	2.75 %	5.45 %
3	2.25 %	4.95 %
4	2.00 %	4.70 %
5	1.75 %	4.45 %
6	1.50 %	4.20 %
7	1.10 %	3.80 %
8	1.00 %	3.70 %
9	0.90 %	3.60 %
10	0.80 %	3.50 %
11	0.70 %	3.40 %
12	0.60 %	3.30 %
13	0.50 %	3.20 %
14	0.40 %	3.10 %
15	0.30 %	3.00 %
16	0.20 %	2.90 %
17	0.20 %	2.90 %
18	0.10 %	2.80 %
19	— %	2.70 %
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 %	20.00 %	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 %	25.00 %	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

Active members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination and deferred vested members are assumed to choose the most valuable option available to them at the time of earliest retirement. The options to choose from are a 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.

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 elect the dependent premium supplement. These assumptions also apply to members who have been retired less than one year and did not elect a health insurance premium supplement.

9. Beneficiary Characteristics

It is assumed that 100% of the members are married. It is also assumed 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, 2020, 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 § 415. Additionally, Internal Revenue Code § 401(a)17 limits were applied to individual salaries. The limit for 2020 is $285,000 and is assumed to increase annually at the inflation rate.
- Members who elect a single life annuity are assumed to receive accumulated benefit payments equal to their contributions after three years of being in receipt. All beneficiaries of pre-retirement deaths are assumed to elect a return of contributions and not elect 401(h) benefits. Valuation payroll (earnings applied to the current valuation year) is the expected payroll for the fiscal year following the valuation date.
- 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.
- The past service contribution rate is adjusted to consider alternate contribution rate payments. The amortization amount is reduced by the anticipated amount of alternate contributions, adjusted for interest. 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 Benefits are assumed to be 0.30% per year. In an effort to support contribution stability, assumed PBIs are accumulated across successive valuations and reduced when actual PBIs are paid.

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
2020	564	210,135	$ 10,858,976,229	$ 51,676	4.1%
2019	564	208,244	10,340,300,426	49,655	3.7%
2018	568	207,119	9,921,214,513	47,901	2.8%
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%)

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

Last 10 Years

	Retirees and Beneficiaries Added to Rolls		Retirees and Beneficiaries Removed from Rolls		Retiree 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
2020	8,196	$ 173,670,945	4,150	$ 65,167,454	155,924	$ 3,189,044,965	3.5 %	$ 20,453
2019	8,746	179,217,085	3,824	58,010,878	151,878	3,080,541,474	4.1 %	20,283
2018	8,651	174,489,286	3,812	59,196,232	146,956	2,959,335,267	4.1 %	20,138
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 %	19,538

[1] Includes PBIs

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

Last 10 Years

Valuation as of June 30,	Retirees and Beneficiaries Added to Rolls No.	Retirees and Beneficiaries Added to Rolls Annual Allowances	Retirees and Beneficiaries Removed from Rolls No.	Retirees and Beneficiaries Removed from Rolls Annual Allowances	Retiree and Beneficiary Rolls End of Year No.	Retiree and Beneficiary Rolls End of Year Annual Allowances	% Change in Annual Allowances	Average Annual Allowances
2020	7,888	$ 10,008,465	6,838	$ 12,021,182	84,986 [9]	$ 97,226,933	(2.0)%	1,144
2019	9,033	11,122,032	6,294	20,892,748	83,936 [8]	99,239,650	(9.0)%	1,182
2018	8,250	17,966,659	8,315	14,688,189	81,197 [7]	109,010,366	3.1 %	1,343
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 [1]	89,663,196	0.9 %	1,418
2011	6,047	10,459,392	3,199	7,707,744	60,643 [1]	88,844,592	3.2 %	1,465

[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.
[7] Includes 379 System members receiving HBS benefits and 622 members receiving LTD benefits and HBS benefits.
[8] Includes 468 System members receiving HBS benefits and 802 members receiving LTD benefits and HBS benefits.
[9] Includes 439 System members receiving HBS benefits and 696 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)
2020	$ 42,409,639,874	$ 58,265,654,218	$ 15,856,014,344	72.8 %	$ 10,858,976,229	146.0 %
2019	$ 40,568,589,169	$ 56,127,566,734	$ 15,558,977,565	72.3 %	$ 10,340,300,426	150.5 %
2018	38,592,895,025	54,176,737,273	15,583,842,248	71.2 %	9,921,214,513	157.1 %
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 %

Exhibit A-18: Solvency Test - Retirement

Last 10 Years
(Dollars in thousands)

	Aggregate Accrued Liabilities for:				Portion of Actuarial Accrued Liabilities Covered by Assets Available for Benefits		
Year Ended June 30, [1]	Active Member Contributions (1)	Retirees and Beneficiaries (2)	Active Members (Employer Financed Portion) (3)	Actuarial Value of Assets Available for Benefits	(1)	(2)	(3)
2020	$ 16,853,510	$ 32,714,771	$ 7,142,422	$ 40,642,836	100 %	73.0 %	— %
2019	15,655,837	31,715,911	7,192,644	38,879,899	100 %	73.0 %	— %
2018	13,582,910	30,602,702	8,360,825	36,984,395	100 %	76.0 %	— %
2017	13,581,097	29,520,335	7,517,329	35,268,099	100 %	73.0 %	— %
2016	12,699,054	26,593,567	5,242,387	34,269,819	100 %	81.0 %	— %
2015	11,714,896	25,757,666	5,495,566	33,112,995	100 %	83.1 %	— %
2014	10,780,694	24,689,078	5,879,545	31,547,987	100 %	84.1 %	— %
2013	9,917,301	23,684,427	6,310,027	30,110,633	100 %	85.3 %	— %
2012	9,110,895	21,699,459	7,639,935	28,948,011	100 %	91.4 %	— %
2011	8,374,150	20,541,082	8,135,948	27,983,517	100 %	96 %	— %

[1] Values shown 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
(Dollars in thousands)

	Aggregate Accrued Liabilities for:				Portion of Actuarial Accrued Liabilities Covered by Assets Available for Benefits		
Year Ended June 30, [1]	Active Member Contributions (1)	Retirees and Beneficiaries (2)	Active Members (Employer Financed Portion) (3)	Actuarial Value of Assets Available for Benefits	(1)	(2)	(3)
2020	$ —	$ 826,795	$ 728,157	$ 1,766,803	100 %	100 %	129.0 %
2019	—	844,745	718,430	1,688,690	100 %	100 %	117.0 %
2018	—	914,372	715,927	1,608,500	100 %	100 %	97.0 %
2017	—	863,850	706,389	1,538,757	100 %	100 %	96.0 %
2016	—	802,949	766,969	1,491,554	100 %	100 %	90.0 %
2015	—	833,902	771,529	1,446,698	100 %	100 %	79.4 %
2014	—	734,450	742,247	1,374,130	100 %	100 %	86.2 %
2013	—	738,731	746,089	1,324,597	100 %	100 %	78.5 %
2012	—	674,713	827,369	1,281,566	100 %	100 %	73.3 %
2011	—	669,593	834,596	1,247,433	100 %	100 %	69.2 %

[1] Values shown include System liabilities and assets for members who retired or will retire on or after July 1, 1981.

Exhibit A-20: Analysis of Financial Experience - Retirement

Last 10 Years

(Dollars in millions)

Year Ended June 30,[4]	Unfunded Actuarial Accrued Liability (UAAL) Prior Year	Normal Cost for the Year	Contributions for the Year	Interest at 7.5% on UAAL[3]	Interest at 7.5% on Normal Cost[2,3]	Interest at 7.5% on Contributions[3]	Total Interest	Expected UAAL	Actual UAAL	Gain/(Loss) for the Year[1]
2020	$ 15,684.49	$ 1,475.58	$ (2,553.12)	$1,176.34	$ 54.33	$ (94.01)	$1,136.66	$15,743.61	$16,067.87	$ (324.26)
2019	15,562.04	1,431.28	(2,482.60)	1,167.15	52.70	(91.41)	1,128.44	15,639.17	15,684.49	(45.32)
2018	15,350.66	1,383.49	(2,134.66)	1,151.30	102.89	(80.05)	1,174.14	15,773.64	15,562.04	211.60
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)

[1] Includes assumption and plan changes.

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

[3] Values in 2017 and prior were valued at 8% interest.

[4] Values shown include System liabilities and assets 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,[4]	Unfunded Actuarial Accrued Liability or Surplus (UAAL/ UAAS) Prior Year	Normal Cost for the Year	Contributions for the Year	Interest at 7.5% on UAAL[3]	Interest at 7.5% on Normal Cost[2,3]	Interest at 7.5% on Contributions[3]	Total Interest	Expected UAAL	Actual UAAL or (UAAS)	Gain/(Loss) for the Year[1]
2020	$ (125.51)	$ 50.18	$ (55.37)	$ (9.41)	$ 1.85	$ (2.04)	$ (9.60)	$ (140.30)	$ (211.85)	$ 71.55
2019	21.80	49.89	(55.15)	1.63	1.84	(2.03)	1.44	17.98	(125.51)	143.49
2018	31.48	48.14	(42.23)	2.36	3.58	(1.58)	4.36	41.74	21.80	19.94
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	158.73	(89.06)
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)

[1] Includes assumption and plan changes.

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

[3] Values in 2017 and prior were valued at 8% interest.

[4] Values shown include System liabilities and assets for members who retired or will retire on or after July 1, 1981.

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October 12, 2021

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, 2020. The information in the Actuarial Section is based on our annual actuarial valuation reports, with the most recent valuations conducted as of June 30, 2020, 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, 2021. 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
- 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, 2020, 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, 2020 actuarial valuation of the ASRS Plan.

5605 North MacArthur Boulevard | Suite 870 | Irving, Texas 75038-2631

Board of Trustees
October 12, 2021
Page 2

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on July 30, 2021 based on the Actuarial Experience Study covering a five-year period from July 1, 2015 to June 30, 2020. Please see the experience study presentations dated May 28, 2021 and July 30, 2021 for more information related to the economic and demographic assumptions.

We believe the assumptions are internally consistent and are reasonable, based on the actual experience of ASRS. Furthermore, the assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice.

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 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 percent of pay payments.

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 (0.38% of payroll) will apply in the fiscal year beginning July 1, 2021. The rate calculated as part of the prior valuation (0.36% of payroll) applied in the fiscal year that began July 1, 2020. 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 increased from $59.9 million as of June 30, 2019 to $64.0 million as of June 30, 2020. Additionally, the funded ratio—actuarial value of assets divided by the actuarial accrued liability—decreased from 74.8% to 73.1% as of June 30, 2020. 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

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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 Cosultant

Joseph P. Newton, FSA, EA, MAAA
Pension Market Leader

Paul T. Wood, ASA, FCA, MAAA
Team Leader

The ASRS LTD Program began on July 1, 1995. The program covers ASRS LTD Program participants who became 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 1 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 2021 is 0.18% for each member and each employer, based on the 2019 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, 1988, 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 ASRS 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, 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. In no event will this amount exceed 130% of market value or be less than 70% of market value.

D. Actuarial Assumptions

1. Investment Return

7.50% per year, net of investment related expenses (composed of an assumed 2.30% inflation rate and a 5.20% 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, 2019, and does not take into account future members.
- All census data was supplied by ASRS and was subject to reasonable consistency checks and 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 § 415 and Internal Revenue Code § 401(a)(17) limits were applied to individual salaries.
- 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 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.

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 Allowance[1]	Members Removed from Rolls No.	Members Removed from Rolls Annual Allowance[2]	Members Rolls End of Year No.	Members Rolls End of Year Annual Allowance[1]	% Change in Annual Allowance	Average Annual Allowance
2020	410	$ 10,377,103	559	$ 12,169,812	3,040	$ 52,674,052	(3.3)%	$ 17,327
2019	449	10,869,605	618	13,714,530	3,189	54,466,761	(5.0)%	17,080
2018	471	11,101,908	647	13,706,082	3,358	57,311,686	(4.3)%	17,067
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

[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 AccruedLiabilities (UAAL) (b - a)	Assets as a % of Accrued Liabilities (a / b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b - a) / c)
2020	$ 173,675	$ 237,657	$ 63,982	73.1 %	$ 10,858,976	0.6 %
2019	177,827	237,711	59,884	74.8 %	10,340,300	0.6 %
2018	184,272	243,149	58,877	75.8 %	9,921,215	0.6 %
2017	198,883	247,356	48,473	80.4 %	9,598,270	0.5 %
2016	223,464	318,840	95,376	70.1 %	9,263,859	1.0 %
2015	253,470	320,624	67,154	79.1 %	9,072,377	0.7 %
2014	279,560	328,928	49,368	85.0 %	8,908,621	0.6 %
2013	285,018	332,597	47,579	85.7 %	8,752,783	0.5 %
2012	295,786	439,706	143,920	67.3 %	8,868,678	1.6 %
2011	307,537	455,695	148,158	67.5 %	9,060,631	1.6 %

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 Ended 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)
2020	$ —	$ 175,149	$ 62,508	$ 173,675	100 %	99 %	— %
2019	—	179,195	58,516	177,827	100 %	99 %	— %
2018	—	187,100	56,049	184,272	100 %	98 %	— %
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 %

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 7.5% on UAAL[3]	Interest at 7.5% on Normal Cost[3]	Interest at 7.5% on Contributions[3]	Total Interest	Expected UAAL	Actual UAAL	Gain/(Loss) for the Year[2]
2020	$ 59,884	$ 32,194	$ (39,783)	$ 4,491	$ 1,185	$ (1,465)	$ 4,211	$ 56,506	$ 63,982	$ (7,476)
2019	58,877	29,700	(35,122)	4,416	1,093	(1,293)	4,216	57,671	59,884	(2,213)
2018	48,473	27,715	(31,414)	3,636	2,079	(1,178)	4,536	49,310	58,877	(9,567)
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

[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 $200,202 (presented in 000s). This gain/(loss) calculation does not include administrative expenses.

[3] Prior to 2018, interest was calculated at 8%.

Legislated Plan Changes Enacted by the 2020 Legislature of the State of Arizona

Due to the COVID-19 pandemic in 2020, the Legislature did not take any action on bills relating to the ASRS.

Statistical Section

An agency of the State of Arizona

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	2021	2020	2019	2018
Assets				
Cash, receivables, and prepaids	$ 434,233	$ 169,057	$ 190,852	$ 550,205
Investments	47,789,937	40,228,258	39,671,759	38,133,864
Securities lending cash collateral	914	98,591	137,089	104,082
Total assets	**48,225,084**	**40,495,906**	**39,999,700**	**38,788,151**
Liabilities				
Investments payable	8,496	1,212,012	18,830	43,406
Securities lending payable	914	98,591	137,089	104,082
Other payables	13,451	17,717	18,639	148,714
Total liabilities	**22,861**	**1,328,320**	**174,558**	**296,202**
Net position restricted for benefits	**$ 48,202,223**	**$ 39,167,586**	**$ 39,825,142**	**$ 38,491,949**
HBS Fund				
Assets				
Cash, receivables, and prepaids	$ 38,094	$ 13,840	$ 24,076	$ 155,594
Investments	2,102,493	1,805,940	1,816,690	1,657,666
Securities lending cash collateral	40	4,272	5,939	4,524
Total assets	**2,140,627**	**1,824,052**	**1,846,705**	**1,817,784**
Liabilities				
Investments payable	369	52,519	816	1,887
Securities lending payable	40	4,272	5,939	4,524
Other payables	409	376	441	20,566
Total liabilities	**818**	**57,167**	**7,196**	**26,977**
Net position restricted for benefits	**$ 2,139,809**	**$ 1,766,885**	**$ 1,839,509**	**$ 1,790,807**
LTD Fund				
Assets				
Cash, receivables, and prepaids	$ 10,299	$ 8,662	$ 8,405	$ 7,283
Investments	183,901	157,505	166,716	176,825
Securities lending cash collateral	4	386	576	483
Total assets	**194,204**	**166,553**	**175,697**	**184,591**
Liabilities				
Investments payable	33	4,745	80	201
Securities lending payable	4	386	576	483
Other payables	145	142	250	463
Total liabilities	**182**	**5,273**	**906**	**1,147**
Net position restricted for benefits	**$ 194,022**	**$ 161,280**	**$ 174,791**	**$ 183,444**
Total				
Assets				
Cash, receivables, and prepaids	$ 482,626	$ 191,559	$ 223,333	$ 713,082
Investments	50,076,331	42,191,703	41,655,165	39,968,355
Securities lending cash collateral	958	103,249	143,604	109,089
Total assets	**50,559,915**	**42,486,511**	**42,022,102**	**40,790,526**
Liabilities				
Investments payable	8,898	1,269,276	19,726	45,494
Securities lending payable	958	103,249	143,604	109,089
Other payables	14,005	18,235	19,330	169,743
Total liabilities	**23,861**	**1,390,760**	**182,660**	**324,326**
Net position restricted for benefits	**$ 50,536,054**	**$ 41,095,751**	**$ 41,839,442**	**$ 40,466,200**

Exhibit S-1: Fiduciary Net Position (Continued)

Last 10 Fiscal Years

(Dollars in thousands)

2017	2016	2015	2014	2013	2012
$ 415,862	$ 975,712	$ 261,074	$ 593,804	$ 1,062,311	$ 1,006,349
35,888,458	32,387,540	33,469,479	33,830,285	29,210,762	26,200,038
166,870	275,684	301,892	14,784	14,812	47,958
36,471,190	**33,638,936**	**34,032,445**	**34,438,873**	**30,287,885**	**27,254,345**
35,202	469,063	40,795	693,459	1,172,209	747,257
166,870	275,684	301,892	14,784	14,812	47,958
66,362	34,398	44,112	36,925	75,434	57,036
268,434	**779,145**	**386,799**	**745,168**	**1,262,455**	**852,251**
$ 36,202,756	**$ 32,859,791**	**$ 33,645,646**	**$ 33,693,705**	**$ 29,025,430**	**$ 26,402,094**
$ 35,777	$ 56,133	$ 48,294	$ 60,353	$ 75,951	$ 79,217
1,677,892	1,509,046	1,528,013	1,527,258	1,313,601	1,175,794
7,274	11,805	12,838	643	648	2,112
1,720,943	**1,576,984**	**1,589,145**	**1,588,254**	**1,390,200**	**1,257,123**
1,534	20,226	1,709	30,095	51,288	32,910
7,274	11,805	12,838	643	648	2,112
19,577	886	1,303	1,274	2,930	19,282
28,385	**32,917**	**15,850**	**32,012**	**54,866**	**54,304**
$ 1,692,558	**$ 1,544,067**	**$ 1,573,295**	**$ 1,556,242**	**$ 1,335,334**	**$ 1,202,819**
$ 9,780	$ 8,450	$ 7,807	$ 6,864	$ 7,254	$ 7,172
187,148	198,281	239,711	278,932	255,636	250,594
—	—	—	—	—	—
196,928	**206,731**	**247,518**	**285,796**	**262,890**	**257,766**
—	—	—	—	—	—
—	—	—	—	—	—
230	337	245	280	270	443
230	**337**	**245**	**280**	**270**	**443**
$ 196,698	**$ 206,394**	**$ 247,273**	**$ 285,516**	**$ 262,620**	**$ 257,323**
$ 461,419	$ 1,040,295	$ 317,175	$ 661,021	$ 1,145,516	$ 1,092,738
37,753,498	34,094,867	35,237,203	35,636,475	30,779,999	27,626,426
174,144	287,489	314,730	15,427	15,460	50,070
38,389,061	**35,422,651**	**35,869,108**	**36,312,923**	**31,940,975**	**28,769,234**
36,736	489,289	42,504	723,554	1,223,497	780,167
174,144	287,489	314,730	15,427	15,460	50,070
86,169	35,621	45,660	38,479	78,634	76,761
297,049	**812,399**	**402,894**	**777,460**	**1,317,591**	**906,998**
$ 38,092,012	**$ 34,610,252**	**$ 35,466,214**	**$ 35,535,463**	**$ 30,623,384**	**$ 27,862,236**

Exhibit S-2: Changes in Fiduciary Net Position

Last 10 Fiscal Years

(Dollars in thousands)

Retirement Fund	2021	2020	2019	2018
Additions				
Member contributions	$ 1,321,694	$ 1,272,080	$ 1,194,100	$ 1,099,663
Employer contributions	1,311,380	1,254,651	1,180,966	1,085,033
Purchased service/transfers/other income	15,023	13,385	17,918	22,411
Net investment income (loss)	10,061,477	354,195	2,398,937	3,414,623
Total additions (reductions)	**12,709,574**	**2,894,311**	**4,791,921**	**5,621,730**
Deductions				
Benefits	$ 3,414,422	$ 3,281,317	$ 3,169,788	$ 3,045,450
Refunds and transfers	232,830	243,214	262,138	259,776
Administration and other	27,685	27,336	26,802	27,311
Total deductions	**3,674,937**	**3,551,867**	**3,458,728**	**3,332,537**
Net change	**9,034,637**	**(657,556)**	**1,333,193**	**2,289,193**
Fiduciary net position, beginning of year	39,167,586	39,825,142	38,491,949	36,202,756
Net position restricted for benefits	**$ 48,202,223**	**$ 39,167,586**	**$ 39,825,142**	**$ 38,491,949**
HBS Fund				
Additions				
Employer contributions	$ 42,816	$ 52,371	$ 47,386	$ 42,976
Purchased service/transfers/other income	18,528	23	9,623	2,225
Net Investment Income (Loss)	437,141	16,764	108,484	150,380
Total additions (reductions)	**498,485**	**69,158**	**165,493**	**195,581**
Deductions				
Benefits	124,382	140,619	115,631	96,098
Administration and other	1,179	1,163	1,160	1,234
Total deductions	**125,561**	**141,782**	**116,791**	**97,332**
Net change	**372,924**	**(72,624)**	**48,702**	**98,249**
Fiduciary net position, beginning of year	1,766,885	1,839,509	1,790,807	1,692,558
Net position restricted for benefits	**$ 2,139,809**	**$ 1,766,885**	**$ 1,839,509**	**$ 1,790,807**
LTD Fund				
Additions				
Member contributions	$ 19,778	$ 18,169	$ 16,434	$ 15,512
Employer contributions	20,001	18,397	16,633	15,902
Purchased service/transfers/other income	21	—	—	—
Net investment income (loss)	38,703	1,581	10,318	14,760
Total additions (reductions)	**78,503**	**38,158**	**43,423**	**46,174**
Deductions				
Benefits	44,142	49,615	50,063	57,664
Administration and other	1,619	2,054	2,013	1,764
Total Deductions	**45,761**	**51,669**	**52,076**	**59,428**
Net change	**32,742**	**(13,511)**	**(8,653)**	**(13,254)**
Fiduciary net position, beginning of year	161,280	174,791	183,444	196,698
Net position restricted for benefits	**$ 194,022**	**$ 161,280**	**$ 174,791**	**$ 183,444**
Total				
Additions				
Member contributions	$ 1,341,472	$ 1,290,249	$ 1,210,534	$ 1,115,175
Employer contributions	1,374,197	1,325,419	1,244,985	1,143,911
Purchased service/transfers/other income	33,572	13,419	27,579	24,636
Net investment income (loss)	10,537,321	372,540	2,517,739	3,579,763
Total additions (reductions)	**13,286,562**	**3,001,627**	**5,000,837**	**5,863,485**
Deductions				
Benefits	$ 3,582,946	$ 3,471,551	$ 3,335,482	$ 3,199,212
Refunds and transfers	232,830	243,214	262,138	259,776
Administration and other	30,483	30,553	29,975	30,309
Total deductions	**3,846,259**	**3,745,318**	**3,627,595**	**3,489,297**
Net change	**9,440,303**	**(743,691)**	**1,373,242**	**2,374,188**
Fiduciary net position, beginning of year	41,095,751	41,839,442	40,466,200	38,092,012
Net position restricted for benefits	**$ 50,536,054**	**$ 41,095,751**	**$ 41,839,442**	**$ 40,466,200**

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

Last 10 Fiscal Years

(Dollars in thousands)

2017	2016	2015	2014	2013	2012
$ 1,079,257	$ 1,036,714	$ 1,031,954	$ 995,284	$ 948,004	$ 905,968
1,053,198	1,015,974	1,004,747	965,969	911,300	852,167
14,649	25,466	20,702	33,485	72,023	53,659
4,406,942	222,906	849,160	5,514,246	3,393,599	322,870
6,554,046	**2,301,060**	**2,906,563**	**7,508,984**	**5,324,926**	**2,134,664**
2,931,860	2,804,531	2,671,496	2,566,372	2,445,341	2,327,678
250,578	259,323	256,243	247,116	219,332	212,313
28,643	23,061	26,883	27,221	36,917	31,802
3,211,081	**3,086,915**	**2,954,622**	**2,840,709**	**2,701,590**	**2,571,793**
3,342,965	**(785,855)**	**(48,059)**	**4,668,275**	**2,623,336**	**(437,129)**
32,859,791	33,645,646	33,693,705	29,025,430	26,402,094	26,839,223
$ 36,202,756	**$ 32,859,791**	**$ 33,645,646**	**$ 33,693,705**	**$ 29,025,430**	**$ 26,402,094**
$ 53,914	$ 46,046	$ 53,586	$ 53,405	$ 57,154	$ 54,463
—	8,455	31,507	29,848	25,826	35,473
191,591	12,024	39,022	240,538	146,737	13,439
245,505	**66,525**	**124,115**	**323,791**	**229,717**	**103,375**
95,720	94,754	105,913	101,746	95,763	93,915
1,294	999	1,149	1,137	1,439	1,370
97,014	**95,753**	**107,062**	**102,883**	**97,202**	**95,285**
148,491	**(29,228)**	**17,053**	**220,908**	**132,515**	**8,090**
1,544,067	1,573,295	1,556,242	1,335,334	1,202,819	1,194,729
$ 1,692,558	**$ 1,544,067**	**$ 1,573,295**	**$ 1,556,242**	**$ 1,335,334**	**$ 1,202,819**
$ 13,342	$ 10,990	$ 10,725	$ 21,151	$ 20,881	$ 20,998
13,606	11,162	10,899	21,628	21,336	20,998
—	—	—	—	—	—
22,021	(387)	3,722	44,950	29,540	2,419
48,969	**21,765**	**25,346**	**87,729**	**71,757**	**44,415**
56,525	60,065	61,045	62,044	63,613	65,190
2,140	2,579	2,544	2,789	2,847	2,757
58,665	**62,644**	**63,589**	**64,833**	**66,460**	**67,947**
(9,696)	**(40,879)**	**(38,243)**	**22,896**	**5,297**	**(23,532)**
206,394	247,273	285,516	262,620	257,323	280,855
$ 196,698	**$ 206,394**	**$ 247,273**	**$ 285,516**	**$ 262,620**	**$ 257,323**
$ 1,092,599	$ 1,047,704	$ 1,042,679	$ 1,016,435	$ 968,885	$ 926,966
1,120,718	1,073,182	1,069,232	1,041,002	989,790	927,628
14,649	33,921	52,209	63,333	97,849	89,132
4,620,554	234,543	891,904	5,799,734	3,569,876	338,728
6,848,520	**2,389,350**	**3,056,024**	**7,920,504**	**5,626,400**	**2,282,454**
$ 3,084,105	$ 2,959,350	$ 2,838,454	$ 2,730,162	$ 2,604,717	$ 2,486,783
250,578	259,323	256,243	247,116	219,332	212,313
32,077	26,639	30,576	31,147	41,203	35,929
3,366,760	**3,245,312**	**3,125,273**	**3,008,425**	**2,865,252**	**2,735,025**
3,481,760	**(855,962)**	**(69,249)**	**4,912,079**	**2,761,148**	**(452,571)**
34,610,252	35,466,214	35,535,463	30,623,384	27,862,236	28,314,807
$ 38,092,012	**$ 34,610,252**	**$ 35,466,214**	**$ 35,535,463**	**$ 30,623,384**	**$ 27,862,236**

Exhibit S-3: Actual Contribution Rates

Last 10 Fiscal Years

Retirement Contribution Rates[1]	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Member	12.04 %	11.94 %	11.64 %	11.34 %	11.34 %	11.35 %	11.48 %	11.30 %	10.90 %	10.50 %
Employer	11.65 %	11.45 %	11.18 %	10.90 %	10.78 %	10.85 %	10.89 %	10.70 %	10.25 %	9.87 %

HBS Contribution Rates	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Employer	0.39 %	0.49 %	0.46 %	0.44 %	0.56 %	0.50 %	0.59 %	0.60 %	0.65 %	0.63 %

LTD Contribution Rates	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Member	0.18 %	0.17 %	0.16 %	0.16 %	0.14 %	0.12 %	0.12 %	0.24 %	0.24 %	0.24 %
Employer	0.18 %	0.17 %	0.16 %	0.16 %	0.14 %	0.12 %	0.12 %	0.24 %	0.24 %	0.24 %

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

Exhibit S-4: Retired Members by Type of Benefit

As of June 30, 2020

Amount of Monthly Benefit	Number of Retirees by Benefit Option[1] 1	2	3	4	5	6	7
Under $300	13,862	176	236	701	3,214	262	1,080
$300 - $499	10,155	139	253	528	2,542	301	996
$500 - $999	20,129	346	546	950	5,019	818	2,198
$1,000 - $1,499	13,966	215	379	570	3,916	896	1,957
$1,500 - $1,999	10,237	150	277	425	3,070	920	1,710
$2,000 - $2,499	8,043	123	224	373	2,847	781	1,658
$2,500 - $2,999	6,363	98	200	305	2,314	655	1,244
$3,000 - $3,499	5,104	84	132	236	2,045	626	1,030
$3,500 - $3,999	3,477	38	79	180	1,471	461	727
$4,000 & Over	6,254	47	141	246	2,719	977	1,483
Totals	97,590	1,416	2,467	4,514	29,157	6,697	14,083

[1]Options:

1. Life Annuity	Refund provision
2. Life Annuity	5 years 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

Source: 2020 actuarial valuation report

Note: The 2020 actuarial valuation report is the most recent report available.

Exhibit S-5: HBS Recipients by Benefit Amount

As of June 30, 2021

HBS Monthly Benefits	Members Receiving Benefits
$1-199	68,992
$200-299	12,181
$300-399	475
$400 & Over	0
Total	81,648

Source: ASRS pension administration system

Exhibit S-6: LTD Recipients by Benefit Amount

As of June 30, 2021

LTD Monthly Benefits	Members Receiving Benefits
<$299	307
$300-499	181
$500-999	660
$1,000-1,499	562
$1,500-1,999	439
$2,000 & over	756
Total	2,905

Source: Long term disability program administrator

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

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+
2020	Average Monthly Benefit	$ 160	$ 374	$ 765	$ 1,165	$ 1,771	$ 2,560	$ 3,524	$ 4,150	$ 5,001	$ 5,671
	Number of Retirees	7,175	21,685	26,308	21,798	26,907	24,757	22,556	3,880	756	102
2019	Average Monthly Benefit	$ 156	$ 370	$ 755	$ 1,152	$ 1,755	$ 2,542	$ 3,498	$ 4,129	$ 4,981	$ 5,647
	Number of Retirees	6,880	21,200	25,713	21,164	26,123	24,235	21,971	3,791	710	91
2018	Average Monthly Benefit	$ 151	$ 366	$ 748	$ 1,140	$ 1,741	$ 2,524	$ 3,476	$ 4,110	$ 4,870	$ 5,577
	Number of Retirees	6,511	20,588	24,971	20,467	25,152	23,540	21,290	3,685	666	86
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

Notes:

This schedule does not include System retirees.

Average final salary information is not available.

The 2020 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+
2021	Average Monthly Benefit	$ 52	$ 56	$ 58	$ 65	$ 66	$ 87
	Number of HBS Participants	1,702	1,336	1,343	1,361	1,297	74,600
2020	Average Monthly Benefit	$ 54	$ 59	$ 63	$ 70	$ 72	$ 97
	Number of HBS Participants	1,671	1,305	1,320	1,346	1,293	74,450
2019	Average Monthly Benefit	$ 54	$ 59	$ 63	$ 69	$ 74	$ 100
	Number of HBS Participants	1,627	1,270	1,275	1,340	1,253	73,473
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

Source: ASRS pension administration system

Exhibit S-9: Average Benefit Payments - LTD

Last 10 Fiscal Years

			LTD
2021	Average Monthly Benefit	$	1,503
	Number of LTD Participants		2,905
2020	Average Monthly Benefit	$	1,490
	Number of LTD Participants		3,214
2019	Average Monthly Benefit	$	1,465
	Number of LTD Participants		3,327
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

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

	2021			2012		
Participating Employer	Covered Employees	Rank	Percent of Membership	Covered Employees	Rank	Percent of Membership
State of Arizona	27,412	1	12.92 %	26,998	1	12.59 %
Maricopa County	9,434	2	4.45 %	8,992	2	4.20 %
Mesa Unified School District #4	7,866	3	3.71 %	8,466	3	3.95 %
University Of Arizona	7,399	4	3.49 %	7,061	5	3.29 %
Arizona State University	6,756	5	3.19 %	5,323	7	2.48 %
Tucson Unified School District #1	5,819	6	2.74 %	7,087	4	3.31 %
Maricopa County Community College District	5,806	7	2.74 %	6,729	6	3.14 %
Chandler Unified School District #80	4,784	8	2.26 %	4,141	10	1.93 %
Pima County	4,690	9	2.21 %	5,274	8	2.46 %
Gilbert Public Schools	4,139	10	1.95 %	4,647	9	2.17 %
All other	127,983		60.34 %	129,628		60.48 %
Total	212,088		100.00 %	214,346		100.00 %

	2021	2012
Total employer units	562	593
Total employers	664	707

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

Source: ASRS pension administration system

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Summary of Investments Owned — Pension Trust Funds

Schedule of Investments Owned as of June 30, 2021

Dollars in Thousands — Page 1 of 7

Description	Rate	Maturity	Fair Value	% of Total Fair Value
Residential Mortgage-Backed Securities				
FNMA TBA 30 YR 3	3.00	7/14/2051	$ 212,789	0.13 %
FNMA TBA 30 YR 2.5	2.50	7/14/2051	170,519	0.10 %
GNMA II TBA 30 YR 3.5	3.50	7/21/2051	144,917	0.09 %
FNMA POOL MA3155	3.00	10/1/2032	112,077	0.07 %
FNMA POOL MA4260	1.50	2/1/2036	97,166	0.06 %
FNMA POOL FM5367	1.50	2/1/2036	96,885	0.06 %
FNMA TBA 15 YR 2.5	2.50	7/19/2036	89,282	0.05 %
FED HM LN PC POOL QN4179	1.50	11/1/2035	64,571	0.04 %
FED HM LN PC POOL ZT2104	2.50	12/1/2033	53,820	0.03 %
FED HM LN PC POOL SB8031	2.50	2/1/2035	52,950	0.03 %
Other	—	—	914,018	0.57 %
Total Residential Mortgage-Backed Securities			**2,008,994**	**1.23 %**
Commercial Mortgage-Backed Securities				
Freddie Mac SLST	3.50	11/25/2028	62,269	0.04 %
Freddie Mac	2.50	4/15/2047	29,241	0.02 %
GS Mortgage Securities Trust	3.57	5/10/2052	22,350	0.01 %
Wells Fargo Commercial Mortgage	3.47	11/15/2050	21,991	0.01 %
Morgan Stanley BAML Trust	3.33	5/15/2049	12,403	0.01 %
Wells Fargo Commercial Mortgage	3.17	2/15/2048	10,686	0.01 %
UBS Barclays Commercial Mortgage	3.09	8/10/2049	8,988	0.01 %
Freddie Mac	3.00	10/15/2040	8,104	0.00 %
Fannie Mae	2.50	7/25/2028	5,637	0.00 %
GS Mortgage Securities Trust	3.52	6/10/2047	3,967	0.00 %
Other	—	—	629	0.00 %
Total Commercial Mortgage-Backed Securities			**186,265**	**0.11 %**
Corporate Bonds — Domestic Dollar Denominated				
Boeing Co.	5.81	5/1/2050	67,395	0.04 %
JPMorgan Chase & Co.	3.96	11/15/2048	64,379	0.04 %
Gilead Sciences Inc.	2.80	10/1/2050	62,379	0.04 %
Apple Inc.	3.75	11/13/2047	58,523	0.04 %
Southwestern Electric Power	4.10	9/15/2028	56,976	0.03 %
Walmart Inc.	3.70	6/26/2028	56,861	0.03 %
Morgan Stanley	3.77	1/24/2029	56,091	0.03 %
Citigroup Inc.	3.52	10/27/2028	54,699	0.03 %
Perkinelmer Inc.	3.30	9/15/2029	54,046	0.03 %
Bank Of America Corp.	3.42	12/20/2028	51,609	0.03 %
Other	—	—	4,316,181	2.66 %
Total Corporate Bonds — Domestic Dollar Denominated			**4,899,139**	**3.00 %**

Schedule of Investments Owned as of June 30, 2021

Dollars in Thousands — Page 2 of 7

Description	Rate	Maturity	Fair Value	% of Total Fair Value
Corporate Bonds — Foreign Nondollar Denominated				
SACI Falabella	6.50	4/30/2023	$ 24,923	0.02 %
Empresas Public Medellin	7.63	9/10/2024	10,320	— %
Total Corporate Bonds — Foreign Nondollar Denominated			**35,243**	**0.02 %**
Corporate Bonds — Foreign Dollar Denominated				
TSMC Global Ltd.	2.25	4/23/2031	90,591	0.06 %
Banco de Bogota SA	6.25	5/12/2026	87,722	0.05 %
Klabin Austria GMBH	5.75	4/3/2029	85,676	0.05 %
Perusahaan Gas Negara	5.13	5/16/2024	83,115	0.05 %
Suzano Austria GMBH	3.75	1/15/2031	73,217	0.04 %
Vale SA	5.63	9/11/2042	71,235	0.04 %
APT Pipelines Ltd.	4.20	3/23/2025	65,726	0.04 %
Alibaba Group Holding	3.40	12/6/2027	65,481	0.04 %
Itau Unibanco Holding SA/KY	4.50	11/21/2029	61,372	0.04 %
Barclays PLC	2.65	6/24/2031	60,665	0.04 %
Other	—	—	9,966,512	6.10 %
Total Corporate Bonds — Foreign Dollar Denominated			**10,711,312**	**6.55 %**
U.S. Government Treasuries				
U.S. Treasury N/B	2.38	8/15/2024	354,319	0.22 %
U.S. Treasury N/B	2.00	8/15/2025	341,663	0.21 %
U.S. Treasury N/B	0.13	3/31/2023	299,261	0.18 %
U.S. Treasury N/B	0.25	5/15/2024	273,260	0.17 %
U.S. Treasury N/B	3.13	11/15/2028	271,223	0.17 %
U.S. Treasury N/B	2.25	8/15/2027	213,672	0.13 %
U.S. Treasury N/B	1.63	5/15/2026	207,101	0.13 %
U.S. Treasury N/B	1.63	11/15/2022	203,839	0.12 %
U.S. Treasury N/B	0.13	2/28/2023	199,569	0.12 %
U.S. Treasury N/B	2.00	10/31/2022	153,534	0.09 %
Other	—	—	1,602,509	0.98 %
Total U.S. Government Treasuries			**4,119,950**	**2.52 %**

Summary of Investments Owned — Pension Trust Funds (cont.)

Schedule of Investments Owned as of June 30, 2021

Dollars in Thousands — Page 3 of 7

Description	Rate	Maturity	Fair Value	% of Total Fair Value
Foreign Government and Agencies — Dollar Denominated				
Ontario Teachers Finance Trust	2.13	9/19/2022	$ 76,602	0.05 %
Socialist Republic of Vietnam	4.80	11/19/2024	64,478	0.04 %
Republic of Peru	2.78	1/23/2031	61,000	0.04 %
Federal Republic of Brazil	4.75	1/14/2050	58,646	0.04 %
Republic of Indonesia	5.38	10/17/2023	55,492	0.03 %
Province of Alberta	2.95	1/23/2024	51,970	0.03 %
CPPIB Capital Inc.	3.13	9/25/2023	51,922	0.03 %
Province of British Columbia	1.75	9/27/2024	51,768	0.03 %
Federal Republic of Brazil	3.75	9/12/2031	49,532	0.03 %
Republic of Philippines	1.65	6/10/2031	48,210	0.03 %
Other	—	—	1,761,404	1.08 %
Total Foreign Government and Agencies — Dollar Denominated			**2,331,024**	**1.43 %**
Foreign Government and Agencies — Nondollar Denominated				
Republica Orient Uruguay	4.38	12/15/2028	52,013	0.04 %
Queensland Treasury Corp.	4.25	7/21/2023	40,631	0.02 %
New S. Wales Treasury Corp.	5.00	8/20/2024	21,377	0.01 %
China Government Bond	3.48	6/29/2027	13,870	0.01 %
China Government Bond	3.10	6/29/2022	2,333	— %
Total Foreign Government and Agencies — Nondollar Denominated			**130,224**	**0.08 %**

CHART 5

LIST OF LARGEST ASSETS HELD

Largest Stock Holdings
June 30, 2021

Ranking	Name	Fair Value
1	APPLE INC	$ 1,522,606,371
2	MICROSOFT CORP	1,443,194,015
3	AMAZON.COM INC	1,038,649,667
4	FACEBOOK INC	589,158,781
5	ALPHABET INC-CL A	518,443,295
6	ALPHABET INC-CL C	508,930,833
7	BERKSHIRE HATHAWAY INC	373,313,539
8	TESLA INC	366,880,310
9	NVIDIA CORP	350,811,846
10	JPMORGAN CHASE & CO	333,549,153

Largest Bond Holdings
June 30, 2021

Ranking	Name			Fair Value
1	U S TREASURY NOTE	0.125%	7/15/2023	$ 878,771,546
2	U S TREASURY NOTE	0.250%	6/15/2024	742,681,184
3	U S TREASURY NOTE	0.125%	10/15/2023	706,921,483
4	U S TREASURY NOTE	0.125%	12/15/2023	704,705,892
5	U S TREASURY NOTE	0.250%	5/15/2024	595,501,479
6	U S TREASURY NOTE	0.500%	3/15/2023	594,372,060
7	U S TREASURY NOTE	0.250%	6/15/2023	562,388,899
8	U S TREASURY NOTE	2.000%	11/30/2022	526,018,675
9	U S TREASURY NOTE	0.125%	5/15/2023	510,086,791
10	U S TREASURY NOTE	0.125%	12/31/2022	424,618,163

Note: A complete list of the portfolio's holdings can be obtained upon request.

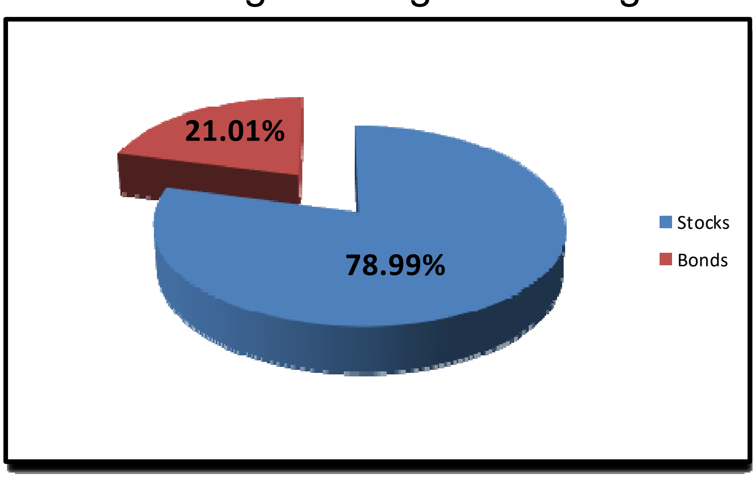
Largest Holdings by Market Value at June 30, 2021

Stocks		Fair Value
Microsoft Corporation	$	54,167,276
Apple Incorporated		51,767,685
Amazon Company Incorporated		38,622,126
Meta Platforms Incorporated		30,508,168
Alphabet Incorporated (Class C)		21,661,692
Alphabet Incorporated (Class A)		21,016,363
T-Mobile US Incorporated		13,423,390
Adobe Systems Incorporated		12,646,973
Taiwan Semiconductor Manufacturing Company		10,991,977
PayPal Holdings Incorporated		10,928,711

Bonds		
FNMA Single Family Mortgages 2% 30 Years Settles August	$	17,401,413
US Treasury Bonds 1.375% Due 11-15-2040		8,375,273
US Treasury Bonds 2.5% Due 05-15-2046		7,811,488
FNMA Pool 2.5% Due 06-01-2041		7,308,474
FNMA 2% Due 11-01-2035		6,637,231
FHLMC Pool 2% Due 04-01-2036		5,814,513
FNMA Pool 2% Due 04-01-2036		4,764,479
US Treasury Bonds 2.25% Due 08-15-2027		4,342,138
US Treasury Notes 2.625% Due 02-15-2029		4,280,554
US Treasury Bonds 1.875% Due 02-15-2041		3,926,618

A complete list of all holdings is available upon request

Percentage of Largest Holdings



SDRS Internal High Yield Bond Portfolio Performance

Fiscal	1 Year		2 Years		3 Years		5 Years		10 Years		15 Years	
Year	SDRS	Bench	SDRS	Bench	SDRS	Bench	SDRS	Bench	SDRS	Bench	SDRS	Bench
2021	29.6%	15.3%	1.3%	6.5%	0.8%	6.7%	6.7%	6.9%	4.1%	6.2%	5.4%	7.2%
2020	(20.8%)	(1.7%)	(11.2%)	2.6%	(4.5%)	2.7%	(0.7%)	4.1%	2.9%	6.1%		
2019	(0.4%)	7.1%	4.8%	4.9%	10.5%	7.2%	1.7%	4.3%	7.1%	8.2%		
2018	10.2%	2.7%	16.3%	7.3%	7.0%	5.1%	3.7%	5.1%	7.2%	7.7%		
2017	22.7%	12.0%	5.4%	6.3%	(0.2%)	3.9%	3.9%	6.3%	6.2%	7.5%		
2016	(9.6%)	0.9%	(10.1%)	0.0%	(4.0%)	3.6%	1.5%	5.5%	4.8%	7.3%		
2015	(10.6%)	(0.8%)	(1.1%)	5.0%	3.0%	6.3%	6.7%	8.2%				
2014	9.5%	11.2%	10.5%	10.0%	10.1%	9.3%	12.7%	12.2%				
2013	11.5%	8.9%	10.4%	8.4%	12.2%	10.5%	10.8%	10.4%				
2012	9.2%	7.9%	12.6%	11.3%	14.2%	13.7%	8.5%	8.8%				
2011	16.0%	14.8%	16.7%	16.8%	11.2%	11.8%	8.2%	9.1%				
2010	17.5%	18.9%	8.8%	10.3%	5.8%	7.2%						
2009	0.7%	2.3%	0.4%	1.8%	2.8%	4.2%						
2008	0.1%	1.2%	3.8%	5.2%								
2007	7.7%	9.2%										

The chart to the left shows the annualized total rate of returns for 1, 2, 3, 5, 10 and 15 years through fiscal year 2021 for the Internal High Yield Bond Portfolio. The High Yield benchmark[5] is provided for comparison.

On July 1, 2006, the investment grade and high yield bonds were separated and are now managed individually.

Internal Bond Profiles

The South Dakota Retirement System's internal Investment Grade (IG) and High Yield (HY) bond portfolio characteristics as of June 30, 2021, are presented below.

Distribution by Duration	IG	HY
0 to 2 Years	6.8%	59.2%
2 to 3 Years	8.0%	12.1%
3 to 4 Years	8.7%	8.9%
4 to 5 Years	22.1%	5.2%
5 to 6 Years	5.5%	6.5%
6 to 8 Years	30.3%	6.8%
Above 8 Years	18.6%	1.3%
Total	100.0%	100.0%

Distribution by Quality Rating	IG	HY
U.S. Gov't/Aaa	64.7%	2.4%
Aa	10.4%	0.0%
A	11.4%	0.0%
Baa	12.6%	1.5%
Ba	0.9%	33.4%
B	0.0%	31.5%
Caa and lower	0.0%	31.2%
Total	100.0%	100.0%

Distribution by Coupon	IG	HY
0.00% - 2.00%	53.9%	25.5%
2.01% - 3.00%	22.6%	0.7%
3.01% - 4.00%	18.8%	5.5%
4.01% - 5.00%	3.2%	20.6%
5.01% - 6.00%	1.4%	19.8%
6.01% - 7.00%	0.1%	12.7%
7.01% and over	0.0%	15.2%
Total	100.0%	100.0%

Distribution by Sector	IG	HY
Cash/Cash Equivalents	0.9%	2.4%
U.S. Treasuries	34.0%	0.0%
Agency Debentures	2.9%	0.0%
Agency Mortgage-Backed Securities	25.7%	0.0%
Investment Grade Corporates	35.6%	1.5%
High Yield Securities	0.9%	96.1%
Total	100.0%	100.0%

Investment Grade Bond Portfolio Ten Largest Corporates by Issuer	% of Total
Ontario (Province Of)	2.3%
Bank of America Corp.	2.2%
Dell Technologies, Inc.	1.7%
Starbucks Corp.	1.6%
Alberta (Province Of)	1.5%
Amazon.com, Inc.	1.5%
Walmart, Inc.	1.3%
Morgan Stanley	1.2%
Quebec (Province Of)	1.2%
BP plc	1.2%
Total	15.7%

High Yield Bond Portfolio Ten Largest Corporates by Issuer	% of Total
Bausch Health Cos., Inc.	2.0%
T-Mobile US, Inc.	1.8%
CCO Holdings LLC	1.6%
CSC Holdings LLC	1.6%
Ford Motor Co.	1.5%
Lumen Technologies, Inc.	1.5%
Carnival Corp.	1.5%
HCA, Inc.	1.4%
Occidental Petroleum Corp.	1.2%
TransDigm Group, Inc.	1.1%
Total	15.2%

List of Largest Assets Held

Largest Stock Holdings (by Fair Value)
June 30, 2021

Description	Shares		Fair Value
Microsoft Corporation	1,644,581	$	445,516,993
Apple Inc.	2,605,356		356,829,558
Amazon.com, Inc.	68,014		233,979,042
Facebook Inc. Class A	638,999		222,186,342
Alphabet Inc. Class A	89,471		218,469,393
Alphabet Inc. Class C	84,038		210,626,120
Intel Corporation	3,617,725		203,099,082
AT&T Inc.	6,507,683		187,291,117
Johnson & Johnson	1,094,141		180,248,788
CISCO Systems Inc.	2,924,013		154,972,689

Largest Bond Holdings (by Fair Value)
June 30, 2021

Description		Par Value		Fair Value
US Treasury Note 2.250% Due November 15, 2025	$	211,200,000	$	224,697,000
US Treasury Note 0.125% Due April 15, 2022		220,300,000		220,368,844
US Treasury Note 2.250% Due November 15, 2024		159,420,300		168,524,694
US Treasury Note 1.375% Due September 15, 2023		138,400,000		141,735,656
US Treasury Note 2.750% Due November 15, 2047		123,105,300		140,138,073
US Treasury Note 1.375% Due November 15, 2040		155,760,000		139,916,288
US Treasury Note 1.625% Due May 15, 2026		128,359,100		133,047,216
US Treasury Note 1.625% Due February 15, 2026		122,786,200		127,275,570
US Treasury Note 1.875% Due February 15, 2022		124,300,000		125,795,484
US Treasury Note 2.250% Due February 15, 2027		116,348,800		124,352,325

A complete list of portfolio holdings may be requested from the Oregon State Treasury, 350 Winter Street NE, Suite 100, Salem, OR 97301-3896.

Actual Asset Class Exposure	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Tactical Cash	2.5%	1.8%	0.2%	0.1%	0.9%	1.5%	1.8%	2.2%	0.1%	3.6%
Marketable Fixed Income	26.2%	26.3%	18.5%	18.7%	16.4%	23.3%	16.8%	18.4%	21.1%	16.3%
Private Debt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	3.9%	4.5%
Marketable Equity	52.3%	54.0%	58.2%	57.6%	54.0%	46.9%	48.4%	46.4%	40.7%	37.3%
Private Equity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	6.9%	10.0%
Marketable Alternatives	10.5%	9.6%	14.6%	13.1%	16.6%	16.5%	17.8%	16.8%	18.1%	17.6%
Real Assets	8.5%	8.4%	8.5%	10.4%	12.2%	11.8%	15.2%	9.3%	9.2%	10.5%

Cash

The Board has provided a target of 2.0% for this asset class with a strategic range of 0.0% to 5.0%, recognizing a cash allocation for liquidity purposes can provide needed flexibility during times of market stress. In addition, WRS typically holds between 3 to 6 months of estimated benefit payments in cash and cash equivalents. Investments in this category will be focused primarily on preservation of capital with a secondary focus on yield.

As of December 31, 2021, the Cash allocation was $394,228,737, or 3.65% of the total portfolio after accounting for the overlay program. Cash includes Short Term Investment Funds (STIF). WRS had contracts with one external investment manager who manages a portfolio related to cash including the overlay.

Fixed Income with Private Debt

Effective May 16, 2019, the WRS Governance Policy was amended to include Private Debt in the Fixed Income Category.

The Board has provided a target of 18.0% for Marketable Fixed Income with a strategic range of 13.0%-25.5%. The Private Debt sub-asset class has a target of 3% and with a strategic range of 2.5% - 7.5 %. The blended benchmark for marketable fixed income consists of 23.8% Barclays U.S. Aggregate, 42.9% Barclays Government, and 19.0% is a 50/50 blend of Bloomberg Barclays High Yield Index and Credit Suisse Leveraged Loan Index. The Private Debt benchmark is Cambridge Associates Vintage Year Blend (Quarter Lag). Private Debt strategies can include Sr. lending, Mezzanine Finance, Distressed debt, and Real Estate debt among others.

The top holdings within the Marketable Fixed Income portfolio as of December 31, 2021, are illustrated in the table below:

Top Marketable Fixed Income Portfolios					
Holdings	**Start Date**	**Rate**	**Due**	**Percent of WRS Marketable Fixed Income Portfolio**	**Fair Value**
UNITED STATES TREAS BDS		2.250%	5/15/2051 REG	1.88%	28,400,000.00
UNITED STATES TREAS BDS		2.250%	5/15/2041 REG	1.61%	24,232,656.25
UNITED STATES TREAS NTS		2.875%	5/15/2028	1.21%	18,218,684.22
UNITED STATES TREAS NTS DTD		2.375%	8/15/2024 REG	1.08%	16,200,310.75
UNITED STATES TREAS NTS DTD	5/15/2014	2.500%	5/15/2024 REG	1.05%	15,845,107.46
UNITED STATES TREAS NTS DTD	5/15/2021	1.625%	5/15/2031	1.02%	15,409,000.00
UNITED STATES OF AMER TREAS NOTES DTD	8/2/2021	0.125%	7/31/2023	0.99%	14,883,398.40
UNITED STATES TREAS NTS		1.250%	3/31/2028	0.99%	14,878,710.90
UNITED STATES TREAS NTS DTD	4/30/2021	1.250%	4/30/2028	0.99%	14,875,781.25
UNITED STATES TREAS NTS DTD	6/15/2021	0.250%	6/15/2024	0.98%	14,782,031.25

Note: Please contact the Wyoming Retirement System for a complete list of portfolio holdings.

LARGEST HOLDINGS

Total Top 40	**37.7%**	**$ 8,808,541,537**

TOTAL FUND

ISSUE NAME	***%***	
US TREAS-CPI INFLAT	10.1%	$ 2,355,507,046
U S TREASURY NOTE	5.0%	$ 1,177,848,188
IDAHO MORTGAGES-FSB	3.7%	$ 864,610,398
U S TREASURY BOND	1.7%	$ 387,300,265
ALPHABET INC	1.3%	$ 299,726,932
PERSI STIF	1.2%	$ 270,113,040
MICROSOFT CORP	1.0%	$ 225,986,022
TAIWAN SEMICONDUCTOR MANUFACTU	0.8%	$ 190,555,217
AMAZON.COM INC	0.8%	$ 184,412,339
APPLE INC	0.7%	$ 157,834,779
PROLOGIS INC	0.7%	$ 157,656,899
MASTERCARD INC	0.6%	$ 148,891,058
IDA INVESTPORT M INDUSTRIAL	0.5%	$ 114,103,337
IDA INVESTPORT- SPRING STREET	0.5%	$ 112,855,174
VISA INC	0.5%	$ 106,696,759
NOVO NORDISK A/S	0.5%	$ 106,477,056
KOLL-PERS LLC	0.4%	$ 102,338,112
UNITEDHEALTH GROUP INC	0.4%	$ 92,516,853
MOODY'S CORP	0.4%	$ 91,766,823
OTIS WORLDWIDE CORP	0.4%	$ 90,189,626
IDA INVESTPORT-SOLERO PLN	0.4%	$ 88,932,308
PRUDENTIAL CONTRACT 9586 PRISA	0.4%	$ 88,185,504
VERITAS CAPITAL FUND VI	0.4%	$ 88,087,482
IDA INVESTPORT CHICAGO INDUST	0.4%	$ 86,474,988
KKR NORTH AMERICA FUND XII	0.4%	$ 85,379,083
ADVENT INTERNATIONAL GPE IX	0.4%	$ 83,409,384
BLACKSTONE CAPITAL PARTNERS	0.4%	$ 83,093,520
ORACLE CORP	0.4%	$ 81,770,569
ROCHE HOLDING AG	0.3%	$ 79,041,042
JOHNSON & JOHNSON	0.3%	$ 77,132,556
CITIGROUP INC	0.3%	$ 77,112,752
IDA INVESTPORT-TUSTIN AVE LLC	0.3%	$ 76,880,404
SAMSUNG ELECTRONICS CO LTD	0.3%	$ 75,904,062
LVMH MOET HENNESSY LOUIS VUITT	0.3%	$ 75,182,504
VERITAS CAPITAL FUND V	0.3%	$ 73,966,119
IDA INVESTPORT BRIDGESTONE	0.3%	$ 73,021,210
ADOBE INC	0.3%	$ 72,363,614
CVC CAPITAL PARTNERS VII	0.3%	$ 70,595,357
EXTRA SPACE STORAGE INC	0.3%	$ 68,018,458
AUTOMATIC DATA PROCESSING INC	0.3%	$ 66,604,700