COMPREHENSIVE ANNUAL FINANCIAL REPORT
FISCAL YEARS ENDING JUNE 30, 2020 AND 2019

City of Phoenix, Arizona

EMPLOYEES' RETIREMENT PLAN

COPERS

CITY OF PHOENIX
EMPLOYEES' RETIREMENT PLAN
(A Component Unit of the City of Phoenix, Arizona)

SEVENTY-FOURTH ANNUAL
COMPREHENSIVE ANNUAL FINANCIAL REPORT
FOR THE FISCAL YEARS ENDED
JUNE 30, 2020 and 2019

200 West Washington Ave, 10th Floor
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Prepared by:
City of Phoenix
Employees' Retirement System
and
City of Phoenix
Finance Department

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Introductory Section

The **Introductory Section** contains the Certificate of Achievement for Excellence in Financial Reporting, the letter of transmittal, the Retirement Board structure, the administrative organization and the Chairperson's Report.

Government Finance Officers Association

Certificate of
Achievement
for Excellence
in Financial
Reporting

Presented to

City of Phoenix Employees' Retirement Plan
Arizona

For its Comprehensive Annual
Financial Report
For the Fiscal Year Ended

June 30, 2019

Christopher P. Morrill
Executive Director/CEO

Public Pension Coordinating Council

Public Pension Standards Award
For Funding and Administration
2020

Presented to

City of Phoenix Employees' Retirement System

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

Presented by the Public Pension Coordinating Council, a confederation of

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

Alan H. Winkle
Alan H. Winkle
Program Administrator

City of Phoenix
RETIREMENT SYSTEM

November 2, 2020

Chairperson and Members of the Retirement Board
City of Phoenix Employees' Retirement System:

I am pleased to submit this Comprehensive Annual Financial Report (CAFR) of the City of Phoenix Employees' Retirement System (COPERS or the Plan) as of and for the years ended June 30, 2020 and 2019. This report consists of the Introductory, Financial, Investment, Actuarial and Statistical sections.

The Plan is governed by the City of Phoenix Employees' Retirement Law of 1953 (Chapter XXIV of the City of Phoenix Charter). This law has been revised over the years, with the latest amendment approved by the City voters on August 25, 2015.

COPERS HISTORY

COPERS was created to provide retirement, survivor and disability benefits to the City of Phoenix general employees. COPERS is a qualified retirement plan under the Internal Revenue Code. The City of Phoenix Employees' Retirement Board (the Board) is the trustee of the Plan.

The Mayor and City Council are covered by the Elected Officials Retirement Plan of Arizona (EORPA). Sworn police and fire employees are covered by the Arizona Public Safety Personnel Retirement System (APSPRS). The EORPA and the APSPRS were created by Arizona State Statute. EORPA and APSPRS benefit payments, investments and overall administration of the Plans are handled by centralized State Boards, and each of the retirement plans publish separate financial reports. However, the administration of the system and responsibility for making the APSPRS provisions effective for each employer are vested in Local Boards. For the City of Phoenix, this responsibility rests with the City of Phoenix Fire Pension Board and the City of Phoenix Police Pension Board. The COPERS Retirement Program Administrator oversees the Local Board Secretary for both Boards, and retirement office staff perform the administrative functions on behalf of those Boards.

FINANCIAL INFORMATION

Responsibility for accuracy of the data, completeness, and fairness of the presentation of the CAFR, including all disclosures, rests with the Retirement Board. The Plan's record-keeping, financial statement and investment control responsibilities have been performed by the City's Finance Department. To the best of our knowledge and belief, this report is accurate in all material respects and is reported in a manner designed to present fairly the Fiduciary Net Position and changes in Fiduciary net position. All disclosures necessary to enable the reader to gain an understanding of the Plan's financial activities have been included.

Readers of this CAFR are encouraged to review the Management's Discussion and Analysis starting on page 17, which a provides narrative analysis and highlights of our financial condition and activities for the fiscal years ended June 30, 2020 and 2019.

AWARDS AND ACKNOWLEDGEMENTS

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to COPERS for its comprehensive annual financial report for the fiscal year ended June 30, 2019. In order to be awarded a Certificate of Achievement, an organization must conform to the highest standards of fiduciary reporting and full disclosure. This is the 34th year COPERS has received this award.

The Plan also received the Public Pension Standards Award for Funding and Administration. This award was presented by the Public Pension Coordinating Council, a confederation of the National Association of State Retirement Administrators, the National Conference on Public Employee Retirement Systems and the National Council on Teacher Retirement. This is the tenth year the Plan has applied for and received this award.

INTERNAL CONTROLS

Internal controls are procedures designed to accomplish the following: to protect assets from loss, theft or misuse; to check the accuracy and reliability of accounting data; to promote operational efficiency; and, to encourage compliance with managerial policies. The Board and the City of Phoenix (the City) management are responsible for establishing a system of internal controls designed to provide reasonable assurance that these objectives are met. Because the cost of internal controls should not outweigh their benefits, the City's comprehensive framework of internal controls has been designed to provide reasonable, rather than absolute, assurance that the financial statements are free of any material misstatements. Representatives from the City Auditor's Department meet periodically with the Board to review their audit plans and present the results of the audits. Moreover, representatives from the independent auditors meet annually with the Board to review their audit plans and receive input from the Board. The City also maintains budgetary controls designed to ensure compliance with legal provisions of the annual budget adopted by the City Council.

This report has been prepared in conformance with the principles of governmental accounting and reporting as set forth by the Governmental Accounting Standards Board. Transactions of COPERS are reported on the accrual basis of accounting. Revenues are recorded when earned, without regard to the date of collection, and expenses are recorded when incurred. The City's internal accounting and audit controls are designed to provide for the accuracy, reliability and integrity of all financial records.

MAJOR INITIATIVES INVOLVING PLAN ADMINISTRATION

In March of 2017, the Board adopted a revised asset allocation that more closely aligns the Board's risk tolerance with expected returns. The Retirement Board and COPERS staff have worked over the past year to move COPERS' investments within the approved target ranges for each of the asset classes. As of this report, this project is complete.

During the reporting period, COPERS entered into an agreement with the firm of Levi, Ray & Shoup, Inc (LRS) to host the new pension administration system. LRS has 40 years of experience in retirement and IT solutions. The project, scheduled to take approximately three years, is on schedule with the first design phase almost complete. The new web-based system will allow greater automation for staff and enhanced member services through a web-based application. The Segal Group (formerly known as LRWL, Inc.) continues to serve as consultants for COPERS in assisting with the replacement software project.

ADMINISTRATIVE BUDGET

The City provides an annual budgetary allocation to pay for the general administration of COPERS. The cost paid by the City for COPERS' administration was $2.134 million. Most investment-related expenses, such as investment custody costs, investment manager fees, and consultant fees, are paid directly from the Plan's assets. Certain administrative fees for legal, actuarial and computer services are also paid directly from Plan assets. The investment costs amounted to $16.162 million for the fiscal year ended June 30, 2020. These costs represented 0.60% of total Plan assets.

FUNDING STATUS AND PROGRESS

COPERS contracts with an independent actuarial firm, GRS, to conduct an actuarial valuation each year. The purpose of the valuation is to measure COPERS' liability for pension payments and its funding progress, to determine the actuarially determined contribution and to analyze changes in experience. The City of Phoenix has adopted a Pension Funding Policy that serves as a roadmap to a fully funded pension plan. Through the policy the City commits to contributing at least 100% of the actuarially determined contribution, as well as exploring other strategies that would have a positive impact on the security of the Plan.

The actuarial valuation as of June 30, 2020 reflects a funded ratio of 63.7% using a smoothed market value of plan assets. This is a 2.9% improvement from the prior fiscal year. The unfunded actuarial accrued liability will be amortized as a level percent of payroll over future years. If all actuarial assumptions are met, the plan will be fully funded in 19 years.

INVESTMENT ACTIVITIES

As of June 30, 2020, COPERS' net position is $2.681 billion. The fiscal year net return for the Plan is 1.4%, which is 5.6% below the assumed rate of return of 7.00%. The five-year annualized return, net of fees, is 5.2%. The Board considered and approved three contracts for investment managers during the year to implement the approved asset allocation.

For more information on COPERS' investment policies and performance, please refer to the Investment section in this report, beginning on page 55.

PROFESSIONAL SERVICES

The Retirement Board retains professional consultants to prudently discharge its fiduciary responsibility for the proper administration of the Plan. Gabriel Roeder Smith & Company (GRS) provides actuarial services and the corresponding certification. BNY Mellon serves as the master custodian. Brokerage trade execution monitoring is compiled by Elkins/McSherry, LLC. Meketa Investment Group provides investment performance analysis, asset allocation review and investment consulting to the Retirement Board. Alignium provides consultative services to COPERS regarding its real estate investments. COPERS' financial statements are audited by BKD, LLP and reviews of operations are performed by the City Auditor's Department. Managed Medical Review Organization, Inc., provides independent medical evaluation services related to disability retirement applications.

The City Attorney's office provides legal representation. COPERS also uses outside legal services in the event the City Attorney's office has a conflict or for specialized legal work. Those firms are Ice Miller and Ryan, Rapp & Underwood, P.L.C.

The guidance provided by the Retirement Board is greatly appreciated. The preparation of this report is a collaborative effort of many individuals. I would like to acknowledge the hard work of the COPERS staff, the Finance Department and the Retirement Board. This report is intended to provide important information crucial to the understanding of the pension plan.

Sincerely,

Scott Steventon

Scott Steventon
Acting Retirement Program Administrator

200 West Washington Street, 10th Floor • Phoenix, Arizona 85003 • 602-534-4400 • Fax: 602-495-2008 • 7-1-1 Relay Friendly

RETIREMENT BOARD



CHARLENE REYNOLDS
Chairperson, Retirement Board
Elected Board Member

Tammy Ryan
Retiree Board Member

ALAN MAGUIRE
Citizen Board Member
Vice Chairperson, Retirement Board



LORI BAYS
Human Resources Director
City of Phoenix
Ex-Officio Board Member

TONI MACCARONE
Deputy City Manager
City of Phoenix
Ex-Officio Board Member

KATHLEEN GITKIN
City Treasurer
City of Phoenix
Ex-Officio Board Member



JASON STOKES
Elected Board Member

DENISE OLSON
Chief Financial Officer
City of Phoenix
Ex-Officio Board Member

SPENCER SELF
Elected Board Member

Retirement Board Committees

Investment Committee

Charlene Reynolds, Chairperson
Kathleen Gitkin
Alan Maguire
Tammy Ryan
Jason Stokes

Charter Amendments/ Policies & Procedures Committee

Lori Bays, Chairperson
Denise Olson
Tammy Ryan
Charlene Reynolds
Jason Stokes

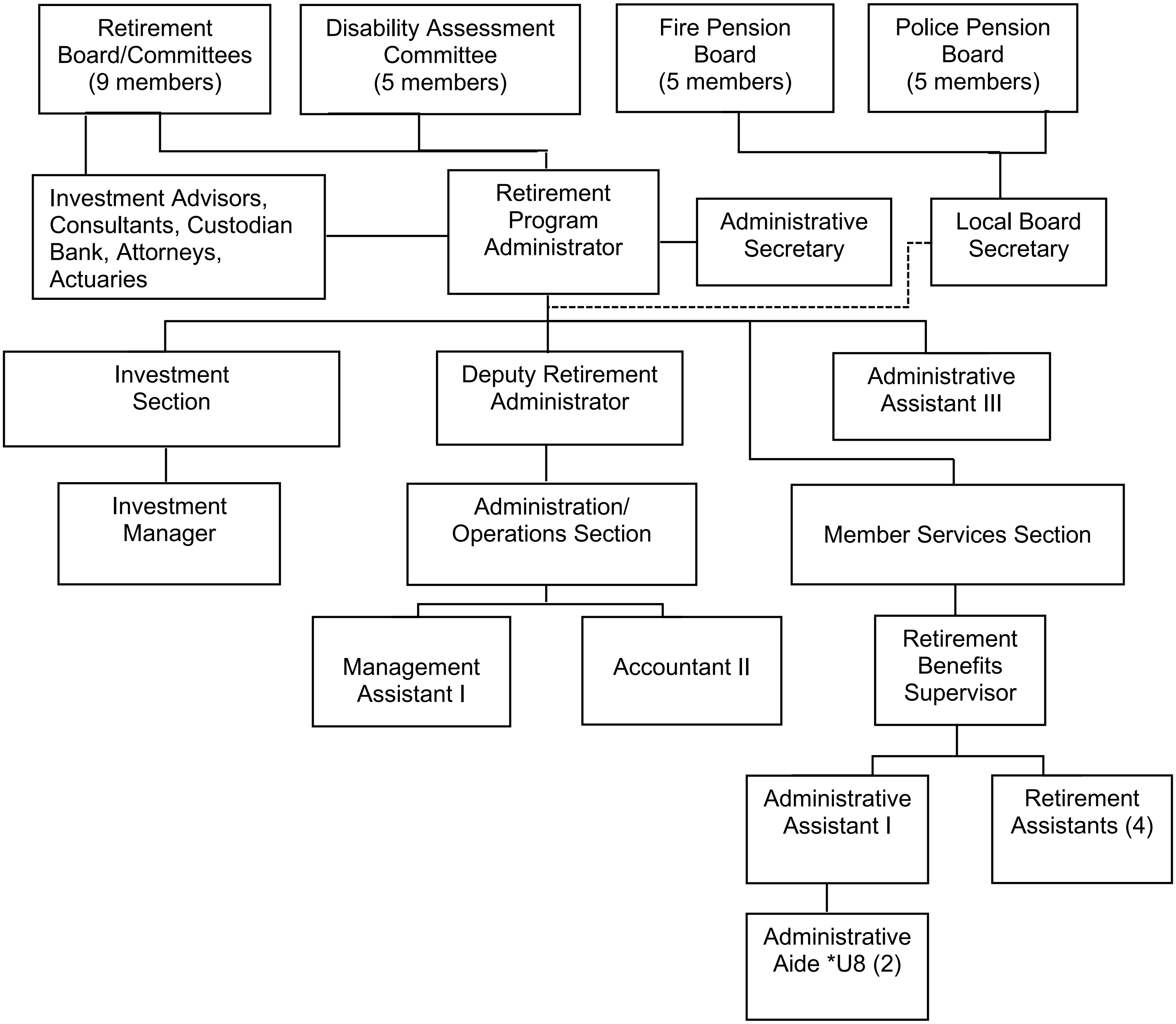
Legal Review Committee

Toni Maccarone, Chairperson
Alan Maguire
Charlene Reynolds
Spencer Self

Disability Assessment Committee

Scott Steventon, Chairperson
Robert Jones, M.D.
Ben Lane
Debra Payan
Ron Ramirez

Retirement Department Administrative Organization



Please refer to the Investment Section for a list of Investment Managers on page 65-66, the Schedule of Investment Fees on pages 72-74 and the Schedule of Commissions of page 76.

Administrative Staff	
Scott Steventon	Retirement Program Administrator
Vacant	Accountant II
Alejandra Montoya	Administrative Aide
Christina Vega	Administrative Aide
Kyle Corbin	Administrative Assistant I
Lollita Whitfield	Administrative Assistant III
Barbara Trollope	Assistant Retirement Administrator
Greg Fitchet	Investment Officer
Tina Esparza	Local Board Secretary
Trista Eaden	Management Assistant I
Bobbie Gonzalez	Retirement Assistant
Marissa Hernandez	Retirement Assistant
Josie Romero	Retirement Assistant
Misty Escamilla	Retirement Assistant
Stacy Osborne-Fry	Retirement Benefits Supervisor
Marcia Wilson	Secretary III

Accounting

Denise Olson — Chief Financial Officer, Finance Department

Treasurer

Kathleen Gitkin — City Treasurer, Finance Department

Legal

Michelle Wood — Assistant City Attorney IV, Law Department

Actuary

Gabriel, Roeder Smith & Company — Denver, CO

Auditor

BKD, LLP — Dallas, TX
Certified Public Accountants under contract with the City Auditor

Brokerage

Elkins McSherry LLC — New York, NY

Investment Services

Refer to Investment Section for: Investment Managers on page 65-66
Schedule of Investment Fees on page 72-74 and
Schedule of Commissions on page 76.

Legal Services

ICE Miller — Indianapolis, IN
Ryan, Rapp & Underwood — Phoenix, AZ

Master Custodian

BNY Mellon — Pittsburgh, Pennsylvania

Medical Advisors

Managed Medical Review Organization, Inc — Novi, MI

City of Phoenix
RETIREMENT SYSTEM

November 5, 2020

To COPERS Members and Retirees:

On behalf of the Retirement Board, it is my pleasure to present the City of Phoenix Employees' Retirement System (COPERS) Comprehensive Annual Financial Report (CAFR) for the fiscal years ended June 30, 2020 and June 30, 2019. This annual report contains information regarding the COPERS administration, financial statements, investments, actuarial and statistical data.

During the fiscal year, the Board's investment consultant, Meketa, provided performance measurement and assisted the Board with analysis of investment issues. Meketa reports the COPERS' total fund assets increased from $2.660 billion to $2.681 billion and net performance for the year ended June 30, 2020 was 1.4%. The annualized net return for the past three and five years was 4.8% and 5.2%, respectively.

The Board has implemented a diversified portfolio, in which all segments of the U.S. and International equity markets are represented. The fixed income and real estate allocations are diversified among several managers. Real estate holdings are further diversified among geographic locations and property types. The Board recently modified the plan’s asset allocation with the objective of maximizing its returns with the lowest possible risk.

The Board's actuarial consultant, Gabriel Roeder Smith & Company (GRS), conducted the annual actuarial valuation as of June 30, 2020. GRS reports the funded ratio based on the actuarial value of assets (AVA) of the plan to be 63.7%, an increase from the June 30, 2019 funded ratio of 60.8%. The plan sponsor, the City of Phoenix, remains committed to funding the employer's actuarially-computed contribution amount.

Representatives from the City Auditor Department and external auditors under contract with the City Auditor meet annually with the Board to review their audit plans, receive input from the Board and present the results of their audits.

The CAFR and the Popular Annual Financial Report (PAFR) for the fiscal year ended June 30, 2019 were once again recognized by the Government Finance Officers Association. These reports are accessible through the COPERS' internet site.

The COPERS Board continues to focus on fulfilling its fiduciary obligation to the COPERS members, retirees and beneficiaries. Please contact the Retirement Office with any questions or comments.

Sincerely,

Charlene Reynolds

Charlene Reynolds
Chairperson, Retirement Board

200 West Washington Street, 10th Floor • Phoenix, Arizona 85003 • 602-534-4400 • Fax: 602-495-2008 • 7-1-1 Relay Friendly

Financial Section

The Financial Section contains the opinion of the independent auditors, management's discussion and analysis, the audited financial statements, notes to the financial statements, and relevant supplemental information.

BKD
CPAs & Advisors

14241 Dallas Parkway, Suite 1100 | Dallas, TX 75254-2961
972.702.8262 | Fax 972.702.0673 | bkd.com

Independent Auditor's Report

Honorable Mayor and Members of the City Council
City of Phoenix Employees' Retirement System Retirement Board
Phoenix, Arizona

We have audited the accompanying financial statements of the City of Phoenix Employees' Retirement System (Plan), a fiduciary fund of the City of Phoenix, Arizona, as of and for the years ended June 30, 2020 and 2019, and the related notes to financial statements, which collectively comprise the Plan's basic financial statement 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.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. 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 auditor's 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.

Honorable Mayor and Members of the City Council
City of Phoenix Employees' Retirement System Retirement Board
Page 2

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Plan as of June 30, 2020 and 2019, and the changes in its fiduciary net position for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis and pension information 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 audits were conducted for the purpose of forming an opinion on the financial statements that collectively comprise the Plan's basic financial statements. The introductory section, supplementary information, investment section, actuarial section and statistical section as listed in the table of contents, are presented for purposes of additional analysis and are not a required part of the basic financial statements.

The supplementary information including the schedule of investment expenses, schedule of administrative expenditures and encumbrances, and schedule of administrative expenses is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audits of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the supplementary information noted above is fairly stated, in all material respects, in relation to the basic financial statements as a whole.

The introductory section, investment section, actuarial section, and statistical section have not been subjected to the auditing procedures applied in the audits of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

BKD, LLP

Dallas, Texas
November 20, 2020

Management's Discussion and Analysis (unaudited)

Dear Members and Retirees:

The City of Phoenix Employees' Retirement System ("COPERS" or the "Plan") is pleased to provide the following analysis of the financial activities for the fiscal years ended June 30, 2020 and 2019. This discussion is presented as a narrative overview only. Readers are encouraged to consider the information presented in this analysis in conjunction with the Transmittal Letter in the Introductory Section, the financial statements and the other information provided in this report.

Financial Highlights:
(in thousands)

- The Plan's Net Position Restricted for Pensions increased by $21,039 or approximately .8% to $2,681,173 as of June 30, 2020 as reflected in the Statement of Fiduciary Net Position on page 23. The Net Position Restricted for Pensions as of June 30, 2019, was $2,660,134. The increase during fiscal year 2020 was primarily attributable to increased contributions to the Plan.

- Total additions to the Net Position Restricted for Pensions, as reported in the Statement of Changes in Fiduciary Net Position on page 24, for the fiscal year ended June 30, 2020 was $267,826 compared to $346,163 for fiscal year ended June 30, 2019. The decrease for the current year was primarily attributable to the market downturn caused by the pandemic. Total additions include employer and employee contributions of $215,303 and total net investment income of $50,389 for the fiscal year ending June 30, 2020 compared to $200,838 and $142,964 in the prior year.

- The recent actuarial valuation prepared as of June 30, 2020 reported the funded ratio to be 63.7%, up from 60.8% the prior fiscal year. This is based on a total pension liability of $4,414,114 and the smoothed actuarial value of assets.

- On a market value basis, the investment rate of return for this fiscal year was 1.4 percent compared with 6.2 percent in fiscal year 2019.

- Monthly retirement benefits paid to retirees and beneficiaries increased 2.2% to $239,407 for fiscal year 2020, compared to $234,301 in fiscal year 2019.

Using This Annual Report:

This report is prepared to provide information as a means for making management decisions, complying with statutory provisions, and demonstrating the responsible stewardship of the assets of the Plan. The financial statements starting on page 23 in the Financial Section identify the Net Position Restricted for Pensions and provide a comparison of the current fiscal year to the prior year.

Overview of Financial Statements:

The Financial Section includes the following:

- Statement of Fiduciary Net Position (Page 23)
- Statement of Changes in Fiduciary Net Position (Page 24)
- Notes to the Financial Statements (Page 25)
- Required Supplementary Information (Page 46)
- Supplementary Information (Page 51)

Statement of Fiduciary Net Position:

This statement presents information on all of the assets and liabilities of the Plan with the difference reported as Net Position Restricted for Pensions available to retirees and survivors. The current year information is provided in comparison to the previous year to assist the reader in evaluating the progress of the Plan.

Statement of Changes in Fiduciary Net Position:

The Statement of Changes in Fiduciary Net Position presents information showing how the Plan's net position changed during the stated fiscal year.

Notes to the Financial Statements:

The Notes to the Financial Statements are an integral part of the financial statements. The information provides the reader additional information that is essential to a full understanding of the data presented in the financial statements to further evaluate the financial condition and operation of the Plan.

Required Supplementary Information:

The Schedule of Changes in Net Pension Liability and Related Ratios provides the Plan's funding progress for the last seven years and the funding ratio that indicates the Plan's ability to meet its current and future benefit obligations. The Schedule of Employer Contributions reflects the City's Actuarial Determined Contribution and Actual Contributions for the last ten years. The Notes to the Required Supplementary Information provide additional information regarding actuarial assumptions and factors affecting trends.

Supplementary Information:

The Supplementary Information includes investment expenses and administrative expenditures for the current and previous year in operating COPERS. The Schedule of Investment Expenses provides the reader with the cost to the Plan for managing and monitoring the Plan's assets.

Financial Analysis
(in thousands)

The evaluation of the Plan's net position provides a measurement tool in assessing the progress and performance of the Plan. COPERS' Net Position Restricted for Pensions as of June 30, 2020 was $2,681,173. This amount represents an increase of .8% from Net Position Restricted for Pensions of $2,660,134 as of June 30, 2019.

Uninvested cash is reflected as Cash & Cash Equivalents on the Statement of Fiduciary Net Position and may fluctuate due to the timing of investments, pension payroll and other transactions. Cash & Cash Equivalents increased from $46,600 as of June 30, 2019 to $68,296 as of June 30, 2020, an increase of $21,696.

The Plan had liabilities of $115,432 on June 30, 2020 compared to $137,981 on June 30, 2019. This change was primarily attributable to the reduction in payables related to securities lending collateral and unsettled investment broker transactions.

The overall return on investments for fiscal years 2020, 2019 and 2018 was 1.4%, 6.20% and 7.10%, respectively. The chart below illustrates the performance of major asset classes over the last three fiscal years.

Table 1: COPERS Fiduciary Net Position for Benefits for June 30, 2020 and 2019 (in thousands)

	2020	2019	Change	% Change
Cash & Cash Equivalents	$ 68,296	$ 46,600	$ 21,696	46.6 %
Total Receivables	19,219	34,278	(15,059)	(43.9)
Total Investments	2,709,090	2,717,237	(8,147)	(0.3)
Total Assets	2,796,605	2,798,115	(1,510)	(0.1)
Total Liabilities	115,432	137,981	(22,549)	(16.3)
COPERS Net Position	**$ 2,681,173**	**$ 2,660,134**	**$ 21,039**	**0.8**

Table 2: COPERS Fiduciary Net Position for Benefits for June 30, 2019 and 2018 (in thousands)

	2019	2018	Change	% Change
Cash & Cash Equivalents	$ 46,600	$ 90,105	$ (43,505)	(48.3) %
Total Receivables	34,278	19,024	15,254	80.2
Total Investments	2,717,237	2,587,042	130,195	5.0
Total Assets	2,798,115	2,696,171	101,944	3.8
Total Liabilities	137,981	141,657	(3,676)	(2.6)
COPERS Net Position	**$ 2,660,134**	**$ 2,554,514**	**$ 105,620**	**4.1**

Reserves:

COPERS maintains five reserve funds to separately account for various transactions of the Plan. Additions to the reserves come from employer and member from contributions, and investment income. Deductions from the reserves include monthly pension benefits and payments to investment managers. A schedule of reserve account balances is included in Note 3 to the Financial Statements.

COPERS' Activities:
(in thousands)

COPERS provides retirement pensions, survivor benefits and disability benefits to qualified members and their beneficiaries. These benefits are financed through employer and member contributions and income on COPERS investments.

Total net investment income, which includes net appreciation or depreciation in fair value of investments, bond interest, dividend income, net securities lending income and investment expenses for the fiscal year ended June 30, 2020 was $50,389. This compares to net investment income for June 30, 2019 and June 30, 2018 of $142,964 and $166,514, respectively. Total employer contributions were $175,947 in fiscal year 2020, compared to $165,796 in fiscal year 2019 and $229,006 in fiscal year 2018. There was a one-time voluntary contribution of $70,000 by the City in fiscal year 2018. Benefit payments for the fiscal years 2020, 2019 and 2018 were $239,407, $234,301 and $224,454, respectively. Total deductions increased by 2.6% over the prior fiscal year, primarily as a result of an increase in the number of retirees.

The summary of COPERS revenues (additions) and expenses (deductions) for the fiscal years ended June 30, 2020, 2019 and 2018 are provided in Table 3 and Table 4:

Table 3: Summary Statement of Changes in Net Position (in thousands)

	2020	2019	Change	% Change
Additions				
Employer Contributions	$ 175,947	$ 165,796	$ 10,151	6.1 %
Members' Contributions	39,356	35,042	4,314	12.3
Inter-System Transfers	-	375	(375)	(100.0)
Retirement Office Administration	2,134	1,986	148	7.5
Net Investment Income	50,181	142,674	(92,493)	(64.8)
Net Securities Lending Income	208	290	(82)	(28.3)
Total Additions	**$ 267,826**	**$ 346,163**	**$ (78,338)**	**(22.6) %**
Deductions				
Benefit Payments	239,407	234,301	5,106	2.2 %
Refunds	2,526	3,012	(486)	(16.1)
Inter-System Transfers	211	451	(240)	(53.2)
Retirement Office Administration	2,134	1,986	148	7.5
Administrative Expense	2,509	793	1,716	216.4
Total Deductions	**$ 246,787**	**$ 240,543**	**$ 6,244**	**2.6 %**
Net Increase	**21,039**	**105,620**	**(84,581)**	**(80.1) %**
Net Position Restricted for Pensions	**$ 2,681,173**	**$ 2,660,134**	**$ 21,039**	**0.8 %**

Table 4: Summary Statement of Changes in Net Position (in thousands)

	2019	2018	Change	% Change
Additions				
Employer Contributions	$ 165,796	$ 229,006	$ (63,210)	(27.6) %
Members' Contributions	35,042	33,340	1,702	5.1
Inter-System Transfers	375	484	(109)	(22.5)
Retirement Office Administration	1,986	1,863	123	6.6
Net Investment Income	142,674	166,239	(23,565)	(14.2)
Net Securities Lending Income	290	275	15	5.5
Total Additions	**$ 346,163**	**$ 431,207**	**$ (85,044)**	**(19.7) %**
Deductions				
Benefit Payments	234,301	224,454	$ 9,847	4.4 %
Refunds	3,012	3,472	(460)	(13.2)
Inter-System Transfers	451	134	317	236.6
Retirement Office Administration	1,986	1,863	123	6.6
Administrative Expense	793	377	416	110.3
Total Deductions	**$ 240,543**	**$ 230,300**	**$ 10,243**	**4.4 %**
Net Increase	**105,620**	**200,907**	**(95,287)**	**(47.4) %**
Net Position Restricted for Pensions	**$ 2,660,134**	**$ 2,554,514**	**$ 105,620**	**4.1 %**

Requests for Information:

This report is prepared to provide the Retirement Board, members, retirees and citizens with an overview of the plan, to assess COPERS' financial position and to show accountability for funds received. Questions regarding the information provided in this financial report or requests for additional information may be addressed to:

COPERS
200 W. Washington, 10th Floor
Phoenix, AZ 85003
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Statement of Fiduciary Net Position as of June 30, 2020 and 2019 (in thousands)

	2020	2019
ASSETS		
Cash and Cash Equivalents	$ 68,296	$ 46,600
Receivables		
City of Phoenix Contributions	7,545	6,199
Member Contributions	1,661	1,331
Interest and Dividends	3,582	3,711
Unsettled Broker Transactions - Sales	4,678	14,906
Other	1,753	8,131
Total Receivables	19,219	34,278
Investments		
Temporary Investments from Securities Lending Collateral	79,589	92,581
Fixed Income	500,218	524,356
Domestic Equities	731,459	1,011,832
Private Equity	181,889	142,943
Global Commingled	326,796	391,061
International Equities	433,108	70,530
Hedge Funds	108,912	110,369
Real Estate	347,119	373,565
Total Investments	2,709,090	2,717,237
Total Assets	2,796,605	2,798,115
LIABILITIES		
Payable for Securities Lending Collateral	79,589	92,581
Unsettled Broker Transactions - Purchases	10,692	22,930
Due to the City of Phoenix	20,286	19,260
Investment Management Fees Payable	3,100	2,498
Other Payables	1,765	712
Total Liabilities	115,432	137,981
Net Position Restricted for Pensions	$ 2,681,173	$ 2,660,134

The accompanying notes are an integral part of these financial statements.

Statement of Changes in Fiduciary Net Position as of June 30, 2020 and 2019 (in thousands)

	2020	2019
ADDITIONS		
Contributions		
City of Phoenix	$ 175,947	$ 165,796
Member	39,356	35,042
Retirement Office Administration	2,134	1,986
Inter-System Transfers	-	375
Total Contributions	217,437	203,199
Net Investment Income		
Net Appreciation in Fair Value of Investments	25,246	113,265
Interest	18,774	17,885
Dividends	18,424	21,692
Other	3,899	5,107
Total Income from Investing Activities	66,343	157,949
Less Investing Activities Expense	(16,162)	(15,275)
Net Income from Investing Activities	50,181	142,674
Security Lending Gross Income	950	1,909
Less Agent Fees	(89)	(124)
Less Broker Rebates/Collateral Management Fees	(653)	(1,495)
Net Security Lending Expenses	(742)	(1,619)
Net Income from Security Lending Activities	208	290
Total Net Investment Income	50,389	142,964
Total Additions	267,826	346,163
DEDUCTIONS		
Benefit Payments	239,407	234,301
Refunds of Contributions	2,526	3,012
Retirement Office Administration	2,134	1,986
Inter-System Transfers	211	451
Administrative Expenses	2,509	793
Total Deductions	246,787	240,543
INCREASE IN NET POSITION	21,039	105,620
Net Position Restricted for Pensions		
Beginning of Year	2,660,134	2,554,514
End of Year	$ 2,681,173	$ 2,660,134

The accompanying notes are an integral part of these financial statements.

Note 1 - Summary of Significant Accounting Policies

The City of Phoenix Employees' Retirement Plan ("COPERS" or the "Plan") is a defined benefit single-employer public employees' retirement system for the City of Phoenix ("City") general municipal employees. The accounting policies of COPERS conform to accounting principles generally accepted in the United States of America ("GAAP") as applicable to governmental retirement plans.

a. Reporting Entity

COPERS prepares and distributes separate financial statements as required by the Charter of the City of Phoenix (Chapter XXIV, Article II, Employees' Retirement Law of 1953) ("Charter"). Its financial statements are also included as a component unit of the City due to the significance of COPERS' operational and financial relationships with the City. The cost of administering the Retirement Office is reflected as offsetting contributions and deductions on the Statement of Changes in Fiduciary Net Position although the costs are borne solely by the City. The City is the only non-employee contributor to the pension plan. Not all employees of the City are covered under COPERS. Police officers and firefighters are covered under the Arizona Public Safety Personnel Retirement System ("APSPRS") and elected officials under the Elected Officials Retirement Plan of Arizona ("EORPA"). APSPRS and EORPA were established by Arizona State Statute and are administered by an independent Board of Trustees. The City's involvement with these plans is limited to the administration of benefits for APSPRS through the City of Phoenix Fire and Police Local Boards and making the required annual contributions.

b. Basis of Accounting

The accompanying financial statements have been prepared using the accrual basis of accounting in conformity with United States generally accepted accounting principles as prescribed by the Governmental Accounting Standards Board. COPERS' transaction are accounted for using the flow of economic resources measurement focus. Employee contributions are recognized as revenue in the period in which employee services are rendered and the contributions are therefore earned. Employer contributions are recognized at the same time, as the City is formally committed to contributing the actuarially determined amount each year. Pension payments and refunds are recognized when due and payable and expenses are recorded when the corresponding liabilities are incurred, regardless of when payments are made.

c. Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make a number of estimates and assumptions that affect the reported amounts of net position restricted for pensions and changes therein. Actual results could differ from those estimates.

d. Investments

Equity securities and fixed-income securities are reported at fair value (Note 14). Interest and dividends are recognized on the accrual basis as earned. Purchases and sales of investments are recorded on a trade-date basis. Cash equivalents are determined by using a maturity of no more than 90 days at time of purchase. The fair value of an investment is the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date. The fair values of investments are generally based

Note 1 - Summary of Significant Accounting Policies (Continued)

on published market prices and quotations obtained from major investment firms. Certain investments are reported at the net asset values calculated by the investment manager as a practical expedient.

In March of 2017, the Board significantly revised the Investment Policy Statement that was more than 10 years old. The Board considered these revisions necessary to:

- Update the objectives and guidelines that govern the investment of COPERS' assets;
- Establish a long-term target asset allocation with a high likelihood of meeting COPERS' objectives; and
- Protect the financial health of COPERS through the implementation of a stable, long-term investment policy.

Significant areas of revision include modifying the asset allocation, reflecting the changes in the Phoenix City Charter that previously limited the types of investments COPERS could make, and adding prudent investor language. In consultation with their investment manager and consulting actuary, the Board believes the revised asset allocation will have a greater probability of realizing the assumed rate of return. The revised asset allocation was adopted during fiscal year 2017, was implemented in phases and completed this fiscal year. Until fully realized, the effect of these changes is not known.

The table below reflects the target and actual allocation of the portfolio and the expected return on those asset classes:

Asset Class	FY 2020 Target Allocation	FY 2020 Actual Allocation	10-Year Expected Real Return
U.S. Equity	16.00 %	19.70 %	7.00 %
Developed Market Equity (non-U.S.)	9.00	10.90	9.50
Emerging Market Equity	8.00	5.32	11.70
Private Equity	9.00	6.20	10.00
Investment Grade Bonds	15.00	16.70	2.40
TIPS	7.00	5.50	2.50
High Yield Bonds	5.00	4.70	4.90
Bank Loans	3.00	2.90	5.30
Emerging Market Bonds	3.00	2.90	4.60
Infrastructure	4.00	0.40	7.70
Natural Resources	4.00	0.20	11.00
Hedge Funds	5.00	4.00	4.00
Real Estate	12.00	12.80	8.20
GTAA	-	5.90	4.30
Cash	-	2.10	1.90

Note 2 - Description of Plan

a. Purpose

COPERS is a single-employer, defined benefit pension plan established by the City Charter. Its purpose is to provide retirement, disability retirement and survivor benefits for its members. Members are full-time employees on a work schedule which consists of the number of full-time hours per week designated for the class of employment for the employee's classification with a work schedule intended to be continuous over a period of twelve months. All full-time classified civil service employees and full-time appointive officials of the City are required, as a condition of employment, to contribute to COPERS.

b. Administration

The general administration, management and operation of COPERS are vested in a nine-member Retirement Board consisting of three elected employee members, four statutory members, a citizen member and a retiree member. The Retirement Board appoints the Retirement Program Administrator, a civil service position, and contracts other services necessary to properly administer the Plan.

c. Plan Amendment and Termination

COPERS is administered in accordance with the Charter and can be amended or repealed only by a vote of the people. There are no provisions for termination of COPERS. Voters approved changes to the City of Phoenix retirement system in an election held on August 25, 2015. New employees hired on or after January 1, 2016 were placed in Tier 3. The employee contribution rate for Tier 3 is based on 50% of the actuarially determined rate or 11% whichever is lower.

d. Membership Data

	June 30	
	2020	**2019**
Retirees, beneficiaries and survivors	7,322	7,195
Alternate payees	180	173
Terminated vested members	1,033	1,008
Active members:		
Tier 1	4,855	5,197
Tier 2	626	657
Tier 3	2,546	2,087
Total Members	**16,562**	**16,317**

Note 2 - Description of Plan (Continued)

e. Pension Benefits

Benefits are calculated on the basis of a given rate, final average salary and service credit. Members are eligible for retirement benefits at age 60 plus ten or more years of service credit, age 62 with five or more years of service credit, or where age and service credits equal 80 for Tier 1 employees and 87 for Tier 2 and 3 employees. The below table outlines the benefits for each tier.

Tier 1	Tier 2	Tier 3
• Up to 32.5 yrs service @ 2.0%	• Less than 20 yrs service @ 2.10%	• Less than 10 yrs service @1.85%
• 32.5 to 35.5 yrs service @ 1.0%	• 20 yrs but less than 25 yrs service @ 2.15%	• 10 yrs but less than 20 yrs service @ 1.9%
• 35.5 yrs service & over @ 0.5%	• 25 yrs but less than 30 yrs service @ 2.20%	• 20 yrs but less than 30 yrs service @ 2.0%
	• 30 yrs or more @ 2.30%	• 30 yrs or more @ 2.1%

A deferred pension is available at age 62 for members who end their City employment with five or more years of service credit and leave their accumulated contributions in COPERS.

A supplemental post-retirement payment and a permanent benefit increase (under the Pension Equalization Program) may be provided to Tier 1 and Tier 2 retirees if sufficient reserves are available at the end of the fiscal year. The reserve is funded if the five-year average investment return exceeds 8%.

f. Disability Benefits

A member who becomes permanently disabled for the performance of duty is eligible for a disability benefit if the disability is 1) due to a personal injury or disease and the member has ten or more years of service credit or 2) due to injuries sustained on the job, regardless of service credit.

g. Survivor Benefits

Dependents of deceased members may qualify for survivor benefits if the deceased member had ten or more years of service credit or if the member's death was in the line of duty with the City and compensable under the Workmen's Compensation Act of the State of Arizona. Chapter XXIV, Section 25 of the Charter of the City of Phoenix specifies conditions for eligibility of survivor benefits.

h. Refunds

Upon separation from employment, a member or beneficiary not entitled to a pension may withdraw the member's contribution plus applicable interest. Acceptance of a refund revokes the individual's rights and benefits in COPERS. Employer contributions to COPERS are not refundable. An interest rate of 3.75%, the rate cap imposed by the City Charter, was granted by the Retirement Board to be applied effective June 30, 2020 to the members' mean account balances during the fiscal year. The interest rate granted in fiscal year 2019 was also 3.75%.

Note 2 - Description of Plan (Continued)

i. Tax Exempt Status of Member Contributions

COPERS has received a favorable letter of determination of qualification from the Internal Revenue Service under Section 401(a) of the Internal Revenue Code. Continued tax-exempt status of COPERS is contingent on future operations remaining in compliance with Section 401(a).

Under Internal Revenue Code Section 414(h)(2) and Revenue Ruling 81-36, effective January 1, 1985 the City of Phoenix authorized that a portion of its contributions be earmarked as being made by the members of COPERS, and "picked up" that portion of the designated active member contributions. The member contribution that is picked up by the City of Phoenix is treated as an employer contribution for federal and state income tax purposes and excluded from the member's gross income until distributed by COPERS.

Note 3 – Net Position Restricted for Pensions

Five reserve funds have been established to separately account for transactions of the Plan:

- The **Income Account** is used to account for COPERS' investment income and loss, including net appreciation or depreciation in fair value and miscellaneous income. At year-end, the Income Account is closed to the Employees' Savings Account, the Pension Accumulation Account, the Pension Reserve Account and the Pension Equalization Reserve Account, which results in no fund balance in the Income Account.

- The **Employees' Savings Account** is used to account for member contributions, member refunds, and the member portion of investment income. As a condition of employment, a member hired before July 1, 2013 is required to contribute 5% of his/her covered compensation; a member hired after this date is required to contribute 50% of the actuarially determined rate, while the City contributes the other 50%. Effective with the election on August 25, 2015, the employee contribution for Tiers 2 and 3 cannot exceed 11%. Accumulated contributions receive regular interest that is computed at the end of each fiscal year on the mean balance in the members' accounts during the year. The rate of interest is established each year by the Board and is capped at 3.75% by the City Charter. Transfers are made from the Employees' Savings Account to the Pension Reserve Account when a member retires or becomes eligible for disability benefits.

- The **Pension Accumulation Account** is used to account for employer contributions and for a portion of investment income. The Charter requires the City to contribute an amount that is determined annually by COPERS' retained actuaries. Contributions are based upon a level percentage of payroll. This contribution is over and above the member contributions made by the City. The Pension Accumulation Account may carry a negative balance as the City contribution rate includes a component for the unfunded actuarial liability (UAL). Transfers are made from the Pension Accumulation Account to the Pension Reserve Account when a member retires or becomes eligible for disability benefits.

- The **Pension Reserve Account** is used to account for distributions to retirees and the balance receives regular interest that is computed at the end of each fiscal year on the mean balance during the year. The rate of interest is the actuarial assumed rate.

Note 3 – Net Position Restricted for Pensions (Continued)

- The **Pension Equalization Reserve Account** is used for funding increases to eligible pensions under the Pension Equalization Program and the "13th Check." The Pension Equalization Program was established on October 1, 1991, when voters of the City of Phoenix approved an amendment to the City Charter, allowing pension adjustments to be paid to retired members of COPERS. These adjustments are to be made exclusively from COPERS' investment earnings in excess of 8% (per Charter) over the preceding 5-year period and may not exceed the Phoenix Area Consumer Price Index (CPI). This amendment was effective January 1, 1992, and will benefit only retirees who, as of January 1 of each year, have received at least 36 pension payments.

Following are the fiscal year-end reserve balances as of June 30, 2020 and 2019 respectively, based on amortized cost for fixed income investments and cost for equity investments (in thousands):

	2020	2019
Employees' Savings	$ 512,318	$ 491,111
Pension Accumulation	(1,893,942)	(1,634,785)
Pension Reserve	3,751,221	3,428,215
Pension Equalization Reserve	(2,042)	(2,042)
Convert to Fair Value	313,618	377,635
Total Based on Fair Value	**$ 2,681,173**	**$ 2,660,134**

Note 4 - Investment Fees (in thousands)

The investment costs paid from Plan assets were $16,162 and $15,275 for the fiscal years 2020 and 2019, respectively. This information is provided in greater detail in the Supplementary Information section of this document.

Note 5 - Funding Requirement Determinations and Actual Contributions (in thousands)

Employer contributions are actuarially determined amounts, which together with member contributions are sufficient to cover both (i) normal costs of the plan and (ii) financing of unfunded actuarial costs over a selected period of future years (See Note 6).

City of Phoenix contributions for fiscal year 2020 were $175,947, which is equivalent to 30.97% of the estimated annual active member payroll, compared to $165,796 or 29.50% for the fiscal year 2019. Member contributions for the fiscal years 2020 and 2019 were $39,356 and $35,042, respectively. The Tier 1 employee contribution rate is 5%. The Tier 2 and Tier 3 employee contribution rate is 11%.

Note 6 – Funded Status and Funding Progress (as of most recent valuation)

Unfunded actuarial liabilities are determined annually by the consulting actuary, applying actuarial assumptions to reflect the time value of money (through discounts for interest) and the probability of payment (by means of decrements, such as for death, disability, withdrawal or retirement) between the valuation date and the expected date of payment.

The information presented in the required supplementary schedules was determined as part of the actuarial valuations at the date indicated. Additional information as of the latest actuarial valuation follows:

Description	**Methods/Assumptions**	
Valuation Date	**June 30, 2020**	**June 30, 2019**
Actuarial Cost Method	Individual Entry Age Normal	Individual Entry Age Normal
Amortization Method	Level Percentage of Payroll	Level Percentage of Payroll
Amortization Method	• The UAL of June 30, 2013 is amortized over a closed 25-year period. • The impact of September 2013 assumption changed is amortized over a closed 25-year period. • The impact of August 2015 assumption changed is amortized over a closed 25-year period with a four-year phase-in. • Future gains and losses are amortized over closed 20-year period.	
Actuarial Assumptions		
Investment Rate of Return	7.00%	7.25%
Projected Salary Increases	2.8%-7.0%	3.0%-9.6%
Cost-of-Living Adjustments	1.25%	1.50%
Wage Inflation	2.80%	3.00%
Payroll Growth Rate	2.50%	3.00%

Note 6 – Funded Status and Funding Progress (as of most recent valuation) (Continued)

The actuarial assumptions used for the June 30, 2020 valuation, include the following:

1) Salary Scale – Salary increases are composed of a price inflation component, a real wage growth component and a merit or longevity component that varies by age. Growth in total payroll is assumed to be 2.50%.

2) Multiple Decrement Tables:

   a) Death - For determination of member, retiree and beneficiary mortality, the Pub-2010.

   b) Disability – Based on 20% of the Arizona State Retirement System disability table.

   c) Withdrawal - Based upon COPERS' experience, measures the probability of members terminating employment for reasons other than retirement, death or disability.

The foregoing actuarial assumptions are based on the presumption that COPERS will continue as presently chartered. If COPERS is amended, different actuarial assumptions and other factors might be applicable in determining actuarial present values.

Discount Rate

A single discount rate of 7.00% and 7.25% was used to measure the total pension liability as of June 30, 2020 and June 30, 2019, respectively. This single discount rate was based on the expected rate of return on pension plan investments. The projection of cash flows used to determine the discount rate assumed that Tier 1 member contributions remain at 5% of payroll, Tier 2 and 3 member contributions are set equal to half of the total actuarially determined contribution rate, not to exceed 11%, and City contributions will be made at rates equal to the difference between the actuarially determined contribution rates and the member rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be sufficient to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the Net Position Liability to Changes in the Discount Rate

The table below presents the net pension liability of the Plan calculated using the discount rate of 7.00%, as well as what the net pension liability would be if it were calculated using the discount rate that is 1.0% lower (6.00%) or 1.0% higher (8.00%) than the current rate at June 30, 2020. Changes in the discount rate affect the measurement of the TPL (Total Pension Liability). Lower discount rates produce a higher TPL and higher discount rates produce a lower TPL. Because the discount rate does not affect the measurement of assets, the percentage change in the NPL (Net Pension Liability) can be significant for a relatively small change in the discount rate. A 1.0% decrease in the discount rate increases the TPL by approximately 11.9% and increases the NPL by approximately 30.4%. A 1.0% increase in the discount rate decreases the TPL by approximately 10.4% and decreases the NPL by approximately 26.6%. The table below shows the sensitivity of the NPL to the discount rate.

Note 6 – Funded Status and Funding Progress (as of most recent valuation) (Continued)

Sensitivity of Net Pension Liability to Changes in Discount Rate (in thousands)

	1% Decrease	Discount Rate	1% Increase
	6.00%	**7.00%**	**8.00%**
Total Pension Liability	$ 4,941,321	$ 4,414,114	$ 3,953,274
Plan Fiduciary Net Position	2,681,173	2,681,173	2,681,173
Net Pension Liability	2,260,148	1,732,941	1,272,101
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	54.3%	60.7%	67.8%

Note 7 - Funding Policy

The City has formally adopted a pension funding policy that requires payment of at least 100 percent of the actuarially determined contribution every year. Under current actuarial calculations and amortization periods COPERS will be fully funded by June 30, 2041.

As a condition of employment, COPERS members are also required to contribute a percentage of their salary as provided in Chapter XXIV, Section 27, of the City Charter. The table below outlines the contribution rates for Tiers 1, 2, and 3.

Tier	Contribution Rate
Tier 1	5%
Tier 2	Capped at 11%
Tier 3	Capped at 11%

Present members' accumulated contributions at June 30, 2020 were $512,318, including interest compounded annually, compared to $491,111 at June 30, 2019, and are included in the Employee Savings Account as discussed on page 29.

Note 8 – Investments

The Board has a fiduciary duty to invest and manage the assets of the Plan solely in the interests of members and beneficiaries. The Board invests and manages trust assets as a prudent investor would, considering the purposes, terms, distribution requirements, and other circumstances of the Plan. In satisfying this standard, the Board exercises reasonable care, skill, and caution.

In fulfilling its responsibilities, the Board has contracted with various investment management firms and a master global custodian. The Board's investment policy addresses permissible investment categories and appropriate allocation.

Note 8 - Investments (Continued)

A summary of investments at June 30, 2020 and 2019 is as follows (in thousands):

	2020		2019	
	Fair Value	**Amortized Cost**	**Fair Value**	**Amortized Cost**
Temporary Investments from Securities Lending Collateral (Note 9)	$ 79,589	$ 79,589	$ 92,581	$ 92,581
Fixed Income	500,218	509,827	524,356	497,521
Domestic Equity	731,459	637,239	1,011,832	863,409
Private Equity	181,889	141,765	142,943	105,634
International Equities	433,108	386,153	70,530	42,978
Global Commingled	326,796	256,244	391,061	348,110
Hedge Funds	108,912	110,008	110,369	112,615
Real Estate	347,119	274,649	373,565	276,754
Total Investments	**$ 2,709,090**	**$ 2,395,474**	**$ 2,717,237**	**$ 2,339,602**
Cash and Cash Equivalents	68,296	68,296	46,600	46,600
Total	**$ 2,777,386**	**$ 2,463,770**	**$ 2,763,837**	**$ 2,386,202**

COPERS investments are managed by professional fund managers and are held by a global master custodian who acts as COPERS' agent.

Note 8 - Investments (Continued)

The following schedule provides the fair value of each investment category at June 30, 2020 and 2019 (in thousands):

Investment Categories	2020 Fair Value	2019 Fair Value
Cash	$ 791	$ 1,107
Short-Term Investment Fund	67,505	45,493
Cash and Cash Equivalents	$ 68,296	$ 46,600
Temporary Investments from Securities Lending Collateral	$ 79,589	$ 92,581
Fixed Income:		
Derivatives	$ (1,262)	$ (366)
U S Government Guaranteed Securities	28,337	32,607
Government Agencies Securities	2,108	2,013
Mortgage Backed Securities-Residential	63,983	76,599
Asset Backed Securities	21,800	18,624
Municipal Bonds	8,456	6,797
Corporate Bonds	288,547	270,933
Foreign	-	10,087
Foreign Commingled	88,249	107,062
	$ 500,218	$ 524,356
Domestic Equities	$ 731,459	$ 1,011,832
Global Commingled	$ 326,796	$ 391,061
International Equities	$ 433,108	$ 70,530
Private Equity	$ 181,889	$ 142,943
Hedge Funds	$ 108,912	$ 110,369
Real Estate Funds	$ 347,119	$ 373,565
Total with Securities Lending Collateral	$2,777,386	$ 2,763,837

Note 8 – Investments (Continued)

Custodial Credit Risk – Deposits

Custodial credit risk for deposits is the risk that in the event of a depository institution failure, a government will not be able to recover deposits or collateral held by an outside party. As of June 30, 2020, COPERS did not realize any losses related to custodial credit risk for deposits.

Annual Money-Weighted Rate of Return

The rate of return for the year ended June 30, 2020, which is the annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 1.4%, compared to 6.2% for the prior year. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

Custodial Credit Risk – Investments

Custodial credit risk for investments is the risk that in the event of a failure of a counterparty to a transaction, a government will not be able to recover the value of investment or collateral securities that are in the possession of an outside party. As of June 30, 2020, COPERS did not realize any losses due to custodial credit risk for investments or securities lending arrangements. Note 9 on page 41 provides detailed information regarding securities lending. COPERS' policy requires all investments to be collateralized and registered in COPERS' or its nominee's name.

Concentration of Credit Risk

Concentration of Credit Risk is the risk of loss attributed to the magnitude of a government's investment in a single issuer. COPERS' investment policy does not allow for an investment in any one issuer in excess of 5% of COPERS' total investments which includes futures, options and swaps, except investments issued or explicitly guaranteed by the U.S. government. As of June 30, 2020, COPERS did not have any investments with any one issuer in excess of 5%.

Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates may adversely affect the fair value of an investment or a deposit. COPERS' investment in foreign fixed income is managed by PIMCO, Longfellow and Western Asset. The managers' report dollar and non-dollar denominated holdings and provide for direct ownership of the underlying security. The following table presents the foreign currency exposure for the Plan's fixed income investments.

Note 8 – Investments (Continued)

Foreign Currency Exposure June 30, 2020 and 2019 (in thousands)

Currency		2020		2019
British Pound		8		8
Canadian Dollar		(7)		62
Chinese Renminbi		252		252
Euro		150		150
Japanese Yen		(54)		(54)
Mexican Peso		12		12
Totals	**$**	**361**	**$**	**430**

Commitments (in thousands)

In connection with the purchase of various real estate investments, COPERS had commitments totaling $347,119 as of June 30, 2020 and $373,565 as of June 30, 2019. Remaining unfunded commitments for real estate were $147,090 as of June 30, 2020 and $141,014 as of June 30, 2019. COPERS is not in any redemption queues. All non-core real estate is self-liquidating. COPERS also had $323,205 in unfunded alternative investment commitments.

Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations. COPERS' investment policy permits purchasing securities included in the Barclays Capital US Aggregate Index and relies on the methodology used by Barclays Capital to determine if a security is investment grade. For fixed income securities and their futures or options derivatives, emphasis is on high-quality securities.

COPERS currently has two managers responsible for fixed income investments. Longfellow Investment Management and Western Asset Management Company ("Western") are active bond managers. As part of their portfolios, Longfellow and Western may enter into futures, options, and swaps contracts for hedging purposes and/or as a part of the overall portfolio strategy and will be incidental to its securities trading activities for the account. COPERS also invests in index funds SSgA U.S. Aggregate Bond Index and SSgA U.S. TIPS.

Table I on page 39 provides fixed income investments as of June 30, 2020 subject to credit risk along with current credit ratings.

Note 8 - Investments (Continued)

Interest Rate Risk

Interest rate risk is the risk that changes in interest rates adversely affect the fair value of an investment. Typically, the longer the maturity of an investment, the greater the sensitivity of its fair value to interest rate changes. COPERS' contract with Western directs them to maintain an average weighted duration of portfolio security holdings including futures and options positions within +/- 20% of the Barclays Capital US Aggregate Index. COPERS' contract with Longfellow specifies a weighted average duration of +/- 20% of the Barclays Capital US Aggregate Index. The contracts with Brigade and DDJ Capital Management require a weighted average duration of +/- two years of the Barclays Capital US Aggregate Index.

Information about the interest rate risk exposure of COPERS is provided in Table I on page 39. COPERS assets include several collateralized mortgage obligations and mortgage-backed securities, which could be considered as highly sensitive to interest rate changes, depending upon the exercise of prepayment options.

COPERS' investment policy permits the following investments, which include investments that are considered to be highly sensitive to interest rate changes due to long maturities, prepayment options, coupon multipliers, reset dates and similar terms:

- Obligations issued or guaranteed by the U.S. Federal Government, U.S. Federal Agencies or U.S. government-sponsored corporations and agencies.
- Obligations of U.S. and non-U.S. corporations such as mortgage bonds, convertible and non-convertible notes and debentures.
- Mortgage-backed and asset-backed securities, swaps, forwards, options on swaps, and options on forwards.
- Obligations denominated in U.S. dollars of international agencies, supranational entities and foreign governments (or their subdivisions or agencies).
- Securities defined under Rule 144A and Commercial paper defined under Section 4(2) of the Securities Act of 1933.
- Bank Loans, TBA Securities and Mortgage Dollar Rolls.
- General obligation bonds, revenue bonds, improvement district bonds, or other evidences of indebtedness of any state of the United States, or any of the counties or incorporated cities, towns and duly organized school districts in the State of Arizona which are not in default as to principal and interest.

Note 8 – Investments (Continued)

Table I: Credit Rating and Maturity for COPERS' Fixed Income Investments (in thousands)

	2020			2019		
	Credit Quality Ratings	Fair Value	Weighted Average Maturity (Years)	Credit Quality Ratings	Fair Value	Weighted Average Maturity (Years)
Derivatives	Not Rated	$ (1,262)	16.390	Not Rated	$ (366)	19.942
Total Derivatives		**(1,262)**			**(366)**	
U.S. Government Guaranteed Securities	Not Rated	$ 6,347	7.500	Not Rated	$ 476	5.923
U.S. Government Guaranteed Securities	AAA	18,989	14.400	AAA	26,382	15.280
U.S. Government Guaranteed Securities	AA	-	-	AA	812	29.148
U.S. Government Guaranteed Securities	A	-	-	A	1,800	11.610
U.S. Government Guaranteed Securities	B	3,001	0.792	B	3,137	10.290
Total U. S. Government Guaranteed		**28,337**			**32,607**	
Government Agency	Not Rated	$ 560	6.666	Not Rated	$ 602	7.668
Government Agency	AAA	176	9.797	AAA	707	2.670
Government Agency	AA	1,372	1.332	AA	704	1.875
Total Government Agency		**2,108**			**2,013**	
Mortgage Backed	Not Rated	$ 51,609	26.077	Not Rated	$ 61,514	26.878
Mortgage Backed	AAA	7,010	23.860	AAA	7,805	21.040
Mortgage Backed	AA	1,655	19.995	AA	3,837	20.552
Mortgage Backed	A	2,493	20.622	A	1,427	21.424
Mortgage Backed	BBB	549	13.518	BBB	1,137	16.720
Mortgage Backed	B	20	13.666	B	36	15.042
Mortgage Backed	CCC	214	15.687	CCC	348	18.638
Mortgage Backed	CC	383	16.912	CC	440	17.915
Mortgage Backed	C	-		C	54	16.582
Mortgage Backed	D	50	26.077	D	-	
Total Mortgage Backed		**63,983**			**76,598**	
Asset Backed	Not Rated	$ 11,045	0.201	Not Rated	$ 9,458	14.544
Asset Backed	AAA	4,342	7.487	AAA	6,021	5.783
Asset Backed	AA	492	14.661	AA	276	14.682
Asset Backed	A	1,585	12.950	A	1,201	13.517
Asset Backed	BBB	2,267	25.736	BBB	1,411	28.026
Asset Backed	B	2,069	5.972	B	258	10.301
Asset Backed	CCC	-	-	CCC	-	-
Total Asset Backed		**21,800**			**18,625**	
Domestic Equity	Not Rated		5.000	Not Rated	$ 51	5.000
Total Domestic Equity		**-**			**51**	
Municipal Bonds	Not Rated	$ 1,077	7.051	Not Rated	$ 96	7.448
Municipal Bonds	AAA	2,462	21.714	AAA	1,396	16.534
Municipal Bonds	AA	1,994	11.553	AA	2,045	14.427
Municipal Bonds	A	1,730	20.854	A	1,752	14.063
Municipal Bonds	BBB	1,009	19.822	BBB	634	21.438
Municipal Bonds	B	184	17.389	B	475	19.133
Municipal Bonds	C	-		C	399	10.513
Total Municipal Bonds		**8,456**			**6,797**	

Note 8 – Investments (Continued)

Table I: Credit Rating and Maturity for COPERS' Fixed Income Investments (in thousands) - Continued

	2020				2019			
	Credit Quality Ratings		Fair Value	Weighted Average Maturity (Years)	Credit Quality Ratings		Fair Value	Weighted Average Maturity (Years)
Corporate Bonds	Not Rated	$	92,965	6.098	Not Rated	$	95,894	5.739
Corporate Bonds	AAA		2,315	18.330	AAA		7,040	6.520
Corporate Bonds	AA		9,050	15.600	AA		6,514	12.024
Corporate Bonds	A		25,131	14.842	A		18,476	9.884
Corporate Bonds	BBB		45,855	11.714	BBB		32,847	10.831
Corporate Bonds	BB		21,526	7.990	BB		17,495	8.271
Corporate Bonds	B		47,753	4.997	B		48,456	5.888
Corporate Bonds	CCC		41,205	4.085	CCC		38,880	4.874
Corporate Bonds	CC		2,123	4.586	CC		1,735	3.166
Corporate Bonds	C		196	4.470	C		2,768	5.900
Corporate Bonds	D		428	4.266	D		777	0.792
Total Corporate Bonds			**288,547**				**270,882**	
Foreign	Not Rated	$	78,262	5.487	Not Rated	$	220	3.816
Foreign	AAA		492	0.063	AAA		761	1.212
Foreign	AA		675	3.926	AA		475	5.022
Foreign	A		2,151	7.880	A		1,101	11.860
Foreign	BBB		6,437	17.228	BBB		6,972	19.012
Foreign	B		232	6.877	B		224	7.879
Foreign	C		-	4.567	C		334	4.567
Total Foreign			**88,249**				**10,087**	
Foreign Commingled	Not Rated	$	-		Not Rated	$	107,062	11.250
Total Foreign Commingled			**-**				**107,062**	
Total Fixed Income Investments		**$**	**500,218**			**$**	**524,356**	

Note 9 – Securities Lending Program

State statutes and City Charter do not prohibit COPERS from participating in securities lending transactions, and COPERS has, via a Securities Lending Authorization Agreement effective May 6, 2015, authorized Bank of New York Mellon ("BNY") to lend its securities to broker-dealers and banks pursuant to a form of loan agreement.

During 2020 and 2019, BNY lent, on behalf of COPERS, certain securities held by BNY as custodian and received cash (United States and foreign currency), securities issued or guaranteed by the United States government and irrevocable letters of credit as collateral. BNY did not have the ability to pledge or sell collateral securities delivered absent a borrower default. Borrowers were required to deliver collateral for each loan equal to: (i) in the case of loaned securities denominated in United States dollars or whose primary trading market was located in the United States or sovereign debt issued by foreign governments, 102% of the fair value of the loaned securities; and (ii) in the case of loaned securities not denominated in United States dollars or whose primary trading market was not located in the United States, 105% of the fair value of the loaned securities.

At June 30, 2020 and 2019, COPERS had the following securities out-on-loan (in thousands).

June 30, 2020	Fair Value of Securities Lent	Cash Collateral Value	Non-Cash Collateral Value
U.S. Equities	$ 45,973	$ 31,883	$ 14,089
U.S. Corporate Securities	23,622	23,622	
U.S. Government Securities	9,994	8,041	1,954
Total	**$ 79,589**	**$ 63,546**	**$ 16,043**

June 30, 2019	Fair Value of Securities Lent	Cash Collateral Value	Non-Cash Collateral Value
U.S. Equities	$ 69,224	$ 42,133	$ 27,091
U.S. Corporate Securities	17,716	17,251	465
U.S. Government Securities	5,641	1,881	3,760
Total	**$ 92,581**	**$ 61,265**	**$ 31,316**

During 2020 and 2019, COPERS and the borrowers maintained the right to terminate all securities lending transactions on demand. The cash collateral received on each loan was invested, together with the cash collateral of other qualified tax-exempt plan lenders, in a liquidity pool and a duration pool. As of June 30, 2020, the collateral pool had a weighted average maturity (WAM) of 30 days and a weighted average life (WAL) of 70 days. Because the loans were terminable at will, their duration did not generally match the duration of the investments made with cash collateral.

Note 10 – Risk and Uncertainties

COPERS invest in various investment securities. Investment securities are exposed to various risks such as interest rate, market and credit risks. Due to the level of risk associated with certain investment securities, it is at least reasonably possible that changes in the values of investment securities will occur in the near term and such changes could materially affect the amounts reported in the statements of changes in fiduciary net position. Because the values of individual investments fluctuate with market conditions, the amount of investment gains or losses that COPERS will recognize in its future financial statements cannot be determined.

Note 11 – Funds To/From Other Systems

Under the provisions of Arizona Revised Statutes, Sections 38-730 and 38-922 as amended, transfers between COPERS and the Arizona State Retirement System ("ASRS") are allowed when the City hires an employee who was formerly covered by ASRS, or a COPERS member who separates from City of Phoenix employment goes to work for an entity whose employees are covered under ASRS. Effective July 2011, an amendment in statute changed the calculation method of retirement service credit transfers between COPERS and ASRS. Previously, retirement service credits (time) would be transferred between systems without possible service reduction or member cost. Beginning July 2011, retirement service credit transfers are based on an actuarial present value (APV) methodology to the extent the prior retirement system is funded on a fair value basis. With this calculation method a member may have to pay for a portion of the transferred service or accept a reduced transfer of service credits.

Also, City employees previously employed by other government entities may purchase prior service credits.

Note 12 – Interfund Balances

Because COPERS does not have a local bank account, the City of Phoenix Payroll Section acts as a paying and collecting agent for COPERS. Payroll issues pension payments and employee retirement contribution refunds from the City's bank account and handles payment reclamations through the City's bank account. This type of activity, if any, is reflected in the Statement of Fiduciary Net Position as a liability or receivable, as applicable.

Note 13 – Contingent Liabilities

As of June 30, 2020, COPERS was party to pending litigation matters. Final outcomes, in favor of the Plan, were reached on October 9, 2020. Management is not aware of any pending or threatened claims.

Note 14 – Fair Value Measurements (in thousands)

<u>Investment valuation</u>
COPERS categorizes the fair value measurements of its investments based on the hierarchy established by generally accepted accounting principles. The fair value hierarchy, which has three levels, is based on the valuation inputs used to measure an asset's fair value: Level 1 inputs are quoted prices in active markets for identical assets; Level 2 inputs are significant other observable inputs; Level 3 inputs are significant unobservable inputs.

Note 14 – Fair Value Measurements (in thousands) (Continued)

Investments

Investments, including derivative instruments that are not hedging derivatives, are measured at fair value on a recurring basis. Recurring fair value measurements are those that Governmental Accounting Standards Board (GASB) Statements require or permit in the statement of fiduciary net position at the end of each reporting period. Fair value investments measurements are as follows at June 30, 2020 and 2019 (in thousands).

	Fair Value June 30, 2020	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Investments by Fair Value Level				
Domestic Equities	731,459	208,285	-	523,174
International Equities	433,108	224,349	-	208,759
Fixed Income				
Derivatives	(1,262)	3	(1,265)	-
US Government and Agency	30,446	28,338	2,108	-
Mortgage Backed - Residential	63,983	-	63,983	-
Asset Backed	21,799	-	21,799	-
Municipal Bonds	8,456	-	8,456	-
Corporate Bonds	288,547	11	174,232	114,304
Foreign	88,249	-	10,546	77,703
Global Commingled	157,809	157,809	-	-
Temporary Investments from Securities Lending	16,043	-	16,043	-
Total Investments by Fair Value Level	**1,838,637**	**618,795**	**295,902**	**923,940**
Investments measured at net asset value (NAV)				
Private Equity	181,889			
Hedge Funds	108,912			
Global Commingled	168,987			
Real Estate Funds	347,119			
Total Investments Measured at NAV	**806,907**			
Cash Equivalents in Securities Lending	63,546			
TOTAL INVESTMENTS	**$ 2,709,090**			

Note 14 – Fair Value Measurements (in thousands) (Continued)

	Fair Value June 30, 2019	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Investments by Fair Value Level				
Domestic Equities	1,011,832	461,140	-	550,692
International Equities	70,530	-	-	70,530
Fixed Income				
Derivatives	(366)	574	(940)	-
US Government and Agency	34,620	32,607	2,013	-
Mortgage Backed - Residential	76,599	-	76,599	-
Asset Backed	18,624	-	18,624	-
Municipal Bonds	6,797	-	6,797	-
Corporate Bonds	270,933	51	160,409	110,473
Foreign	10,087	-	10,087	-
Foreign Commingled	107,062	-	-	107,062
Global Commingled	253,087	253,087	**-**	**-**
Temporary Investments from Securities Lending	31,316	-	31,316	
Total Investments by Fair Value Level	**1,891,121**	**747,459**	**304,905**	**838,757**
Investments measured at net asset value (NAV)				
Private Equity	142,943			
Hedge Funds	110,369			
Global Commingled	137,974			
Real Estate Funds	373,565			
Total Investments Measured at NAV	**764,851**			
Cash Equivalents in Securities Lending	61,265			
TOTAL INVESTMENTS	**$ 2,717,237**			

Note 14 – Fair Value Measurements (in thousands) (Continued)

Alternative investments measured at NAV include private equity funds, hedge funds, real estate, opportunistic and global fixed income. Below is a description of the various investment strategies:

- COPERS has one private equity fund manager that focuses on limited partnership arrangements.
- COPERS invests in three direct hedge funds which all have a global macro strategy.
- COPERS' portfolio consists of one comingled fixed income fund and two fixed income separate accounts. These accounts have a core-plus strategy.
- COPERS has two global commingled funds, one with a global large cap growth mandate and the second fund with a large cap value mandate.
- COPERS' real estate investments consist of two core real estate funds and 15 non-core real estate partnerships. The core funds permit redemptions with a 90-day notice, the non-core fund investments have a limited liquidity and redemptions are restricted.

Certain investments are reported at the net asset values calculated by the investment manager as a practical expedient and are not classified in the fair value hierarchy. The fair value amounts included above are intended to permit reconciliation of the fair value hierarchy to the amounts presented in the statement of fiduciary net position. These investments (in thousands), at June 30, 2020, detailed in the following table, are subject to capital calls and specific redemption terms:

	6/30/2020	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Hedge Funds	108,912	-	Quarterly	90 Days
Global Commingled	168,987	-	Monthly	30 Days
Private Equity	181,889	323,205	Quarterly	0-90 Days
Real Estate Funds	347,119	147,090	Quarterly	0 - 90 Days

Debt and equity securities categorized as Level 1 are valued based on prices quoted in active markets for those debts and securities. Debt and equity securities categorized as Level 2 are valued using matrix pricing techniques maintained by the various pricing vendors for these securities. Matrix pricing is used to value securities based on the relationship to benchmark quoted prices. Investment derivative instruments categorized as Level 2 are valued using market approaches that consider, as applicable, benchmark interest rates or foreign exchange rates. Mortgage-backed securities categorized as Level 2 are valued using discounted cash flow techniques. Debt and equity securities categorized as Level 3 are debt and securities whose stated market price is unobservable by the marketplace, many of these securities are priced by the issuers or industry groups for these securities. Collateralized debt obligations categorized as Level 3 are valued using consensus pricing. The fair value of international equity funds and related short-term investments classified as Level 3 represent the value of unit positions in funds that are not publicly traded on an exchange. Fair value of these securities can be impacted by redemption restrictions imposed by the fund managers.

Required Supplementary Information

The schedules of Required Supplementary Information started with one year of information as of the implementation of GASB 67 in 2014 but builds to 10 years of information. The schedule below shows the changes in Net Pension Liability and related ratios required by GASB. As more information becomes available, additional years will be presented.

Schedule of Changes in Net Pension Liability and Related Ratios (in thousands) *

Total Pension Liability	**2020**	**2019**	**2018**	**2017**
Service cost	$ 81,119	$ 73,255	$ 73,072	$ 72,876
Interest on total pension liability	313,397	300,543	293,883	293,258
Changes of benefit terms	-	-	-	-
Difference between expected and actual experience	(77,698)	39,370	(42,785)	429
Changes of assumptions	(62,386)	-	-	2,420
Benefit payments, including refunds of member contributions	(242,143)	(237,389)	(227,576)	(223,667)
Net change in pension liability	**$ 12,289**	**$ 175,779**	**$ 96,594**	**$ 145,315**
Total Pension liability - beginning	**4,401,825**	**4,226,046**	**4,129,452**	**3,984,137**
Total Pension liability - ending	**$4,414,114**	**$4,401,825**	**$4,226,046**	**$4,129,452**
Plan Fiduciary Net Position				
Contributions - employer	$ 175,947	$ 165,796	$ 229,006	$ 152,153
Contributions - member	39,356	35,042	33,340	30,870
Net investment income	50,389	142,964	166,514	243,210
Benefit payments, including refunds of member contributions and transfer outs	(242,143)	(237,389)	(227,576)	(223,667)
Administrative Expenses	(2,509)	(793)	(377)	(380)
Net change in plan fiduciary net position	**$ 21,040**	**$ 105,620**	**$ 200,907**	**$ 202,186**
Plan fiduciary net position - beginning	**$2,660,134**	**$2,554,514**	**$2,353,607**	**$2,151,421**
Plan fiduciary net position - ending	**$2,681,173**	**$2,660,134**	**$2,554,514**	**$2,353,607**
Net Pension Liability	**$1,732,941**	**$1,741,691**	**$1,671,532**	**$1,775,845**
Plan fiduciary net position as a percentage of the total pension liability	60.74%	60.43%	60.45%	57.00%
Covered payroll	$ 568,089	$ 561,938	$ 526,667	$ 521,295
Net pension liability as a percentage of covered employee payroll	305.05%	309.94%	317.38%	340.66%

* May not sum due to rounding

Required Supplementary Information (Continued)

Schedule of Changes in Net Pension Liability and Related Ratios (in thousands) *

Total Pension Liability	**2016**	**2015**	**2014**
Service cost	$ 80,757	$ 75,310	$ 78,331
Interest on total pension liability	293,206	266,355	257,219
Changes of benefit terms	(3,229)	-	-
Difference between expected and actual experience	(76,891)	(31,009)	(20,336)
Changes of assumptions	(69,420)	254,870	-
Benefit payments, including refunds of member contributions	(216,193)	(204,403)	(179,877)
Net change in pension liability	**$ 8,230**	**$ 361,123**	**$ 135,337**
Total Pension liability - beginning	**3,975,907**	**3,614,784**	**3,479,447**
Total Pension liability - ending	**$3,984,137**	**$3,975,907**	**$3,614,784**
Plan Fiduciary Net Position			
Contributions - employer	$ 119,844	$ 117,092	$ 110,629
Contributions - member	29,523	27,861	27,760
Net investment income	9,171	47,148	298,736
Benefit payments, including refunds of member contributions and transfer outs	(216,409)	(204,403)	(179,877)
Administrative Expenses	(234)	(414)	(628)
Net change in plan fiduciary net position	**$ (58,105)**	**$ (12,716)**	**$ 256,620**
Plan fiduciary net position - beginning	**$2,209,526**	**$2,222,242**	**$1,965,622**
Plan fiduciary net position - ending	**$2,151,421**	**$2,209,526**	**$2,222,242**
Net Pension Liability	**$1,832,716**	**$1,766,381**	**$1,392,542**
Plan fiduciary net position as a percentage of the total pension liability	54.00%	55.57%	61.48%
Covered payroll	$ 473,974	$ 460,441	$ 485,227
Net pension liability as a percentage of covered employee payroll	386.67%	383.63%	286.99%

* May not add due to rounding

Required Supplementary Information (Continued)

Schedule of Employer Contributions – Last 10 Fiscal Years (in thousands)

Fiscal Year	Actuarial Determined Contribution	Actual Contributions	Contribution Deficiency (Excess)	Covered Payroll		Actual Contributions As A Percentage of Covered Payroll
2019-20	$ 175,947	$ 175,947	$ -	$ 568,089		30.97%
2018-19	165,796	165,796	-	561,938		29.50%
2017-18	159,006	229,006	(70,000)	526,667		43.48%
2016-17	152,153	152,153	-	521,295		29.19%
2015-16	119,844	119,844	-	473,974		25.28%
2014-15	117,092	117,092	-	484,309	*	24.18%
2013-14	110,629	110,629	-	518,746	*	21.33%
2012-13	115,244	115,244	-	524,648		21.97%
2011-12	114,709	114,709	-	540,792		21.21%
2010-11	105,682	105,682	-	541,388		19.52%

*For fiscal years 2013-14 and 2014-15, the Plan's actuary was calculating covered payroll based on their assumption this was an estimated amount. For subsequent reports, the actuary began using actual amounts which slightly changed the amounts previously reported.

Schedule of Investment Returns

	2020	2019	2018	2017	2016	2015	2014
Annual money-weighted rate of return, net of investment expenses	1.40%	6.20%	7.10%	7.30%	0.60%	2.19%	15.42%

Notes to the Required Supplementary Information (Continued)

In July 2020, the COPERS Board adopted several new actuarial assumptions based upon the recommendations from its actuary, GRS, for the purpose of determining contribution rates. The 2020 adopted changes are:

1. The discount rate was lowered to 7.00%.
2. The rate of inflation was lowered to 2.30%.
3. The payroll growth rate lowered to 2.50%.
4. Pension Equalization Reserve (PER) was valued for future benefits payable through the PER as a 1.25% annual compound cost-of-living adjustment (COLA).
5. Wage inflation was lowered to 2.8%.
6. Individual merit/promotion increase were changed to be service based rates ranging from 4.20% to 0.00%.
7. Unused sick leave, vacation time and compensation time was updated to be valued explicitly with a 1.50% load included for adverse experience.
8. Post-retirement, active life and disable life mortality was updated to be based on the Pub-2010 tables with multipliers for healthy annuitant mortality and projected with the ultimate rates from the MP projection scales.
9. Rate of disability, retirement and termination were updated to reflect recent experience.

In July and August 2017, the COPERS Board adopted several new actuarial assumptions based upon the recommendations from its actuary, GRS, for the purpose of determining contribution rates. The 2017 adopted changes were:

1. The discount rate was lowered to 7.25%.
2. The rate of inflation was lowered to 2.50%.
3. The payroll growth rate lowered to 3.00%.
4. Pension Equalization Reserve (PER) was valued for future benefits payable through the PER as a 1.5% annual compound cost-of-living adjustment (COLA).

In August and October 2015, the COPERS Board adopted new actuarial assumptions and methods, based upon the recommendations from its actuary, Cheiron, for the purpose of determining contributions and to meet the GASB 67 implementation requirements to be applied to the financial reporting for the fiscal year ending June 30, 2015. The 2015 adopted changes were the following:

1. PER was valued for future benefits payable through the PER as a 1.5% annual compound COLA. Amortization method for the unfunded actuarial liability (UAL) was amortized over a 20-year period as a level percentage of payroll with a four-year phase-in to the full amortization rate. Future gains and losses are amortized over closed 20-year periods as a level percentage of payroll from the valuation date in which they are first recognized. For Tier 1, members contribute 5% of pay and the City contributes the remainder of the total contribution rate. For the Tier 2, the members and the City each pay half of the total contribution rate.
2. Revised data tables for merit/salary increases, retirement rates, termination rates, disability incidence rates, and mortality rates.

In September 2013, the COPERS Board adopted new assumptions and methods, based upon the recommendations from its actuary, Cheiron, for the purpose of determining contributions and to meet the GASB 67 implementation requirements to be applied to the financial reporting for the fiscal year ending June 30, 2014. The September 2013 adopted changes were the following:

1. Discount rate was lowered to 7.5% based on the expected return on assets.

Notes to the Required Supplementary Information (Continued)

2. Salary increase rate was changed for price inflation to 3.00%, real wage growth to 0.50% and wage inflation to 3.5%.
3. Amortization method for the unfunded actuarial liability (UAL) was amortized over a 25-year period as a level percentage of payroll with a four-year phase-in to the full amortization rate. Future gains and losses are amortized over closed 20-year periods as a level percentage of payroll from the valuation date in which they are first recognized. For Tier 1, members contribute 5% of pay and the City contributes the remainder of the total contribution rate. For the Tier 2, the members and the City each pay half of the total contribution rate.
4. The administrative expense assumption was added. In prior years, the discount rate was assumed to be net of administrative expenses.

Supplementary Information

Schedule of Investment Expenses for the Fiscal Years Ended June 30, 2020 and 2019 (in thousands)

Payee	Fees 2020	Fees 2019	Nature of Services
Aberdeen/Artio Global Investors	$ -	$ 33	Investment Management
Artisan Global Opportunities	1,094	974	Investment Management
Ascentris Value Add Fund III	173	-	Investment Management
Baillie Gifford	707	664	Investment Management
BNY Mellon	277	170	Master Custodian
Brevan Howard (BH-DG)	276	269	Investment Management
Brigade Capital Management	368	364	Investment Management
Carlson Capital	589	598	Investment Management
Cramer Rosenthal McGlynn	367	416	Investment Management
DDJ Capital Management	347	329	Investment Management
Eagle Asset Management	299	293	Investment Management
Fir Tree	594	654	Investment Management
FOCUS Healthcare Partners	223	252	Investment Management
GMO	-	558	Investment Management
GQG	238	-	Investment Management
Hammes Partners III	438	263	Investment Management
HSI Real Estate V	228	390	Investment Management
J P Morgan	761	960	Investment Management
JDM Partners	242	242	Investment Management
Logan Circle	425	-	Investment Management
Longfellow	282	265	Investment Management
LSV Asset Management	221	-	Investment Management
MFS	87	522	Investment Management
Mondrian	124	612	Investment Management
Morgan Stanley	772	836	Investment Management
Neuberger Fund LP	-	594	Investment Management
Neuberger Sonoran A	743	-	Investment Management
Neuberger Sonoran B	556	-	Investment Management
Neuberger Sonoran C	253	-	Investment Management
Neuberger Sonoran D	253	-	Investment Management
Northwood GP, LLC IV	196	318	Investment Management
Northwood Series V	171	545	Investment Management
PAAMCO	-	17	Investment Management

Supplementary Information (Continued)

Schedule of Investment Expenses for the Fiscal Years Ended June 30, 2020 and 2019 (in thousands)(continued)

Payee	Fees 2020	Fees 2019	Nature of Services
Pacific Asset Management	291	238	Investment Management
PIMCO All Asset	1,448	1,500	Investment Management
RECAP III	39	63	Investment Management
RECAP IV	253	253	Investment Management
RECAP V	979	-	Investment Management
Robeco Investment Management	529	501	Investment Management
SC Core Fund	155	135	Investment Management
SSgA FTSE RAFI Developed ex-U.S. Low Volatility	70	72	Investment Management
SSgA FTSE RAFI U.S. Low Volatility	96	80	Investment Management
SSgA U.S. TIPS	46	52	Investment Management
SSgA US Aggregate Bond	56	52	Investment Management
The Boston Company	-	277	Investment Management
Western Asset	314	295	Investment Management
Wheelock Partners	6	35	Investment Management
Wheelock I	18	-	Investment Management
Wheelock II	157	236	Investment Management
Wheelock V	251	348	Investment Management
Wheelock VI	150	-	Investment Management
Total	$ 16,162	$ 15,275	
Net Securities Lending Expenses	$ 742	$ 1,619	Agent Fees/Broker Rebates

Supplementary Information (Continued)

Schedule of Administrative Expenditures and Encumbrances (Non-GAAP Budgetary Basis) Paid by the City of Phoenix for the Fiscal Years Ended June 30, 2020 and 2019

	2020		2019	
	Original Budget	Actual	Original Budget	Actual
Personal Services				
Staff Salaries and Benefits	$ 1,175,820	$ 1,170,361	$ 1,089,252	$ 1,062,618
Insurance	240,519	226,798	233,121	229,806
Social Security and Medicare	80,963	79,631	77,704	72,367
Retirement Contributions	381,905	386,496	343,902	334,831
Total Personal Services	**$ 1,879,207**	**$ 1,863,286**	**$ 1,743,979**	**$ 1,699,622**
Professional Services				
Consultants	$ 500	$ 2,786	$ 500	$ 694
Audit and Accounting	133,100	77,356	103,000	97,921
Computer Services	148,328	147,318	144,590	144,590
Total Professional Services	**$ 281,928**	**$ 227,460**	**$ 248,090**	**$ 243,205**
Communications				
Printing	$ 9,600	$ 12,152	$ 9,600	$ 15,758
Postage and Mailing	7,300	12,506	7,300	13,298
Telephone	1,475	1,773	2,213	2,512
Subscriptions and Memberships	2,070	2,034	2,070	1,637
Total Communications	**$ 20,445**	**$ 28,465**	**$ 21,183**	**$ 33,205**
Miscellaneous				
Supplies	$ 7,824	$ 4,852	$ 7,824	$ 3,619
Computer Equipment	300	2,391	4,700	3,682
Other	2,546	7,173	2,496	2,561
Total Miscellaneous	**$ 10,670**	**$ 14,416**	**$ 15,020**	**$ 9,862**
Total Administrative Expenditures and Encumbrances	**$ 2,192,250**	**$ 2,133,627**	**$ 2,028,272**	**$ 1,985,894**

Note: The schedule above represents administrative expenditures of COPERS that are budgeted and paid by the City of Phoenix through the general fund. They are recognized as offsetting contributions and deductions on the Statement of Changes in Fiduciary Net Position.

Schedule of Administrative Expenses (Plan Assets) for the Fiscal Years Ended June 30, 2020 and 2019

	Fees Paid	
Expense Category	**2020**	**2019**
Technology	$ 1,932,897	$ 355,842
Consulting	377,220	333,684
Actuarial Consulting	62,150	43,603
Legal Services	90,841	38,115
Administrative - Other	45,699	21,568
Total	**$ 2,508,807**	**$ 792,812**

Supplementary Information (Continued)

Schedule of Payments to Consultants (Plan Assets) for the Fiscal Years Ended June 30, 2020 and 2019

Consultant	2020	2019
Alignium	$ 104,220	$ 101,184
Elkins Mc Sherry	12,500	7,500
GEO Advertising	35,500	-
Meketa Investment Group	225,000	225,000
Total	$ 377,220	$ 333,684

Investment Section

The **Investment Section** contains the Plan's report on investment activity, its investment policies, schedules of investment results and related information.

MEKETA
INVESTMENT GROUP

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October 20, 2020

Board of Trustees
City of Phoenix Employees' Retirement System
c/o Scott Steventon
Retirement Program Administrator
200 W. Washington Street, 10th Floor
Phoenix, AZ 85003

Dear Board Members:

Please find below a summary of the market environment and System performance for the 2020 fiscal year.

Fiscal Year 2020 Year in Review

The past year has seen remarkable shifts in economic and financial market performance. We entered fiscal year 2020 facing considerable uncertainty regarding the path of fiscal and monetary policies, elevated valuations, declining growth in China, a general slowdown in global growth, the potential for additional trade issues, and political uncertainty in Europe (Italy, Greece, Brexit). All of these concerns weighed heavily on most investors' minds. Fast forward to where we sit today at the close of the 2020 fiscal year, and much has changed in the world.

The start of the fiscal year was characterized by widespread concerns regarding slowing global growth. This backdrop of uncertainty prompted major central banks to continue their pivot toward more accommodative policies. Here in the US, ongoing concerns regarding a decline in growth and the trade standoff between the US and China played a key role in the Federal Reserve's decision to cut rates several times, and eventually settle at a range of 1.50-1.75% by December 2019. Considering that the Fed had previously embarked on what was characterized as a fairly aggressive rate-hiking cycle until late 2018 given improvements in the economy, this represented a stark reversal of course. Fed Chairman Jerome Powell indicated that these so called "insurance cuts" were to combat recent weakness in the economy and were not necessarily a part of a longer cycle of interest rate cuts.

Outside of the US, major central banks, notably the European Central Bank ("ECB") and the Bank of Japan, affirmed similar accommodative policy stances. ECB President Mario Draghi, in one of his last formal acts as President, re-initiated the ECB's quantitative easing program, prior to being succeeded by Christine Lagarde in November 2019. Continued monetary accommodation, and increasing whispers of more formal fiscal support, set the stage for strong performance in global equities and other risk assets at the end of 2019.

In the third calendar quarter of 2019, markets experienced mixed results with US stocks and bonds posting gains, while international assets, smaller company stocks, and commodities declined. The calendar year finished strong though as a result of broadly accommodative policy stances, coupled with optimism about the pass-through of easier monetary policy to better economic prospects. US equities led the way in the second half of calendar 2020, with the Russell 3000 posting a return of 10.4%, followed by emerging market equities (MSCI Emerging Markets Index) producing a return of 7.1%, and developed international markets (MSCI EAFE) generating a return of 7.0%. With interest rates declining toward multi-decade lows, spread sectors within bond markets enjoyed strong performance as well. Local currency emerging markets debt, US investment grade corporate debt, and US high yield debt led the way; the JP Morgan GBI-EM Global Diversified, Bloomberg Barclays US Corporate Investment Grade, and Bloomberg Barclays US Corporate High Yield indices generated total returns of 4.4%, 4.3%, and 4.0%,

BOSTON CHICAGO LONDON MIAMI NEW YORK PORTLAND SAN DIEGO

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respectively in the second half of 2019. The VIX Index (a measure of volatility expectations), which saw a jump in Q4 2019 above 30.0 before ending the year at 25.4, fell markedly as the year came to a close, ending 2019 at an extremely benign level of 13.8. Gold ended the year with a reasonably strong gain, trading at $1,519.50 at the end of 2019, up from $1,278.30 at the end of 2018. WTI Crude ended 2019 at $61.10, an increase from its year-end 2018 level of $45.15.

By most accounts, global financial markets entered calendar year 2020 on relatively strong footing. Equity markets continued their march higher early in the year, despite elevated valuations, as investors increasingly began to price in a reflationary growth impulse, as suggested by leading economic indicators in global developed and emerging markets. However, a relatively optimistic backdrop underwent a remarkably rapid shift over the course of just a few weeks.

In January, the first COVID-19 case was acknowledged by Chinese authorities, reportedly originating in Wuhan, China. The actual timeline of the spread of the virus and its origination continue to be the subject of much speculation. With limited historical precedent, market participants leaned on China's relative success in containing SARS as indicative of the path of COVID-19. By March, the virus began to spread globally, particularly in Europe, with Italy and Spain reporting massive spikes in infections and, sadly, mortality rates, so markets changed course. Clearly, where SARS was quickly contained, COVID-19's infection rate had exploded globally. By virtue of greater freedom of travel and 21st century globalization, the virus spread far more quickly than was initially expected based on previous viral outbreaks. In March, in an effort to contain the spread, countries responded by enacting stringent lockdowns, or "stay at home orders" leading to an abrupt halt in production and consumption. Layoffs expanded dramatically and swiftly, as businesses were forced to close down in an effort to stop the disease from spreading.

The impact on financial markets was extreme. Global equity markets rapidly entered bear market territory, and continued their path downward throughout the month of March, as market participants attempted to price in the impact of the cessation of a large portion of global economic activity. With limited data on COVID-19, the pendulum clearly swung toward pessimism regarding the virus' impact and the likely path of activity going forward. After ending 2019 below 14, the VIX spiked above its prior peak during the Global Financial Crisis, briefly breaching 80 in early March. In the US, circuit breakers were triggered at the New York Stock Exchange, with markets opening limit down, on March 9th and March 16th. At the depth of the drawdown from January 1, 2020 to March 23, 2020, the Russell 3000 was down -31.6%, the MSCI EAFE Index (developed market equities) was down -33.2%, and the MSCI Emerging Markets Index (emerging market equities) was down -31.8%. The perception of acute stress in credit markets, both in the US and abroad, led to solvency fears; the Barclays High Yield index fell -19.8%. Investors universally fled risk assets, in all forms, during the selloff in favor of perceived safer assets like US Treasuries.

Over this same time period, the spread between large cap stocks, which went into the shock with stronger financial positions and have tended to experience less volatility in drawdowns, and small cap stocks, which are more pro-cyclical and volatile, widened during the selloff. Whereas the Russell 1000 fell by -31.1%, the Russell 2000 fell by -39.7%, a spread of nearly 10%. Going further, the ever-widening performance gap between growth and value, which we have highlighted in past CAFR reviews, persisted. The spread between large cap growth and small cap value expanded during the selloff, with the Russell 1000 Growth declining 25.1% and the Russell 2000 Value falling 44.3%, for a spread of nearly 20%.

The rapid unwind of risk in early 2020, which was one of the fastest market selloffs in modern financial history, reinforced the importance of diversification. While equity and credit markets fell precipitously, bonds provided

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an offset for investors. The Bloomberg Barclays US Aggregate generated a return of 1.0% over the course of the drawdown noted above, and long-term treasuries, measured by the Bloomberg Barclays Long US Government index, generated a return of 20.2%.

The volatility of the pandemic was exacerbated by volatility in oil prices, which experienced a rapid collapse early in 2020. The COVID-19 related restrictions weighed heavily on demand, with Saudi Arabia's untimely decision to flood the market with oil to gain market share creating further stress on prices. Oil futures briefly traded at negative price levels during the depths of the crisis, as demand collapsed and storage capacity dwindled. The May WTI futures contract briefly changed hands at nearly -$40 per barrel. Commodity and natural resource asset classes both participated in the broader market selloff; the Bloomberg Commodity Index and the S&P Global Natural Resources Index were down -23.4% and -44.6% at the trough, respectively. While the futures curve has since normalized, the oil supply/demand dynamic remains in flux. OPEC+ (inclusive of additional key producers such as Russia) reached a supply cut agreement in April that supported prices and stabilized the market.

To combat the expected, significant decline in economic activity, global fiscal and monetary authorities responded with immediate and historic stimulus measures. The Federal Reserve, in the midst of the March drawdown, immediately cut the Fed Funds Target Rate effectively to zero, and subsequently introduced aggressive stimulus measures, including backstop liquidity, funding programs, and trillions of dollars in promised asset purchases. Meanwhile, fiscal authorities released over $2.4 trillion in targeted stimulus, with the promise of additional measures in the future. Importantly, both the speed and breadth of the response, made the joint monetary/fiscal stimulus unprecedented. In Japan and Europe, similarly aggressive monetary and fiscal measures were implemented, although it should be noted that they entered the crisis with no room to cut policy rates, so their focus was on quantitative easing and fiscal measures.

Robust stimulus across global developed and emerging economies, coupled with incremental positive news regarding the spread of COVID-19 and economies slowly reopening, set the stage for a relatively rapid rebound in risk assets in the second quarter. While the pace of the deceleration in economic activity was rapid, and data for the second calendar quarter of 2020 has been relatively dire in absolute terms, market participants are largely taking a longer-term view with expectations for a recovery in economic activity later this year and into 2021. In the second calendar quarter of 2020, the Russell 3000 (US equities), the MSCI EAFE, (developed market equities), and the MSCI Emerging Markets (emerging market equities) generated total returns of 22.0%, 14.9%, and 18.1%, respectively. Given support from the Federal Reserve and increased risk appetite, credit recovered rapidly as well, with the Bloomberg Barclays US High Yield index generating a return of 10.2%. The broader fixed income market, as measured by the Bloomberg Barclays US Aggregate, benefitted from monetary stimulus, producing a 2.9% total return. While the VIX remained elevated relative to its pre-crisis levels at 30.4 as of June 2020, it had fallen significantly since the peak of the crisis in the first calendar quarter. Equally, bond market volatility as measured by the MOVE Index fell to nearly a record low.

An investor who had not been following current events over the past year and only chose to look at US equity market performance could be forgiven for thinking that little had changed regarding the prevailing market regime. Despite a massive risk-off event in the first quarter of 2020 associated with a global pandemic, risk assets have, in some cases, posted moderately positive returns over the past fiscal year. US equities, as represented by the Russell 3000 Index, finished the fiscal year with a 6.5% return. Emerging markets (MSCI Emerging Markets) delivered -3.4% for the year. The MSCI EAFE Index was the worst performer among the headline global regions, posting a total return of -5.1%.

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Several important trends underneath the headline results merit emphasis. In the US, the spread between large cap stocks and small cap stocks remains extremely wide. The Russell 1000 produced a total return of 7.5% over the fiscal year, whereas the Russell 2000 generated a total return of -6.6%. The spread between growth and value also remains stubbornly wide; the Russell 1000 Growth's return of 23.3% during the fiscal year far outpaced the Russell 1000 Value's total return of -8.8%. Key to the persistent spread between value and growth has been the sector composition of the Value and Growth indices. The Russell 1000 Value's large financials and utilities overweights, as well as large information technology and consumer discretionary underweights, relative to the Russell 1000 Growth, were key contributors. The two benchmarks' relative allocations to financials and information technology alone generated a performance spread of 14.1% in favor of the growth index. An even starker contrast can be observed between large cap growth (Russell 1000 Growth at 23.3%) and small cap value (Russell 2000 Value at -17.5%) where the total return spread was a massive 40.8%!

Within international developed markets, the MSCI EAFE opportunity set, of which Japan, the UK, and the Eurozone are featured most heavily, underperformed relative to the US and emerging markets. This can largely be attributed to the weak footing on which they entered the crisis to begin with, the robust spread of COVID-19, and the stringency of lockdowns in many of these economies. Within emerging markets, an extremely wide spread between countries that were able to manage the virus' spread and deployed aggressive countermeasures (e.g., China: 9.9% return) relative to countries facing already-dire economic circumstances (e.g., Brazil: -33.4%, Mexico: -25.2%, and South Africa: -24.9%) was relatively extreme. The same style regime observed in the US, with growth outperforming value, persisted in both developed and emerging international markets. Again, the relative performance of financials and information technology and consumer stocks were key drivers of the spread between value and growth indices.

Fixed income markets generated relatively strong results, due to a collapse in global yield curves coupled with a robust liquidity backstop from central banks. The Bloomberg Barclays US Aggregate produced a total return of 8.7% over the past year. High yield bonds retraced their earlier losses, with the Bloomberg Barclays US High Yield index finishing flat over the fiscal year. However, the standout performer within fixed income has been long maturity Treasuries, with the Bloomberg Barclays Long US Government index gaining an impressive 25.1% over the past year.

While equities, and especially large cap growth equities, as well as fixed income, produced relatively strong results despite the COVID-19 shock, we have seen mixed results from other asset classes. While energy prices recovered to some extent, with WTI Crude Oil trading at $39.28 at the end of the fiscal year, the current level still represents a significant drawdown relative to even a year ago, when it traded at $58.20. Natural resource stocks and commodities, on account of uncertainty regarding supply gluts, especially in the oil market, and the uncertainty regarding the recovery of demand, produced weak total returns. The S&P Global Natural Resources Index returned -16.8% while the Bloomberg Commodity Index returned -17.4%. One of the hardest hit asset classes in markets in 2020 has been real estate, where fears regarding utilization rates in commercial real estate have prevented the asset class from participating in the recovery to the same extent as other asset classes. The MSCI U.S. REIT Index returned -12.9%.

Elsewhere, an increasingly robust acceleration in money supply growth, widening fiscal deficits on account of unprecedented stimulus measures, and an environment of stagnating growth expectations manifesting in a collapse in real yields, resulted in a significant increase in demand for physical gold. Over the course of the fiscal year, the price of gold increased from $1,409.40 per ounce to $1,793.00, an increase of 27.2%. With investors increasingly fearing the potential ramifications of fiat currency devaluation as a result of monetary de-basement by the Federal Reserve and other global central banks, they have turned to gold as a potential hedge.

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Fiscal 2021 Outlook

Looking ahead, we acknowledge the wide breadth of new issues being presented by the pandemic, including: 1) economies opening up too soon from virus-related restrictions, and ultimately having to retract and "close down" again, 2) consumers permanently, or for an extended time, changing economic behaviors; 3) persistently high unemployment due to a significant number of companies not surviving the economic downturn; 4) virus-related fears negatively impacting the future of globalization, 5) an increase in sovereign debt risk due to the record issuance by governments; and 6) knock-on effects of unprecedented central bank intervention, including over-extended equity markets and the risk of unexpected inflation.

Globally, countries continue to tentatively ease their lockdown measures, as politicians face increasing pressure to get economic growth and employment back on track after a rapid and severe disruption. As a result, local outbreaks of the virus have arisen in the US and abroad, forcing local restrictive measures in harder-hit areas. The continued need for careful management of the spread of the virus is likely to prompt additional volatility in financial markets. This will only accelerate as we approach the end of the warm summer months in parts of the world and enter the traditional "flu season" of fall and winter. This brings many potential risks, including a spike in infections and hospitalizations, the mutation of the virus in an unfavorable manner, or even a concurrent outbreak and a severe flu season alongside COVID-19. Since market participants remain focused on developments regarding COVID-19, its trajectory will be a key driver of market volatility in the near-term.

We have already observed a rapid change in consumption preferences in the US in the wake of the initial COVID-19 shock. The US savings rate spiked to an unprecedented level, and remains elevated when compared to historical trends. This represents a potential opportunity, as it could represent pent-up demand and, eventually increased spending and consumption. However, consumer confidence has not fully recovered, and without certainty regarding the path of the virus, survey data suggest that most people in the US have chosen to build cash as a defense against further issues with COVID-19, rather than spend aggressively. Importantly, survey data also suggest that stimulus checks were not used for durable goods purchases, and instead were either saved or spent on necessary staples. Until consumers build more confidence in the path of COVID-19, the testing regime improves, and the outlook for a vaccine becomes less opaque, it is likely that consumer confidence, and thus consumption itself, will remain muted relative to pre-crisis levels, placing a damper on the prospective economic recovery.

Unemployment, despite a gradual re-opening of the US economy over the past quarter, remains stubbornly high after spiking to a post-World War II record. Unemployment as of the end of the fiscal year remained at 11.1%. The Bureau of Labor Statistics has also cautioned that considerable uncertainty exists around data quality; the actual numbers could be far better than reported, or far worse. A continued decline in unemployment from its current level will follow an easing of COVID-19 related restrictions, especially in the hard-hit service sector, as well as additional fiscal support. Conversely, companies continue to right-size their workforces to cope with a collapse in their top-lines and increasing solvency risk. The longer that uncertainty regarding the virus persists and leads to measures that are likely to stifle economic activity, the weaker business confidence will continue to be. This increases the risk that many layoffs, which might have been perceived as temporary, could become permanent, resulting in a higher equilibrium rate of unemployment.

COVID-19 has had a meaningful impact on the already-tapering long-term trend toward globalization in the 21st century. In some cases, local trade conflicts have arisen and have been resolved, but the trend toward the re-localization of supply chains is likely to accelerate in the wake of the crisis. The most obvious example of this trend is the continued, protracted conflict between the US and China. While the conflict was set aside in the early stages of COVID-19, it has been rekindled in recent months. The current US presidential administration's foreign policy approach has increasingly shifted toward a more aggressive anti-China stance. COVID-19 also exposed the reliance of some countries on choke-points in global supply chains that they will undoubtedly seek to address going forward. Global policymakers, such as ECB President Christine Lagarde, have acknowledged that de-globalization is likely to persist in the wake of the virus, beyond the US/China conflict. The risk is most severe for countries that have become reliant on foreign investment and export-driven growth. If global economies increasingly focus on domestic products, export-oriented economies are likely to suffer inordinately in this type of environment.

Historically, crisis periods have often witnessed concurrent periods of either voluntary or involuntary deleveraging, at the sovereign, corporate, and consumer levels. In 2008, for example, the US experienced a rapid de-leveraging in the mortgage market that quickly spread to corporates and consumers. In 2020, while consumers entered the crisis in a reasonable financial position, corporates and sovereigns did not. In the US, for example, corporate solvency was a meaningful source of uncertainty even prior to the crisis, as debt built up in the US corporate debt market. With the COVID-19 shock, March markets were gripped by fears that an economic crisis would become a financial crisis, where in the GFC the opposite had been the case. The Federal Reserve, seeking to prevent this outcome, chose to intervene by essentially backstopping corporate credit. As a result, corporate leverage has rapidly *increased*, where the opposite was true in previous cycles. Alongside this trend, the US government has massively increased the size of the fiscal deficit in order to support those people facing temporary income loss due to unemployment. Suddenly, the US faces the need to finance a widening budget deficit; a large slate of debt issuance will test global investors' willingness to finance a weakening US fiscal position, which could have considerable knock-on effects for interest rates and thus global risk assets. The US, within both the corporate and sovereign sector, continues to push the boundary of investors' appetite for debt.

The evolution of economic growth and inflation bear close monitoring going forward. In addition to widening deficits, unprecedented asset purchases by central banks run the risk of creating longer-term distortions in markets. There can be little doubt that the Federal Reserve's actions have boosted market confidence, and thus asset prices, in recent months. While they execute these policies in the hope of creating a virtuous feedback loop in order to stimulate growth, the pass through is indirect, at best. The Fed is increasingly facing a tightrope walk, backstopping market risk while trying not to lose the market's confidence in its ability to do so with an increasingly narrow set of policy tools. Given that interest rates are probably near a lower bound, at least for now, that leaves them with quantitative easing, which might increasingly become permanent rather than temporary. As evidenced by the path of nominal interest rates across the yield curve, growth expectations remain incredibly weak, while inflation expectations have begun to tick higher, resulting in a collapse in real interest rates. In addition, the Fed has increasingly signaled that it is likely to revise its inflation target, in the interest of allowing inflation to "run hot" in order to focus on achieving growth and full employment, with the added benefit of reducing the US sovereign debt burden. The potential for unexpected inflation within this regime means that asset allocation care is warranted; assets with low yields, like US Treasuries, could experience diminished long-term return prospects, requiring shifts in allocation decisions.

We will continue to monitor these issues and others, as they arise.

Since the end of the fiscal year, global markets have evolved significantly. The impact of COVID-19 and the extraordinary policy response have engendered profound significant changes in financial markets that have continued to play out since the end of the fiscal year. The evolution of COVID-19, with respect to its spread and the prospect for an eventual definitive healthcare solution, will continue to impact markets going forward.

Retirement System Investment Results and Asset Allocation

October 20, 2020

The fair value of the City of Phoenix Employees' Retirement System was $2.694 billion as of June 30, 2020. This was an increase of $26.4 million from June 30, 2019 due to positive investment performance of $50.3 million and $24.0 million in net cash outflows. The System's net of fees return was +1.4% over the fiscal year, +4.8% over three years, +5.2% over five years, and +7.3% over ten years[1]. As of June 30, 2020, the System's actuarial assumed rate of return is 7.0%.

As of June 30, 2020, the System's assets were allocated to equity (42.0%), rate-sensitive (22.2%), credit (10.5%), real assets (13.3%), hedge funds (4.0%), GTAA (5.9%), and cash (2.1%).

In March 2017, the Board approved a new asset allocation policy with an expected return of 7.26%, in line with the actuarial assumed rate of return at the time of 7.25% (the actuarial assumed rate of return was lowered to 7% as of June 30, 2020). During the fiscal year, the System made continued progress towards implementing the approved asset allocation policy. The System funded two new emerging markets equity managers within the equity asset class and an emerging markets bond manager within the credit asset class. The funding of these three managers enabled the System to bring all sub-aggregates within investment policy statement ranges, with the exception of GTAA which continues to be drawn down in order to fund private markets asset classes. We look forward to continuing our work with Staff and the Board to move the Retirement System towards its new policy targets, with the ultimate goal of allowing the Retirement System to continue to meet its obligations to participants.

Sincerely,

Larry Witt, CFA
Principal

Stephen P. McCourt, CFA
Managing Principal

Laura B. Wirick, CFA, CAIA
Principal

Chris Theordor, CAIA
Vice President

LW/SPM/LW/CT/nca

[1] Returns over one-year are annualized.

Outline of Investment Policies and Objectives
Adopted July 1990 and subsequently amended

COPERS' asset allocation targets (at fair value) as of June 30, 2020 were:

Asset Class	Target Allocation
Domestic Equity	16%
Developed Market Equity	9%
Emerging Market Equities	8%
Private Equity	9%
Investment Grade Bonds	15%
TIPS	7%
High Yield Bonds	5%
Bank Loans	3%
Emerging Market Bonds	3%
Real Estate	12%
Infrastructure	4%
Natural Resources	4%
Hedge Funds	5%
GTAA	0%
Cash Equivalents	0%

1. In March 2017, the COPERS Board adopted a new asset allocation that more closely aligns the Board's risk tolerance and expected returns.
2. Each asset class will be broadly diversified to be similar to the market for the asset class. The market for equities shall be represented by the Russell 3000 Value Index, MSCI EAFE Index, MSCI Emerging Markets. The market for bonds shall be represented by the Barclays Capital Aggregate and Barclays High Yield. The market for real estate shall be represented by the NCREIF ODCE Property Index.
3. Multiple managers will be employed. Allocations among the managers will be controlled by the Trustees to maintain both diversification and policy guidelines.
4. Investments will conform to the Phoenix City Charter, Chapter XXIV, Part II, Section 34 (See Note 8).
5. COPERS' main investment objective is to achieve a rate of return that exceeds inflation by at least 3% over time. The actuarial assumed rate of return is 7.00%.

Directed Brokerage Commissions

A directed brokerage commissions program was established by COPERS' Board on July 31, 1991. Becker, Burke Associates ("BBA") provided the directed brokerage commissions program through December 31, 2003. As of January 1, 2004, State Street Global Markets, LLC ("SSGM") became the provider of the commission recapture program. SSGM has agreed to allocate to the fund 80% of commissions for US trades executed with a network of brokers and 100% (above the "execution only" rate) for US trades directly with SSGM's Trading Desk, identified and designated by investment managers as "directed." Under this program, COPERS' equity managers are requested to execute trades to achieve best execution of fund transactions and to use best efforts to place trades with SSGM. For the fiscal year ended June 30, 2020, the total payments received from the directed brokerage commissions program under SSGM were $138.28.

Investment Services Under Contract (as of June 30, 2020)

Equity Managers

Artisan Partners	Ting Rattanaphasouk	San Francisco, CA
Baillie Gifford	Kathrin Hamilton	Edinburgh, Scotland
Cramer Rosenthal McGlynn	Clair Componi	New York, NY
Eagle Asset Management	Clay Lindsey	St. Petersburg, FL
GQG	Matt Crowe	Ft. Lauderdale, FL
GMO	Ryan Dawley	Berkeley, CA
LSV	Jason Ciaglo	Chicago, IL
Mondrian	Paul Ross	Philadelphia, PA
PIMCO	Matt Clark	Newport Beach, CA
Robeco Investment Management	William Supple	Philadelphia, PA
State Street Global Advisors	Sonya Park	San Francisco, CA

Fixed Income Managers

Brigade Capital Management	Marielle Bush	New York, NY
DDJ Capital Management	Matt Hensher	Waltham, MA
Logan Circle Partners	Angus Campbell	Philadelphia, PA
Longfellow Investment Management	Corrine Larson	Boston, MA
Pacific Asset Management	Michael Spitler	Newport Beach, CA
PIMCO	Summer Jarret	Newport Beach, CA
Western Asset Management	Kevin Gore	Pasadena, CA

Hedge Fund Managers

Brevan Howard US LLC	William Cummings	New York, NY
Carlson Capital	Jessica Biggs	Dallas, TX
Fir Tree Partners	Benjamin Ghriskey	New York, NY

Transition Managers

Northern Trust Transition Management	Grant Johnsey	Chicago, IL
Russell Implementation Services, Inc	Steve Cauble	Seattle, WA
State Street Global Markets	James Doherty	Irvine, CA

Private Equity

Neuberger Berman	Kaci Boyer	Dallas, TX

Real Estate Managers

Ascentris	Rob Toomey	Denver, CO
FOCUS Healthcare Partners	Michael Feinstein	Chicago, IL
Hammes Partners	Patrick Hammes	Brookfield, WI
JDM Partners	Mel Shultz	Phoenix, AZ
JP Morgan	Tom Klugherz	San Francisco, CA
Hemisferio Sul Investments	Diogo Bustani	Sao Paulo, BR
Morgan Stanley	Candice Todd	Atlanta, GA
Northwood Real Estate Partners	Jennifer Davis	New York, NY
RECAP II, III, IV, SC Core	Chris Van Beek	Singapore, CH
Wheelock Street Real Estate	Lawrence Settanni	Greenwich, CT

Investment Services Under Contract
(as of June 30, 2020 continued)

Real Return Managers

Research Affiliates LLC	Jeff Wilson	Newport Beach, CA

Real Estate Consultant

Alignium	Dan Krivinksas	Chicago, IL

Investment Consultant

Meketa Investment Group	Larry Witt	Carlsbad, CA

Schedule of Investment Results
For the Fiscal Year Ended June 30, 2020

		Annualized	
	1-Year	3-Years	5-Years
TOTAL PORTFOLIO:			
COPERS	1.4 %	4.8 %	5.2 %
Policy Benchmark	1.9	5.3	5.7
Meketa All Pension Plans > $1B Net Median	1.3	4.8	5.2
BANK LOANS			
Pacific Asset Management (1)	(0.5)	-	-
EQUITY FUNDS			
Artisan Global Opportunities	22.5	15.2	13.6
MSCI ACWI	2.1	6.1	6.5
Baillie Gifford	9.5	7.3	7.6
MSCI ACWI Ex USA	(4.8)	1.1	2.3
Cramer Rosenthal McGlynn	(21.1)	(4.1)	1.1
Russell 2000 Value Index	(17.5)	(4.3)	1.3
Eagle Asset Management	11.2	13.1	10.9
Russell 2000 Growth Index	3.5	7.9	6.9
GQG (3)	-	-	-
MSCI Emerging Markets Growth NR	-	-	-
LSV (7)	-	-	-
MSCI Emerging Markets Growth NR	-	-	-
Robeco Investment Management	(8.8)	1.7	4.1
Russell 1000 Value Index	(8.8)	1.8	4.6
SSgA FTSE RAFI US Low Vol	(7.1)	3.7	6.1
FTSE RAFI US Low Vol Index	(7.0)	3.7	6.2
SSgA FTSE RAFI Dev ex-US Low Vol (2)	(13.0)	(1.6)	-
FTSE RAFI US Dev ex-US Low Vol Index	(13.4)	(1.9)	-
FIXED INCOME FUNDS			
Longfellow Core Fixed Income (6)	7.4	-	-
Barclays US Aggregate	8.7	-	-
SSgA US AGG Bond Index (5)	8.7	-	-
Barclays US Aggregate	8.7	-	-
SSgA US TIPS (4)	8.3	-	-
Barclays US TIPS	8.3	-	-
Western Asset Management	8.4	5.8	5.3
Barclays US Aggregate	8.7	5.3	4.3

Schedule of Investment Results (continued)

	Annualized		
	1-Year	3-Years	5-Years
HEDGE FUND OF FUNDS			
BH-DG Systematic Trading (10)	(2.5) %	- %	- %
Carlson	(1.5)	(0.2)	0.6
Fir Tree International	2.1	(1.9)	(3.2)
HIGH YIELD BONDS			
Brigade Capital Management (8)	(3.9)	-	-
DDJ Capital Management (9)	(7.1)	-	-
PRIVATE EQUITY FUNDS			
Neuberger Berman Sonoran	1.2	10.3	8.6
REAL ESTATE FUNDS			
Core (11)	2.1	5.5	7.1
Non-Core (12)	(3.5)	5.4	6.0
NCREIF ODCE	2.2	5.7	7.3
REAL RETURN FUND			
PIMCO All Asset	(2.2)	2.3	3.5
All Asset Index	4.1	4.7	4.5

(1) Pacific Asset Management was added as a bank loan manager effective September 1, 2018. Performance figures would not be representative of the benchmark index.
(2) SSgA FTSE RAFI Dev ex-US Low Vol was added as an equity manager effective July 1, 2015. Performance figures would not be representative of the benchmark index.
(3) GQG was added as an equity manager effective January 1, 2020. Performance figures would not be representative of the benchmark index.
(4) SSgA US TIPS was added as a fixed income manager effective February 1, 2018. Performance figures would not be representative of the benchmark index.
(5) SSgA US AGG Bond Index Fund was added as a fixed income manager effective April 1, 2018. Performance figures would not be representative of the benchmark index.
(6) Longfellow Core Fixed Income was added as a core plus fixed income manager effective May 1, 2018. Performance figures would not be representative of the benchmark index.
(7) LSV was added as an equity manager effective November 1, 2019. Performance figures would not be representative of the benchmark index.
(8) Brigade Capital Management was added as a high yield bonds manager effective August 1, 2018.
(9) DDJ was added as a high yield bonds manager effective September 1, 2018. Performance figures would not be representative of the benchmark index.
(10) BH-DG Systematic Trading was added as a hedge fund manager effective March 1, 2018. Performance figures would not be representative of the benchmark index.
(11) Core Real Estate performance was reported as the gross time-weighted returns.
(12) Non-Core Real Estate performance was reported as the gross time-weighted returns.

The calculations above were prepared by COPERS' consultant, using a time-weighted rate of return, based on fair value. Core and Non-Core real estate performance is calculated as an IRR.

Asset Allocation by Manager
For the Fiscal Year Ended June 30, 2020

Manager	Style		Management (in thousands)	% of Portfolio	
CASH AND CASH EQUIVALENTS FUNDS					
Brigade Capital Management	Fixed Income	$	2,187	0.08	%
COPERS Cash Account	Core Plus Fixed Income		55,660	2.06	
Cramer Rosenthal McGlynn	Small Cap Growth		875	0.03	
DDJ Capital Management	Small Cap Growth		2,315	0.09	
Eagle Asset Management	Core Plus Fixed Income		1,365	0.05	
Longfellow Core Fixed	Core Plus Fixed Income		754	0.03	
Robeco Investment Management	Large Cap Value		2,402	0.09	
Western Asset Management	Core Plus Fixed Income		2,738	0.10	
TOTAL CASH & CASH EQUIVALENT FUNDS			68,296	2.53	
DOMESTIC EQUITIES FUNDS					
Brigade Capital Management	Bonds		563	0.02	
Cramer Rosenthal McGlynn	Small Cap Value		38,581	1.43	
DDJ Capital Management	Bonds		183	0.01	
Eagle Asset Management	Small Cap Growth		59,612	2.21	
FTSE RAFI US LOW VOL	Large Cap Core		150,016	5.56	
Robeco Investment Management	Large Cap Value		109,347	4.05	
STATE ST US AG BND IND	Bonds		224,624	8.33	
STATE ST US TIPS IDX	Bonds		148,533	5.51	
TOTAL DOMESTIC EQUITIES FUNDS			731,459	27.11	
FIXED INCOME FUNDS					
Brigade Capital Management	Fixed Income		63,115	2.34	
DDJ Capital Management	Fixed Income		59,150	2.19	
Logan Circle	Fixed Income		77,703	2.88	
Longfellow Core Fixed	Core Plus Fixed Income		109,170	4.05	
Pacific Asset Management	Bank Loans		78,773	2.92	
Western Asset Management	Core Plus Fixed Income		112,307	4.16	
TOTAL FIXED INCOME FUNDS			500,218	18.54	
HEDGE FUNDS					
BH DG SYS TRD FD	Hedge Fund of Funds		28,228	1.05	
Carlson Capital	Hedge Fund of Funds		39,129	1.45	
Fir Tree Partners	Hedge Fund of Funds		40,754	1.51	
PAAMCO	Hedge Fund of Funds		801	0.03	
TOTAL HEDGE FUNDS			108,912	4.04	

Asset Allocation by Manager
For the Fiscal Year Ended June 30, 2020 (continued)

Manager	Style	Management (in thousands)	% of Portfolio
GLOBAL COMMINGLED FUNDS			
Artisan Partners	International	$ 168,987	6.26 %
PIMCO All Asset Custom Index	International	157,809	5.85
TOTAL INTERNATIONAL COMMINGLED FUNDS		326,796	12.11
INTERNATIONAL EQUITIES FUNDS			
Baillie Gifford	Large Cap Growth	224,349	8.32
FTSE RAFI DV EX US	Large Cap Core	69,327	2.57
GQG Emerging Market	International	76,871	2.85
LSV Emerging Market	International	62,561	2.32
TOTAL INTERNATIONAL EQUITIES FUNDS		433,108	16.05
PRIVATE EQUITY FUNDS			
Neuberger	Private Equity	181,889	6.74
TOTAL PRIVATE EQUITY FUNDS		181,890	6.74
REAL ESTATE FUNDS			
Ascentris	Non-Core Real Estate	13,464	0.50
Focus Sh Fund	Non-Core Real Estate	9,532	0.35
Hammes Partners III	Non-Core Real Estate	4,097	0.15
HSI Real Estate V	Non-Core Real Estate	10,579	0.39
JDM Opportunity Fund	Non-Core Real Estate	22,201	0.82
JPM Strategic Property	Core Real Estate	74,814	2.77
Morgan Stanley Prime Property	Core Real Estate	79,680	2.95
Northwood IV	Non-Core Real Estate	17,365	0.64
Northwood V	Non-Core Real Estate	25,312	0.94
RECAP III	Non-Core Real Estate	4,352	0.16
RECAP IV	Non-Core Real Estate	18,247	0.68
RECAP V	Non-Core Real Estate	10,066	0.37
SC Core Fund LP	Non-Core Real Estate	31,523	1.17
Wheelock Street Partners I	Non-Core Real Estate	1,784	0.07
Wheelock Street Partners II	Non-Core Real Estate	6,972	0.26
Wheelock Street Partners V	Non-Core Real Estate	17,123	0.63
Wheelock Street Partners VI	Non-Core Real Estate	8	0.00
TOTAL REAL ESTATE FUNDS		347,119	12.87
Total Portfolio Before Securities Lending		$ 2,697,797	100.00 %
Securities Lending		79,589	
TOTAL INVESTMENTS		$ 2,777,386	

List of Largest Assets Held
As of June 30, 2020 (in thousands)

Ten Largest Bond Holdings (Fair Value)

Par Value	Description	Interest Rate	Due	Rating	Fair Value
$ 3,352	US Treasury Note	1.63	11/15/2022	AAA	$3,501
3,003	US Treasury Note	2.38	04/15/2021	AAA	3,001
2,653	One Call	11.50	07/01/2024	NR	2,744
2,602	Asurion	6.99	08/04/2025	B3	2,531
2,210	US TIPS	0.38	01/15/2027	AAA	2,259
2,248	US Treasury Note	0.50	06/30/2027	AAA	2,252
2,012	US Treasury Note	1.13	02/28/2025	AAA	2,023
1,547	US TIPS	1.00	02/15/2049	AAA	1,915
1,682	US Treasury Bond	2.25	08/15/2049	AAA	1,672
1,669	US Treasury Bill	0.00	10/22/2020	AAA	1,669

Ten Largest Stock Holdings (Fair Value)

Shares	Stock	Fair Value
21,507	Berkshire Hathaway Inc	$ 3,839
38,288	JPMorgan Chase & Co	3,601
71,564	Cisco Systems Inc	3,338
22,816	Johnson & Johnson	3,209
15,796	CIGNA Corp	2,964
121,436	Bank of America Corp	2,884
1,869	Alphabet Inc	2,650
76,690	Pfizer Inc	2,508
87,458	Barrick Gold Corp	2,356
2,049	Autozone Inc	2,312

A complete list of portfolio holdings is available at the COPERS office.

Schedule of Investment Related Fees (in thousands)
For the Fiscal Year Ended June 30, 2020

	Management	Fees (1)
CASH AND CASH EQUIVALENTS FUNDS		
Brigade Capital Management	$ 2,187	$ -
COPERS Cash Account	55,660	-
Cramer Rosenthal McGlynn	875	-
DDJ Capital Management	2,315	-
Eagle Asset Management	1,365	-
Longfellow Core Fixed	754	-
Robeco Investment Management	2,402	-
Western Asset Management	2,738	-
TOTAL CASH & CASH EQUIVALENT FUNDS	68,296	-
DOMESTIC EQUITIES FUNDS		
Brigade Capital Management	563	-
Cramer Rosenthal McGlynn	38,581	367
DDJ Capital Management	183	-
Eagle Asset Management	59,612	299
FTSE RAFI US LOW VOL	150,016	96
Robeco Investment Management	109,347	529
STATE ST US AG BND IND	224,624	56
STATE ST US TIPS IDX	148,533	46
TOTAL DOMESTIC EQUITIES FUNDS	731,459	1,393
FIXED INCOME FUNDS		
Brigade Capital Management	63,115	368
DDJ Capital Management	59,150	347
Logan Circle	77,703	425
Longfellow Core Fixed	109,170	282
MFS Emerging Markets Debt	-	87
Pacific Asset Management	78,773	291
Western Asset Management	112,307	314
TOTAL FIXED INCOME FUNDS	500,218	2,114
GLOBAL COMMINGLED FUNDS		
Artisan Partners	168,987	1,094
PIMCO All Asset	157,809	1,448
TOTAL GLOBAL COMMINGLED FUNDS	326,796	2,542

Schedule of Investment Related Fees (in thousands)
For the Fiscal Year Ended June 30, 2020 (continued)

	Management	Fees (1)
HEDGE FUNDS		
BH DG Sys Trd FD LP	$ 28,228	$ 276
Carlson Capital	39,129	589
Fir Tree Partners	40,754	594
PAAMCO	801	-
TOTAL HEDGE FUNDS	108,912	1,459
INTERNATIONAL EQUITIES FUNDS		
Baillie Gifford	224,349	707
FTSE RAFI DV EX US	69,327	70
GQG	76,871	238
LSV	62,561	221
Mondrian	-	124
TOTAL INTERNATIONAL EQUITIES	433,108	1,360
PRIVATE EQUITY		
Neuberger	181,889	1,805
TOTAL PRIVATE EQUITY FUNDS	181,889	1,805
REAL ESTATE FUNDS		
Ascentris	13,464	173
Focus	9,532	223
Hammes Partners III	4,097	438
HSI Real Estate V	10,579	228
JDM Opportunity Fund	22,201	242
JP Morgan Strategic Property	74,814	761
Morgan Stanley Prime Property	79,680	772
Northwood GP LLC IV	17,365	196
Northwood Series V	25,312	171
RECAP III	4,352	39
RECAP IV	18,247	253
RECAP V	10,066	979
SC Core	31,523	155
Wheelock Street Partners I	1,784	24
Wheelock Street Partners II	6,972	157
Wheelock Street Partners V	17,123	251
Wheelock Street Partners VI	8	150
TOTAL REAL ESTATE	347,119	5,212

Schedule of Investment Related Fees (in thousands)
For the Fiscal Year Ended June 30, 2020 (continued)

	Management	Fees (1)
MASTER CUSTODIAN FEES		
BNY Mellon	$ -	$ 277
TOTAL MASTER CUSTODIAN FEES	-	277
TOTAL SECURITIES LENDING (2)	79,589	
TOTAL INVESTMENTS	$ 2,709,090	$ 16,162
CASH AND CASH EQUIVALENTS	68,296	
TOTAL CASH & CASH EQUIVALENTS AND INVESTMENTS	$ 2,777,386	

(1) Does not represent contractual fee schedule and may include expenses other than management fees.
(2) No separate billing for the securities lending program, the fees are netted from the securities lending income.

Investment Summary by Sector
For the Fiscal Year Ended June 30, 2020

Type of Investment	Fair Value (in thousands)	Percent of Total Fair Value
Cash and Cash Equivalents:		
Cash & Cash Equivalents	$ 68,296	2.53 %
Total Cash and Cash Equivalents	68,296	2.53
Domestic Equities:		
Basic Materials	10,559	0.39
Commingled	523,173	19.39
Consumer Discretionary	5,067	0.19
Consumer Goods	10,801	0.40
Consumer Services	22,975	0.85
Energy Related	1,538	0.06
Financials	37,615	1.39
Health Care	41,062	1.52
Industrials	31,960	1.18
Information Technology	7,772	0.29
Oil and Gas	4,077	0.15
Real Estate Fund	2,544	0.09
Technology	31,226	1.16
Utilities	1,090	0.04
Total Domestic Equities	731,459	27.11
Fixed Income:		
Asset Backed	15,976	0.59
Cash & Cash Equivalents	2,908	0.11
Corporate Bonds	297,487	11.03
Derivative	(1,262)	(0.05)
Foreign Bonds	11,367	0.42
Foreign Debt	77,703	2.88
Government Agency	2,108	0.08
Mortgage Backed	65,601	2.43
Municipal Bond	2,901	0.11
US Government Guaranteed	25,429	0.94
Total Fixed Income	500,218	18.54
Global Commingled:		
Global Commingled	157,809	5.85
Other	168,987	6.26
Total Global Commingled	326,796	12.11
Hedge Funds:		
Other	108,912	4.04
Total Hedge Funds	108,912	4.04

Investment Summary by Sector
For the Fiscal Year Ended June 30, 2020 (continued)

International Equities:			
Commingled	$	293,676	10.89 %
International		139,432	5.17
Total International Equities		433,108	16.06
Private Equity:			
Private Equity		181,889	6.74
Total Private Equity		181,889	6.74
Real Estate:			
Real Estate Fund		347,119	12.87
Total Real Estate		347,119	12.87
Securities Lending		79,589	2.87
Total Investments	$	2,777,386	100.00 %

Schedule of Commissions
For the Fiscal Year Ended June 30, 2020

Brokerage Firm	Number of Shares Traded	Total Commissions	Commissions Per Share
GOLDMAN SACHS & CO, NY	908,096	$ 22,665	$ 0.025
J.P. MORGAN SECURITIES LLC, NEW YORK	693,865	18,642	0.027
CREDIT SUISSE, NEW YORK (CSUS)	614,983	15,003	0.024
MERRILL LYNCH PIERCE FENNER SMITH INC NY	488,267	13,565	0.028
MORGAN STANLEY & CO INC, NY	526,465	12,402	0.024
LIQUIDNET INC, NEW YORK	380,410	11,412	0.030
CITIGROUP GLOBAL MARKETS, INC., NEW YORK	379,281	11,254	0.030
HSBC SECURITIES (USA) INC, NEW YORK	314,971	10,581	0.034
All Other Brokers (1)	2,755,165	68,417	
Total	7,061,503	$ 183,941	

(1) Includes brokers with total commissions less than $10,000 each.

Actuarial Section

The **Actuarial Section** contains the actuary's certification letter, supporting schedules prepared by the actuary and a summary of plan provisions.

P: 720.274.7270 | www.grsconsulting.com

October 30, 2020

Mr. Scott Steventon
Retirement Program Administrator
City of Phoenix Employees' Retirement System
200 W. Washington Street, 10th Floor
Phoenix, Arizona 85003

Re: City of Phoenix Employees' Retirement System Actuarial Certification

Dear Mr. Steventon:

At the request of the City of Phoenix Employees' Retirement System ("COPERS"), Gabriel Roeder Smith & Company (GRS) has performed the actuarial valuation of the benefits associated with the COPERS defined benefit pension plan. The information in the Actuarial Section is based on our annual actuarial valuation report, with the most recent valuation conducted as of June 30, 2020. The Actuarial Section is intended to be used in conjunction with the full report.

The information in the Financial Section is based on the GASB 67 and 68 valuation report, with the most recent report conducted as of June 30, 2020. The Financial Section is intended to be used in conjunction with the full report.

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, 2020. GRS prepared the following schedules (information prior to 2017 was provided by COPERS):

- Actuarial Section
    - Summary of Actuarial Assumptions and Methods
    - Schedule of Retirees Members Added To and Removed From Rolls
    - Solvency Test
    - Analysis of Financial Experience
    - Summary of Benefit Provisions
- Financial Section
    - Sensitivity of Net Pension Liability to Changes in Discount Rate
    - Schedule of Changes in Net Pension Liability and Related Ratios
    - Schedule of Employer Contributions

Data

The valuation was based upon information as of June 30, 2020, furnished by COPERS 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 COPERS staff.

7900 East Union Avenue | Suite 650 | Denver, Colorado 80237-2746

Mr. Scott Steventon
October 30, 2020
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Actuarial Assumptions and Methods

The Board accepted GRS's recommendations on both the economic and demographic assumptions based on the most recent experience study that analyzed data from July 1, 2014 through June 30, 2019. The new assumptions were adopted in July 2020. The assumptions regarding sick leave, vacation time, and compensation time were adopted in August 2020.

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

The actuarial assumptions and methods used to develop the Net Pension Liability, 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 including the use of the Entry Age Normal actuarial cost method to calculate the total pension liability.

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 COPERS is outside the scope of this actuarial valuation.

The current actuarial assumptions are outlined in the section titled "Summary of Actuarial Assumptions and Methods."

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."

Funding Policy and Objectives

The Actuarially Determined Contribution is determined by taking the sum of the normal cost, a component to amortize the unfunded liability and a component to cover administrative expenses. The Board's current funding policy is to contribute an amount each year based on the most recently calculated Actuarially Determined Contribution.

The unfunded accrued liability is comprised of experience gains and losses, assumption changes and benefit changes. A base is established in each year for changes in the unfunded accrued liability arising from these sources. In September 2013, the Board adopted amortization payment methods that amortize the pre-assumption changes of July 1, 2013 over a closed 25-year period as a level percentage of payroll; amortizes

Mr. Scott Steventon
October 30, 2020
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the assumption change liability as of July 1, 2013 over a closed 25-year period as a level percentage of payroll; amortizes the assumption change liability as of July 1, 2015 over a closed 20-year period as a level percentage of payroll with a four-year phase in; and amortizes future gains and losses over a closed 20-year period. Future gains cannot be amortized over a period shorter than the period remaining on the 25-year amortization schedule. Since the 2019 actuarial valuation the actuarially determined contribution has decreased from 38.62% of pay to 37.60% of pay. The decrease is primarily due to assumption changes.

Assuming all actuarial assumptions are met, this method of payment of the unfunded liability will result in full funding of the unfunded accrued liability in 20 years. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions.

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 Internal Revenue Code, and ERISA.

The signing actuaries are independent of COPERS sponsor. All signing actuaries are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.
Respectfully submitted,

Gabriel, Roeder, Smith & Company

Paul T Wood

Paul Wood, ASA, FCA, MAAA
Consultant

Bill Detweiler, ASA, FCA, MAAA
Senior Analyst

GRS

SUMMARY OF BENEFIT PROVISIONS

Membership

Full-time employees of the City of Phoenix other than police officers, firefighters, or elected officials who are covered by another retirement system to which the City contributes.

Members who were hired before July 1, 2013, as well as members who joined the City between July 1, 2013 and December 31, 2015 who were members of ASRS prior to July 1, 2011 and did not withdraw their contributions are Tier 1 members.

Members hired into employment with the City between July 1, 2013 and December 31, 2015 who are not Tier 1 members are Tier 2 members.

Members hired into employment with the City on or after July 1, 2016 who are not Tier 1 members or Tier 2 members are Tier 3 members.

Final Average Compensation (FAC)

Tier 1/Tier 2
The average of annual compensation for the period of 3 consecutive years producing the highest average contained within the last 10 years immediately preceding retirement.

Tier 3
The average of annual compensation for the period of 5 consecutive years producing the highest average contained within the last 10 years immediately preceding retirement. Annual compensation will be limited to the first $125,000 of compensation, indexed to inflation (CPI-U) each January 1, commencing on January 1, 2017.

Credited Service

Credited service is determined based on Section 14 of Chapter XXIV of the Phoenix City Charter as well as COPERS administrative policy number 43. In no case is more than a year of service credited to any member for all service rendered in any calendar year. The amount of service credited to members varies by Tier, as detailed below.

Tier 1
A member is credited with a month of service for each calendar month in which the member performs at least 10 days of City service. A member is credited with a year of service for any calendar year in which the member has at least 10 months of credited service. If a member has less than 10 months of credited service for any calendar year, they are credited for the actual number of months.

Tier 2/Tier 3
A member is credited with a month of service for each calendar month in which the member performs at least 20 days of City service. A member is credited with a year of service for any calendar year in which the member has at least 12 months of credited service. If a member has less than 12 months of credited service for any calendar year, they are credited for the actual number of months.

Summary of Benefit Provisions (Continued)

Voluntary Retirement (no reduction for age)

Tier 1

Eligibility:
Sum of age and credited service equals 80 or more, age 60 with 10 or more years of credited service or age 62 with 5 or more years of credited service.

Annual Benefit:
Eligible unused sick leave service multiplied by 2% of FAC plus 2% of FAC times credited service up to 32.5 years plus 1% of FAC times service in excess of 32.5 years plus 0.5% of FAC times service in excess of 35.5 years. Minimum monthly pension is $250 ($500 if member has 15 or more years of service).

Tier 2/Tier3

Eligibility:
Sum of age and credited service equals 87 or more, age 60 with 10 or more years of credited service or age 62 with 5 or more years of credited service.

Annual Benefit:
Eligible unused sick leave service multiplied by 2% of FAC for Tier 2 members only plus FAC times credited service times the corresponding accrual rate:

Tier 2		Tier 3	
Years of Service	**Accrual Rate**	**Years of Service**	**Accrual Rate**
0 < Service ≤ 20	2.10%	0 < Service ≤ 10	1.85%
20 < Service ≤ 25	2.15%	10 < Service ≤ 20	1.90%
25 < Service ≤ 30	2.20%	20 < Service ≤ 30	2.00%
Service >30	2.30%	Service >30	2.10%

Note that for Tier 2 and Tier 3, the same accrual rate will apply for each year of service based on the total years of service.

Deferred Vested Retirement

Eligibility:
Termination of City employment prior to age 62 with 5 or more years of credited service.

Annual Benefit:
Accrued regular retirement amount based on credited service, unused sick leave service, and FAC at time of termination, payable beginning at age 62.

Duty Disability Retirement

Eligibility:
Total and permanent disability incurred in line of duty with the City.

Summary of Benefit Provisions (Continued)

Annual Benefit:
Computed in the same manner as the regular retirement amount based on FAC and credited service at time of disability retirement. Minimum is 15% of FAC for Tier 1 members and 15.75% for Tier 2 and Tier 3 members. Maximum during workers' compensation period is difference between final compensation and annualized workers' compensation. At expiration of workers' compensation period, amount is recomputed to include years during which workers' compensation was paid.

Non-Duty Disability Retirement

Eligibility:
Total and permanent disability after 10 or more years of credited service.

Annual Benefit:
Computed in the same manner as the regular retirement amount based on FAC and credited service at time of disability retirement.

Pre-Retirement Duty Death Benefit

Eligibility:
Death in line of duty with the City and compensable under worker's compensation.

Annual Benefit:
To the spouse: Joint and 100% survivor actuarial equivalent of accrued regular retirement amount based on FAC and credited service and unused sick leave service at time of death. Minimum of 10 years of service is credited. To the children of a deceased member with 10 or more years of credited service: each child shall receive a monthly pension of $200 until adoption, marriage, death or attainment of age 18.

Pre-Retirement Non-Duty Death Benefit

Eligibility:
10 or more years of credited service.

Annual Benefit:
Same as Pre-Retirement Duty Death Benefit.

Refund of Contributions

Eligibility:
Termination of covered service employment prior to eligibility for any other benefits.

Annual Benefit:
No annual benefit. Accumulated member contribution with interest at no more than 3.75% annually after July 1, 2016.

Pension Equalization Reserve (PER)

The PER is credited with Excess Earnings, if any, each calendar year. Excess Earnings are defined as the excess over 8.0% of the annual average of the time-weighted rates of return for the immediately preceding five calendar years. The amounts credited to the PER are either used to fund

Summary of Benefit Provisions (Continued)

percentage increases to pension amounts or one-time post retirement distribution benefits (13th checks).

On July 1 of each year, persons in receipt of a pension for at least 36 months receive a percentage increase based on the lesser of:

i. Phoenix area Consumer Price Index (CPI) and
ii. The amount the balance in the PER can fully fund

The increase, subject to the availability of funds in the PER, is payable beginning with the April 1 payment each year, retroactive to January 1 of the same year.

Also, after each plan year's return is known, all pensioners (excluding minors) as of the end of the plan year are eligible to receive a one-time post retirement distribution (13th check). The 13th check is a percentage of the pensioner's annual benefits based on the lesser of:

i. One half of the Phoenix Area Consumer Price Index (CPI) and
ii. The excess of the rate of return over the assumed interest rate

The percentage cannot be more than three percent, but must be at least one percent and is subject to the availability of funds in the PER. The 13th check is payable on December 1.

The PER is only applicable for Tiers 1 and 2.

Projected Percentage

Actuarially determined normal cost rate plus an amortization rate on the unfunded actuarial liability and a rate for administrative expenses, stated as a percentage of projected member compensation.

Member Contribution Rates

Tier 1:	5% of pay
Tier 2/Tier 3:	50% of the Projected Percentage not to exceed 11% of pay on or after January 1, 2016

City Contribution Rates

Total Projected Percentage less Member Contribution Rates for each Tier.

Summary of Census Data

	2020	2019	2018	2017	2016
Active Members					
Counts	8,027	7,941	7,977	8,030	7,783
Annual Compensation	$ 568,646,484	$ 562,988,925	$ 527,160,824	$ 521,709,266	$ 496,332,801
Average Annual Compensation	$ 70,842	$ 70,896	$ 66,085	$ 64,970	$ 63,771
Change in Average Annual Compensation	-0.1%	7.3%	1.7%	1.9%	-1.5%
Average Age	46.8	46.6	46.6	46.5	46.5
Average Service	12.1	12.2	12.4	12.3	12.2
Deferred Vested Members					
Counts	1,033	1,008	943	925	885
Annual Deferred Benefits	$ 14,115,513	$ 13,619,208	$ 12,167,691	$ 11,638,455	$ 11,080,138
Average Benefit	$ 13,665	$ 13,511	$ 12,903	$ 12,582	$ 12,520
Retired Members					
Counts	6,109	6,013	5,813	5,661	5,576
Annual Deferred Benefits	$ 214,952,799	$ 210,707,173	$ 202,550,837	$ 195,912,247	$ 191,137,835
Average Benefit	$ 35,186	$ 35,042	$ 34,844	$ 34,607	$ 34,279
Disability					
Counts	233	245	249	247	249
Annual Deferred Benefits	$ 3,830,503	$ 3,963,226	$ 4,069,714	$ 4,000,756	$ 3,895,823
Average Benefit	$ 16,440	$ 16,176	$ 16,344	$ 16,197	$ 15,646
Beneficiaries and QDROs					
Counts	1,160	1,110	1,076	1,072	1,060
Annual Benefits	$ 23,551,335	$ 22,007,859	$ 21,231,243	$ 20,639,481	$ 20,103,429
Average Benefit	$ 20,303	$ 19,827	$ 19,732	$ 19,253	$ 18,965
Total Members Included in Valuation	16,562	16,317	16,058	15,935	15,553

	2015	2014	2013	2012	2011
Active Members					
Counts	7,463	7,731	8,090	8,325	8,569
Annual Compensation	$ 484,853,108	$ 509,267,263	$ 508,031,593	$ 506,016,928	$ 513,312,633
Average Annual Compensation	$ 64,968	$ 65,874	$ 62,798	$ 60,783	$ 59,904
Change in Average Annual Compensation	-1.4%	4.9%	3.2%	1.5%	-3.2%
Average Age	46.7	46.8	46.6	46.5	46.1
Average Service	12.6	12.8	12.8	12.5	12.8
Deferred Vested Members					
Counts	901	816	788	697	680
Annual Deferred Benefits	$ 11,207,455	$ 9,956,781	$ 9,526,523	$ 8,158,009	$ 7,811,158
Average Benefit	$ 12,439	$ 12,202	$ 12,089	$ 11,704	$ 11,487
Retired Members					
Counts	5,419	5,080	4,653	4,455	4,197
Annual Deferred Benefits	$ 185,103,085	$ 168,443,463	$ 150,600,135	$ 142,722,085	$ 133,308,193
Average Benefit	$ 34,158	$ 33,158	$ 32,366	$ 32,036	$ 31,763
Disability					
Counts	251	249	246	248	247
Annual Deferred Benefits	$ 3,873,354	$ 3,639,564	$ 3,557,536	$ 3,570,997	$ 3,545,913
Average Benefit	$ 15,432	$ 14,617	$ 14,462	$ 14,399	$ 14,356
Beneficiaries and QDROs					
Counts	1,018	961	925	886	850
Annual Benefits	$ 18,896,049	$ 17,301,146	$ 16,199,651	$ 15,295,172	$ 14,301,838
Average Benefit	$ 18,562	$ 18,003	$ 17,513	$ 17,263	$ 16,826
Total Members Included in Valuation	15,052	14,837	14,702	14,611	14,543

Note: Schedule is intended to show last 10 years. Additional years will be displayed as they become available.

Summary of Actuarial Assumptions and Methods

The assumptions were adopted by the City of Phoenix Employees' Retirement System based on the most recent experience study covering the period of July 1, 2014 through June 30, 2019. New assumptions, including updated mortality and economic assumption, were adopted in July of 2020 and were used in the June 30, 2020 valuation.

I. Valuation Date

The valuation date is June 30th 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.

II. Actuarial Cost Method

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

1. 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 (7.00%). 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.

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

3. The normal cost and the allocation of benefit values between service rendered before and after the valuation date were determined using the individual entry age actuarial cost method having the following characteristics of (i) the annual normal costs for each active member, payable from the date of entry into the system to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement, and (ii) each annual normal cost is constant percentage of the member's year-by-year projected covered pay.

4. 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 over periods in accordance with the following amortization methods.

    a. The UAL as of June 30, 2013, developed prior to implementing the September 2013 assumption changes, is amortized over a closed 25-year period as a level percentage of payroll.

Summary of Actuarial Assumptions and Methods (Continued)

b. The impact of the September 2013 assumption changes on the UAL is amortized over a closed 25-year period as a level percentage of payroll with a four-year phase-in to the full amortization rate. The phase-in is calculated by multiplying the first year amortization payment by 25 percent. For the second year, the amortization schedule is recalculated reflecting the 25 percent payment in the first year and the remaining 24-year period and the calculated amortization payment is then multiplied by 50 percent. The process is repeated until the full amortization payment is made beginning in the fourth year of the 25-year period.

c. The impact of the August 2015 assumption changes on the UAL is amortized over a closed 20-year period as a level percentage of payroll with a four-year phase-in to the full amortization rate. The phase-in is calculated by multiplying the first year amortization payment by 25 percent. For the second year, the amortization schedule is recalculated reflecting the 25 percent payment in the first year and the remaining 19-year period and the calculated amortization payment is then multiplied by 50 percent. The process is repeated until the full amortization payment is made beginning in the fourth year of the 20-year period.

d. Future gains and losses are amortized over closed 20-year periods as a level percentage of payroll from the valuation date in which they are first recognized. However, gains will not be amortized over a shorter period than the remaining period on the amortization of the 2013 UAL.

III. <u>Actuarial Value of Assets</u>

The actuarial value of assets is determined by recognizing market value gains and losses over a four-year period. Gain and loss bases to be spread over the four-year period are determined by comparing expected returns based on the market value of assets and cash flows during the year to actual investment returns. The actuarial value of assets must be between 80 and 120% of market value.

IV. <u>Actuarial Assumptions</u>

A. <u>Economic Assumptions</u>

1. Investment return: 7.00% per annum, compounded annually. Inflation is assumed to be 2.30%.

2. Salary increase rate: Individual salary increases are composed of a price inflation component, a real wage growth component, and a merit or longevity component that varies by age. The table below combines the various components of salary increases for sample ages. Growth in the total payroll is assumed to be 2.50%.

Summary of Actuarial Assumptions and Methods (Continued)

Attained Years of Service	Percentage Increase in Salary: Price Inflation	Real Wage Growth	Merit or Longevity	Total
1-7	2.30%	0.50%	4.20%	7.00%
8-14	2.30%	0.50%	1.30%	4.10%
15+	2.30%	0.50%	0.00%	2.80%

3. COLA Due to Pension Equalization Reserve (PER): The PER only applies to Tier 1 and Tier 2 benefits. Future benefits payable through the PER are valued as an annual compound cost-of-living adjustment (COLA) equal to 0.50% through 2024, 1.00% from 2025-2029, and then 1.25% thereafter.

4. Administrative expenses are assumed to be equal to the prior year's amount, increased by 2.50%.

5. Tier 3 capped pay was assumed to be $134,904 at the valuation date.

B. <u>Demographic Assumptions</u>

1. Rates of Mortality for Healthy and Disabled Lives: Mortality rates are based on the sex-distinct employee and annuitant mortality tables described below, including adjustment factors applied to the published tables for each group. Half of active member deaths are assumed to be duty related. Future mortality improvements are reflected by applying the ultimate rates of the MP projection scales on a generational basis to the adjusted base tables from the base year shown below.

   (i) Non-Annuitant – Pub-2010, Amount-Weighted, General, Employee Mortality Table

Gender	Adjustment Factor	Base Year
Male	1.000	2010
Female	1.000	2010

   (ii) Healthy Annuitant - Pub-2010, Amount-Weighted, General, Health Retiree Mortality Table

Gender	Adjustment Factor	Base Year
Male	1.090	2010
Female	1.040	2010

Summary of Actuarial Assumptions and Methods (Continued)

(iii) Disabled Annuitant - Pub-2010, Amount-Weighted, General, Disabled Retiree Mortality Table

Gender	Adjustment Factor	Base Year
Male	1.000	2010
Female	1.000	2010

Sample Rates with Projections to 2020 (not including adjustment factors)

	Probability of Death Pre-Retirement		Probability of Death Post-Retirement		Probability of Death Post-Disability	
Age	Men	Women	Men	Women	Men	Women
20	0.033 %	0.012 %	0.036 %	0.012 %	0.373 %	0.211 %
25	0.025	0.008	0.028	0.008	0.251	0.148
30	0.033	0.014	0.035	0.014	0.320	0.232
35	0.043	0.021	0.046	0.022	0.414	0.363
40	0.060	0.033	0.065	0.034	0.583	0.569
45	0.089	0.051	0.108	0.061	0.911	0.891
50	0.135	0.075	0.294	0.209	1.452	1.341
55	0.198	0.111	0.425	0.269	1.912	1.575
60	0.288	0.168	0.606	0.361	2.264	1.769
65	0.423	0.268	0.900	0.577	2.753	2.040
70	0.636	0.442	1.504	1.000	3.528	2.588
75	0.991	0.731	2.633	1.771	4.696	3.620
80	1.565	1.203	4.706	3.160	6.645	5.433
85	6.532	4.823	8.469	5.836	9.781	8.439
90	13.363	10.462	14.566	10.881	14.803	12.446

2. Disability Rates. The disability incidence rates are 20% of the Arizona State Retirement System disability table. Half of disabilities are assumed to be duty-related. Sample disability rates of active members are provided in the table below. The rates apply to both male and female COPERS members.

Sample Attained Ages	Probability of Disablement
25	0.0100%
30	0.0121
35	0.0185
40	0.0294
45	0.0454
50	0.0677
55	0.0794
60	0.0863

Summary of Actuarial Assumptions and Methods (Continued)

3. Termination rates (for causes other than death, disability or retirement): Termination rates are based on age and service. Termination rates are not applied after a member becomes eligible for a retirement benefit. Rates at selected ages are shown.

Probability of Termination						
	Years of Service					
Age	0	1	2	3	4	5+
20	19.00 %	17.00 %	11.00 %	10.00 %	8.25 %	8.00 %
25	19.00	17.00	11.00	10.00	8.25	8.00
30	17.00	13.25	10.00	8.75	7.25	5.00
35	17.00	10.75	9.00	7.50	6.50	4.00
40	17.00	9.50	8.25	6.50	6.00	3.10
45	17.00	8.50	7.50	6.50	6.00	2.10
50	14.00	9.00	5.00	5.00	4.50	1.50
55	14.00	9.00	5.00	5.00	4.50	1.50
60	14.00	9.00	5.00	5.00	4.50	1.50

4. Retirement Rates

Probability of Retirement				
	Years of Service			
Age	< 15	15-24	25-31	≥ 32
50-51	0.00 %	0.00 %	40.00 %	42.50 %
52	0.00	0.00	40.00	35.00
53	0.00	0.00	40.00	27.50
54	0.00	0.00	30.00	27.50
55	0.00	0.00	30.00	27.50
56	0.00	37.50	25.00	27.50
57	0.00	37.50	22.50	22.50
58	0.00	22.50	22.50	22.50
59	0.00	22.50	20.00	22.50
60	10.00	22.50	20.00	22.50
61	10.00	20.00	20.00	22.50
62	13.00	20.00	25.00	32.50
63	13.00	20.00	25.00	37.50
64	10.00	17.50	15.00	25.00
65	20.00	27.50	25.00	35.00
66	25.00	32.50	40.00	37.50
67	25.00	35.00	40.00	37.50
68	25.00	35.00	40.00	37.50
69	25.00	35.00	40.00	47.50
70	100.00	100.00	100.00	100.00

Summary of Actuarial Assumptions and Methods (Continued)

C. Other Assumptions

1. Percent married: 90% of employees are assumed to be married.

2. Age difference: Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses.

3. Unused Vacation and Compensatory Time: For Tier 1 and Tier 2 members, compensatory service credits and lump sum payments for unused vacation and compensatory time are explicitly valued. An additional load of 1.5% is also included as margin for adverse deviation.

4. Member Contribution Crediting Rate: Member contributions are assumed to be credited with interest at 3.75% per annum.

Schedule of Retired Members Added to and Removed from Rolls

	Added to Rolls		Removed		Total			
Year Ended	Count	Annual Pensions*	Count	Annual Pensions*	Count	Annual Pensions*	Average Annual Pension	% Increase in Pensions
6/30/2011	444	$ 15,251	184	$ 3,574	5,191	$ 149,950	$ 28,887	8.4 %
6/30/2012	448	14,488	161	4,174	5,478	160,294	29,256	6.9
6/30/2013	426	12,574	201	3,996	5,703	168,843	29,606	5.4
6/30/2014	597	21,948	145	3,232	6,155	187,559	30,473	11.1
6/30/2015	578	22,483	192	4,225	6,541	205,816	31,466	9.7
6/30/2016	375	11,573	182	4,329	6,734	213,061	31,640	3.5
6/30/2017	321	9,317	233	4,395	6,822	218,364	32,009	2.5
6/30/2018	370	11,314	218	4,825	6,974	225,644	32,355	3.3
6/30/2019	417	13,109	196	4,398	7,195	234,341	32,570	3.9
6/30/2020	378	12,025	251	6,530	7,322	239,836	32,756	2.3

* Represents in thousands

Solvency Test (in thousands)

	Aggregated Accrued Liabilities for				Portion of Actuarial Liability Covered by Reported Assets		
Valuation Date	Active Member Contributions	Retirees and Beneficiaries and Vested Terminations	Members (Employer Financed Portion)	Actuarial Value Assets	(5)/(2)	[(5) - (2)]/(3)	[(5) - (2)] -(3)] /(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
6/30/2011	446,456	1,431,877	874,576	1,834,620	100.0%	96.9%	0.0%
6/30/2012	443,964	1,525,152	970,258	1,827,528	100.0%	90.7%	0.0%
6/30/2013	396,583	1,881,123	1,201,741	1,962,533	100.0%	83.2%	0.0%
6/30/2014	393,754	2,099,274	1,121,756	2,120,700	100.0%	82.3%	0.0%
6/30/2015	383,029	2,465,862	1,127,017	2,202,923	100.0%	73.8%	0.0%
6/30/2016	393,626	2,522,989	1,067,522	2,283,216	100.0%	74.9%	0.0%
6/30/2017	406,651	2,638,084	1,084,717	2,402,707	100.0%	75.7%	0.0%
6/30/2018	417,314	2,704,971	1,103,761	2,562,847	100.0%	79.3%	0.0%
6/30/2019	420,431	2,804,775	1,176,619	2,677,353	100.0%	80.5%	0.0%
6/30/2020	437,719	2,857,254	1,119,141	2,811,163	100.0%	83.1%	0.0%

Summary of Actuarial Assumptions and Methods (Continued)

Analysis of Financial Experience (in thousands)

	2020	2019	2018	2017	2016
(1) UAAL at Start of Year	1,724,473	1,663,199	1,726,745	1,700,921	1,772,985
(2) Normal Cost for Year*	83,628	74,048	73,449	73,256	80,757
(3) Expected Contributions	(213,142)	(198,860)	(187,324)	(183,023)	(178,288)
(4) Assumed Investment Income Accrual on (1), (2) and (3)	120,412	116,137	121,133	123,527	129,383
(5) Expected UAAL Before Changes	1,715,371	1,654,524	1,734,003	1,714,681	1,804,836
(6) Effect of Assumption/Method Changes	(62,386)	-	-	2,420	(69,420)
(7) Effect of Benefit Changes	-	-	-	-	(3,229)
(8) Expected UAAL After Changes	1,652,985	1,654,524	1,734,003	1,717,101	1,732,187
(9) Actual UAAL	1,602,951	1,724,473	1,663,199	1,726,745	1,700,921
(10) Gain/Loss [8. - 9.]	50,034	(69,949)	70,804	(9,644)	31,266
(11) As % of AAL at Start of Year	1.14%	-1.66%	1.71%	-0.24%	0.80%

	2015	2014	2013	2012	2011
(1) UAAL at Start of Year	1,494,084	1,516,915	1,111,845	918,289	829,195
(2) Normal Cost for Year	75,310	78,331	71,828	77,366	80,099
(3) Expected Contributions	(157,314)	(153,885)	(143,502)	(133,822)	(119,613)
(4) Assumed Investment Income Accrual on (1), (2) and (3)	109,037	110,987	86,136	71,248	64,652
(5) Expected UAAL Before Changes	1.521,117	1,552,347	1,126,307	933,081	854,333
(6) Effect of Assumption/Method Changes	254,870	-	423,247	-	-
(7) Effect of Benefit Changes	-	-	-	-	-
(8) Expected UAAL After Changes	1,775,987	1,552,347	1,549,554	933,081	854,333
(9) Actual UAAL	1,772,985	1,494,084	1,516,915	1,111,845	918,289
(10) Gain/Loss [8. - 9.]	3,002	58,263	32,639	(178,764)	(63,956)
(11) As % of AAL at Start of Year	0.10%	1.70%	1.10%	-6.50%	-2.40%

*Includes administrative expenses beginning in 2017

Statistical Section

The section provides financial and demographic data pertaining to COPERS.

Introduction

The purpose of the statistical section is to provide the reader with data which is considered to be pertinent to the financial and economic condition of the retirement plan. Each schedule is defined below with an explanation of the schedule and an identification of the source of the data.

Schedule of Changes in Fiduciary Net Position

This schedule provides the additions and deductions to the plan for the past ten years. The change in net position is provided to illustrate whether the plan's assets are growing or not. This schedule is developed using the Statement of Changes in Fiduciary Net Position for the past ten years.

Schedule of Benefit Expenses by Type

This schedule provides the benefit expenses of the plan by type for the last ten years. COPERS benefits include service retirement payments, disability benefits, death in service benefits, child benefits, payment to alternate payees and survivor benefits. This schedule is developed using reports from the pension administration system. The total expenses can be found in COPERS' Statement of Changes in Fiduciary Net Position for the past ten years.

Schedule of Refunds by Type

This schedule provides the annual amount of refunds issued to employees and beneficiaries upon separation from City employment. This schedule is compiled using information from the pension administration system and the payroll system.

Schedule of Retired Members by Type of Benefit

This schedule provides the number of retired members in each benefit category. COPERS plan benefits include payments for deferred benefits, normal retirement benefits, disability benefits, survivor benefits, death benefits and payments to alternate payees. The schedule is developed using the pension administration system.

Schedule of Average Benefit Payment Amounts

This schedule provides the average benefit payments per years of credited service. This information is provided to illustrate how benefit payments increase as the years of credited service increases. This schedule is developed using the pension administration system.

Schedule of Changes in Fiduciary Net Position (in thousands)
Last Ten Fiscal Years

	2020	2019	2018	2017	2016
ADDITIONS					
Employer Contributions	$ 175,947	$ 165,796	$ 229,006	$ 152,153	$ 119,844
Member Contributions	39,356	35,042	33,340	30,870	29,306
Inter-System Transfers	-	375	484	43	217
Retirement Office Administration	2,134	1,986	1,863	-	-
Net Investment Income (Loss)	50,389	142,964	166,514	243,210	9,171
Total Additions	267,826	346,163	431,207	426,276	158,538
DEDUCTIONS					
Benefit Payments	$ 239,407	$ 234,301	224,454	220,276	213,047
Refunds of Contributions	2,526	3,012	3,472	3,227	3,047
Inter-System Transfers (Note 11)	211	451	134	207	315
Retirement Office Administration	2,134	1,986	1,863	-	-
Administrative Expenses	2,509	793	377	380	234
Total Deductions	246,787	240,543	230,300	224,090	216,643
CHANGE IN NET POSITION RESTRICTED FOR PENSIONS	$ 21,039	$ 105,620	$ 200,907	$ 202,186	$ (58,105)

	2015	2014	2013	2012	2011
ADDITIONS					
Member Contributions	$ 117,092	$ 115,244	$ 27,738	$ 28,140	$ 28,648
Employer Contributions	27,861	28,815	110,094	105,682	90,965
Funds from Other Systems	199	160	105	4,030	4,999
Net Investment Income (Loss)	47,149	298,576	195,305	(5,664)	315,936
Total Additions	192,301	442,795	$ 333,242	$ 132,188	$ 440,548
DEDUCTIONS					
Benefit Payments	201,178	177,447	165,521	156,679	145,922
Refunds of Contributions	3,004	2,192	2,464	2,333	2,470
Funds to Other Systems	421	238	606	1,365	2,872
Administrative Expenses	414	628	389	328	251
Total Deductions	205,017	180,505	$ 168,980	$ 160,705	$ 151,515
CHANGE IN NET POSITION RESTRICTED FOR PENSIONS	$ (12,716)	$ 262,290	$ 164,262	$ (28,517)	$ 289,033

Schedule of Benefit Expenses by Type (in thousands)
Last Ten Fiscal Years

	Age & Service	Death & Disability Benefits (Retirees)							
Fiscal Year	Benefits (Retirees)	Death In Service	Duty	Non-Duty	Survivors	Deferred	Child	Alternate Payee	Total Benefits
2019-2020	$ 209,454	$ 3,341	$ 606	$ 3,278	$ 16,639	$ 3,675	$ 47	$ 2,367	$239,407
2018-2019	205,349	3,260	625	3,409	15,985	3,422	51	2,200	234,301
2017-2018	196,573	3,281	642	3,426	15,256	3,085	58	2,133	224,454
2016-2017	193,048	3,271	672	3,311	15,038	2,801	61	2,074	220,276
2015-2016	186,802	3,324	686	3,273	14,150	2,721	62	2,029	213,047
2014-2015	176,699	3,109	710	3,184	12,958	2,582	47	1,889	201,178
2013-2014	154,684	2,921	711	2,898	12,157	2,373	32	1,701	177,477
2012-2013	143,970	2,812	702	2,880	11,581	2,158	31	1,387	165,521
2011-2012	136,223	2,792	700	2,882	10,792	1,997	36	1,257	156,679
2010-2011	126,576	2,706	718	2,774	10,047	1,859	32	1,210	145,922

*Amounts shown are annualized amounts based on the June 30th payroll.

Schedule Refunds by Type (in thousands)
Last Ten Fiscal Years

Fiscal Year	Beneficiaries	Separation	Total Refunds
2019-2020	$ 481	$ 2,045	$ 2,526
2018-2019	496	2,516	3,012
2017-2018	332	3,140	3,472
2016-2017	518	2,709	3,227
2015-2016	589	2,413	3,002
2014-2015	725	2,279	3,004
2013-2014	515	1,677	2,192
2012-2013	821	1,643	2,464
2011-2012	437	1,896	2,333
2010-2011	677	1,793	2,470

Schedule of Retired Members by Type of Benefit
For the Fiscal Year ended June 30, 2020

			Type of Retirement					
Monthly Benefit	Number of Retirees	Deferred	Normal or Voluntary	Duty Disability	Non-Duty Disability	Survivor Payment	Death Benefit	Alternate Payee
Deferred	1,033	1,033	-	-	-	-	-	-
$1 - 300	93	-	46	1	-	15	19	12
301 – 400	129	-	85	4	1	25	3	11
401 – 500	141	-	92	6	1	31	1	10
501 – 600	146	-	99	4	6	26	3	8
601 – 700	159	-	82	3	7	49	5	13
701 – 800	181	-	104	1	11	41	8	16
801 – 900	187	-	110	5	21	34	8	9
901 – 1,000	188	-	106	1	12	49	5	15
1,001 – 1,100	210	-	123	4	10	49	10	14
1,101 – 1,200	207	-	138	1	13	36	5	14
1,201 – 1,300	169	-	122	1	14	22	3	7
1,301 – 1,400	182	-	119	-	16	31	8	8
1,401 – 1,500	179	-	131	3	5	28	9	3
1,501 – 2,000	859	-	666	14	35	93	32	19
2,001 – 2,500	907	-	774	1	12	98	13	9
2,501 – 3,000	823	-	734	-	10	60	13	6
3,001 – 4,000	1,251	-	1,159	-	8	69	13	2
4,001 – 5,000	737	-	702	-	2	25	6	2
5,001+	754	-	717	-	-	32	3	2
Totals	8,535	1,033	6,109	49	184	813	167	180

Schedule of Average Benefit Payment Amounts By Year of Retirement (Last Five Fiscal Years)

Retirement Effective Dates For Fiscal Years Ending June 30:	Years of Credited Service 5-9	10-14	15-19	20-24	25-29	30+
2020						
Average Monthly Benefit	$ 595.25	$1,292.48	$ 1,959.94	$2,726.63	$3,573.48	$4,472.53
Mean Monthly Final Average Compensation	4,524.39	5,386.73	5,734.01	6,178.95	6,618.61	6,940.39
Number of New Retirees	27	31	39	69	61	57
2019						
Average Monthly Benefit	$ 779.83	$1,412.91	$ 1,850.93	$2,783.23	$3,804.91	$4,162.13
Mean Monthly Final Average Compensation	6,036.56	5,746.03	5,460.68	6,178.63	6,967.71	6,453.55
Number of New Retirees	18	24	44	72	85	65
2018						
Average Monthly Benefit	$ 485.88	$1,247.90	$ 1,864.62	$2,831.05	$3,702.93	$4,536.18
Mean Monthly Final Average Compensation	3,717.43	5,233.92	5,715.12	6,283.43	6,669.52	6,924.99
Number of New Retirees	25	37	47	75	58	47
2017						
Average Monthly Benefit	$ 705.81	$ 973.60	$ 1,887.47	$2,534.96	$3,720.04	$3,945.87
Mean Monthly Final Average Compensation	4,447.09	4,259.10	5,826.38	5,694.16	6,652.33	6,235.95
Number of New Retirees	17	37	32	48	67	53
2016						
Average Monthly Benefit	$ 736.45	$1,275.96	$ 1,669.03	$2,597.60	$3,613.86	$4,779.84
Mean Monthly Final Average Compensation	4,573.73	5,203.89	5,076.77	5,891.97	6,582.60	7,289.30
Number of New Retirees	25	42	44	50	88	43
From July 1, 2016 to June 30, 2020						
Average Monthly Benefit	$ 660.64	$1,240.57	$ 1,846.40	$2,694.69	$3,683.04	$4,379.31
Mean Monthly Final Average Compensation	4,659.84	5,165.93	5,562.59	6,045.43	6,698.15	6,768.84
Average Number of New Retirees	22.40	34.20	41.20	62.80	71.80	53.00

City of Phoenix
Employees' Retirement System
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