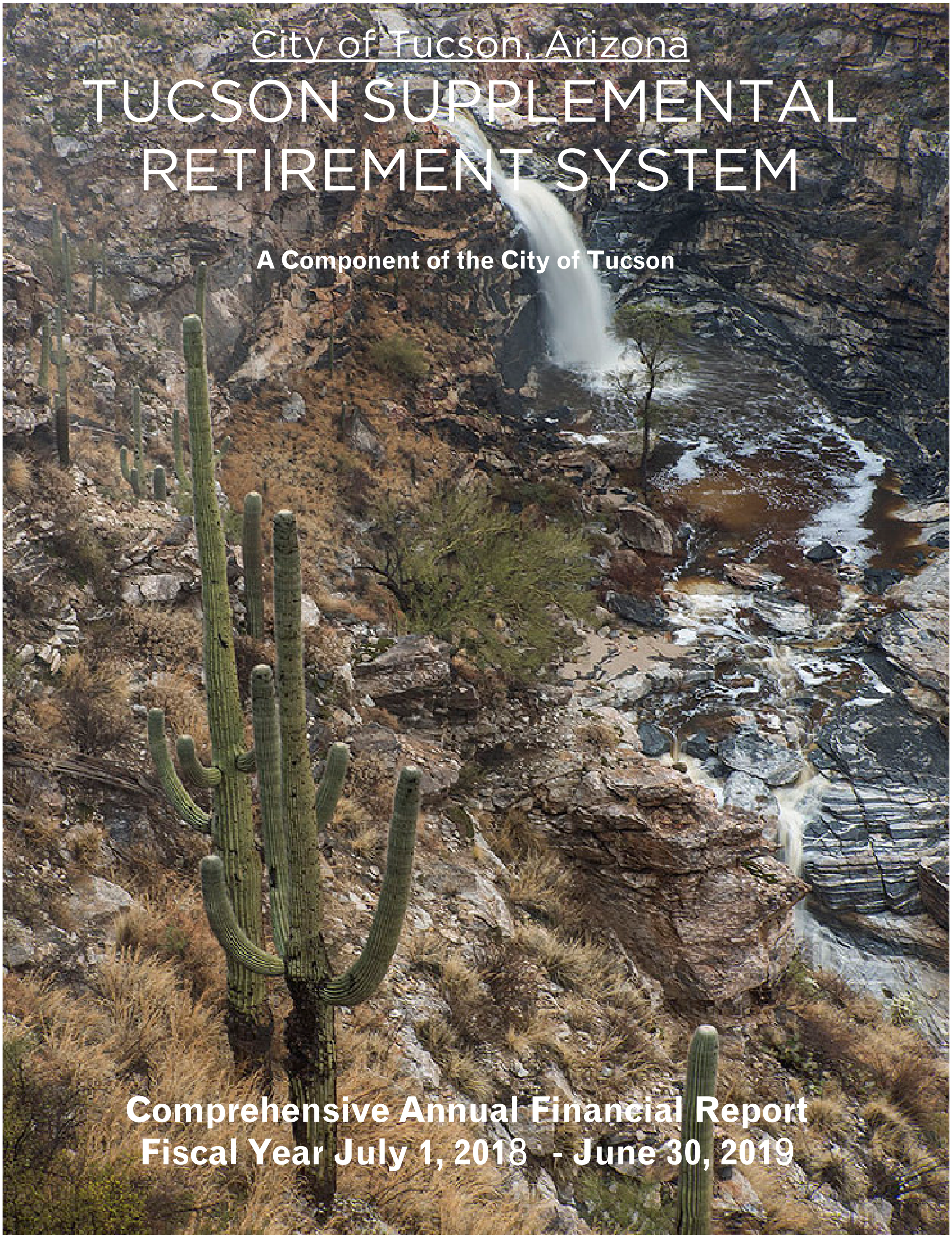
City of Tucson, Arizona

TUCSON SUPPLEMENTAL RETIREMENT SYSTEM

A Component of the City of Tucson



Comprehensive Annual Financial Report
Fiscal Year July 1, 2018 - June 30, 2019

TUCSON SUPPLEMENTAL RETIREMENT SYSTEM
(A Component Unit of the City of Tucson, Arizona)

Comprehensive Annual Financial Report
For Fiscal Year Ended
JUNE 30, 2019

Issued by the City of Tucson, Retirement Division

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Introductory

Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Tucson Supplemental Retirement System

Arizona

For its Comprehensive Annual Financial Report for the Fiscal Year Ended

June 30, 2018

Christopher P. Morrill

Executive Director/CEO

December 23, 2019

To the Chairman and Members of the Retirement Board,

Tucson Supplemental Retirement System

The Comprehensive Annual Financial Report (CAFR) of the Tucson Supplemental Retirement System ("TSRS" or the "System") for the year ended June 30, 2019, is herewith submitted. Responsibility for both the accuracy of the data and the completeness and fairness of the presentation rests with the management of TSRS. A narrative introduction to financial statement highlights, overview and analysis for fiscal year 2019 can be found in the Management's Discussion and Analysis beginning on page 3 of the Financial Section.

The Tucson Supplemental Retirement System was established in 1953 to provide a monthly retirement supplement to social security benefits and to the personal retirement savings of its members. The benefits provided to members are supported by payroll contributions made by active members, City contributions and investment returns from the retirement system asset portfolio.

After five consecutive years of improvement, as of June 30, 2019, the System's funded status decreased from 76.2% to 72.8%. The decrease is primarily due to assumption changes, including a reduction in assumed investment returns, and an increase in life expectancy.

The TSRS Board of Trustees (the "Board") has recommended changes during the past several years specifically aimed at improving the financial sustainability of the System. In 2006, the Board initiated variable contribution rates for employees hired after June 30, 2006. In 2011, the Board implemented a reduced cost Tier II plan design for all new employees hired after June 30, 2011. In 2013, the Board adopted a funding policy that changed the amortization period from 15 to 20 years. In 2014, the Board added a rounding policy designed to pay-off the unfunded liability sooner, and this year, the Board reduced the assumed investment rate of return from 7.25% to 7.00%.

Record keeping is the responsibility of the Human Resource Department, Employee Benefits and Retirement Section. Preparation of financial statements and control over investment responsibilities for TSRS are performed by Retirement staff in conjunction with the City's Financial Operations. TSRS uses the accrual basis of accounting. This CAFR was prepared in conformance with principles of governmental accounting and reporting set forth by the Governmental Accounting Standards Board (GASB). Internal control is the responsibility of management, with an objective that they are responsible for an accounting of their stewardship of the resources entrusted to their care. Internal accounting controls provide reasonable, but not absolute, assurance that the financial statements are free of any material misstatements because the cost of a control should not exceed the benefits to be derived, the objective is to provide reasonable, rather than absolute assurance the financial statements are free of any material misstatement.

Annually, the budget for the System must be approved by the Board. The budget is also included in the City of Tucson annual budget which is recommended by the City Manager for adoption by the Mayor and Council.

Provisions of the Tucson City Code require unanimous approval of all System expenses by the Board. The Board reviews the TSRS expenses and ratifies all retirements at their monthly meetings.

Contributions to the System are based on principles of level-cost financing with current service financed as a level percent of payroll on a current basis and prior service amortized as a level percent of payroll over a fixed period of twenty years beginning July 1, 2014.

Funding Status

Analysis of the funding progress for TSRS measures the net assets available for benefits against the actuarial accrued liability, in order to arrive at the System's percent funded ratio. As of June 30, 2019, the System's funded ratio decreased from 76.2% to a 72.8% funded level on an actuarial basis. On a market basis, the System's funded ratio decreased from 78.08% to 74.07%. The actuarial accrued liability increased from $1,054.0M to $1,129.5M an increase of 6.68%. The actuarial value of assets allocated to funding and available for benefits increased by 2.41%, from $803,439,269 to $822,834,629. The unfunded actuarial accrued liability increased by $75,504,873 or 7.16% in the current year. The System experienced an asset gain of $19.4 million during fiscal year 2019. The total investment of the fund returned 6.21% (net of fees) during the year; somewhat less than the assumed rate of return.

Investment Activities

Net investment income amounted to $49,773,045. The net investment income or loss is comprised of bond interest, dividend income, real estate income, security lending income, investment expenses and realized and unrealized gains and losses on securities. The rate of return, on a money-weighted basis, for the total fund for the year was 6.21% (gross of fees). For the last three and five years, the System had annualized returns of 9.70% and 6.98%, respectively.

TSRS asset allocation targets are 34% U.S. equities, 25% foreign equities, 9% real estate, 27% fixed income and 5% infrastructure. These percentages reflect the current diversification posture as of June 30, 2019 and represent the Board's prudent judgment in the pursuit of maximum returns at acceptable levels of risk.

In accordance with current investment policy, the System's asset classes were rebalanced throughout the fiscal year. Due to ongoing liquidity requirements needed to pay retiree pensions, $36.9 million was moved out of various asset classes, in monthly increments, to the City's investment pool account. This amount was utilized throughout the fiscal year to make up the shortfall between pension contributions and distributions. This movement of funds had a "self-balancing" effect between equities, fixed income, real estate and infrastructure which helped to keep those asset classes within their current target allocation percentage ranges.

Professional Services

The Retirement Board retains money managers and other professionals to prudently discharge its fiduciary responsibility for the proper administration of the System. Opinions of the independent auditors and the actuary are included in this report. The professionals retained by the Board are listed on page vi of this report.

Acknowledgments

This report is intended to provide information as a means for making management decisions, complying with statutory provisions, and demonstrating responsible stewardship for assets of the System. The preparation of this report reflects the combined efforts of TSRS staff, the City of Tucson Business Services Department, and others that have worked diligently to assure the successful operation of TSRS. The effort and commitment of the Board of Trustees who volunteer their time and expertise is greatly appreciated. In addition, the ongoing support of the Mayor and Council to support TSRS and specifically to provide financial support to the Board's funding plan is highly valued and a tangible support to the membership.

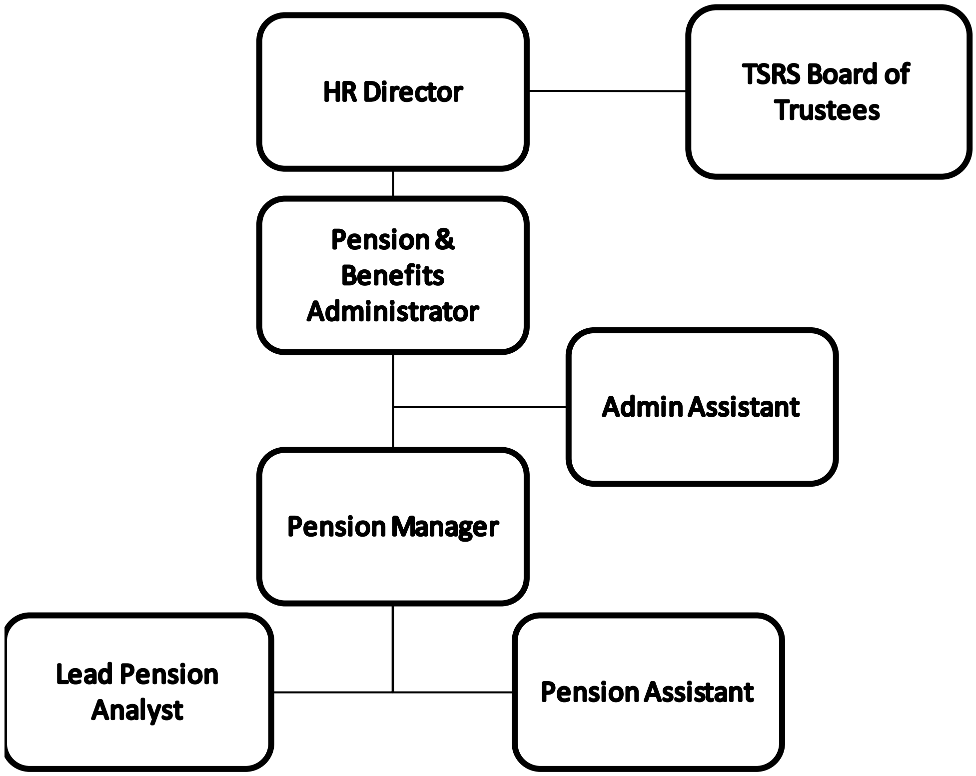
The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Tucson Supplemental Retirement System for its comprehensive annual financial report for the fiscal year ended June 30, 2018. This was the 23rd consecutive year that the Tucson Supplemental Retirement System has achieved this prestigious award. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report. This report must satisfy both generally accepted accounting principles and applicable legal requirements.

A Certificate of Achievement is valid for a period of one year only. We believe that our current comprehensive annual financial report continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

Respectfully submitted,

Art Cuaron, MBA
Pension & Benefits Administrator
Tucson Supplemental Retirement System

Organization Chart



Administrative Organization

RETIREMENT STAFF
Art Cuaron, MBA
Pension & Benefits Administrator

Pete Saxton
Pension Manager

Dawn Davis
Lead Pension Analyst

vacant
Pension Assistant

Ernestina Gamez
Administrative Assistant

Administrative Organization

TREASURY DIVISION STAFF
Silvia Navarro
Treasury Administrator

Lisa Lopez
Finance Manager

ACCOUNTING
David Roels
Sr. Financial Accountant

LEGAL
David Deibel
Principal Assistant City Attorney

EXTERNAL COUNSEL
Yoder & Langford, P.C.
Phoenix, AZ

ACTUARY
Gabriel, Roeder, Smith & Company
Denver, CO

AUDITOR
Heinfeld & Meech
Tucson, AZ

INVESTMENT CONSULTANT
Callan Associates, Inc.
San Francisco, CA

CUSTODIAN BANK
BNY Mellon – New York, NY

INVESTMENT MANAGERS*
Aberdeen Asset Management
Philadelphia, PA

Alliance Capital Management Corporation
New York, NY

American Century Investments
Kansas City, MO

BlackRock Institutional Trust Company, N.A.
San Francisco, CA

Causeway Capital Management
Los Angeles, CA

Fidelity Investments
Smithfield, RI

JP Morgan Asset Management
San Francisco, CA

Pacific Investment Management Company
Newport Beach, CA

Champlain Investment Partners
Burlington, VT

Macquarie Capital (USA), Inc.
New York, NY

SteelRiver Infrastructure
New York, NY

T. Rowe Price Associates
Baltimore, MD

*Schedule of Fees see page 42,
Schedule of Commissions see page 43.

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Financial Section

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INDEPENDENT AUDITOR'S REPORT

Board of Trustees
Tucson Supplemental Retirement System

Report on the Financial Statements

We have audited the financial statements of the Tucson Supplemental Retirement System (System), a pension trust fund of the City of Tucson, Arizona, which comprise the Statement of Fiduciary Net Position as of June 30, 2019, and the related Statement of Changes in Fiduciary Net Position for the year then ended, and the related notes to the financial statements.

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

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the 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.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the net position of the Tucson Supplemental Retirement System, a pension trust of the City of Tucson, Arizona, as of June 30, 2019, and the respective changes in net position, for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

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

Other Information

Our audit was conducted for the purpose of forming an opinion on the System's financial statements. The Introductory Section, Other Supplemental 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 financial statements.

The Other Supplemental Information, as listed in the table of contents under the Financial Section, is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. Such information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or to the financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the Other Supplemental Information is fairly stated, in all material respects, in relation to the 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 audit of the financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated December 23, 2019, on our consideration of the Tucson Supplemental Retirement System's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to solely describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Tucson Supplemental Retirement System's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Tucson Supplemental Retirement System's internal control over financial reporting and compliance.

Heinfeld Meech & Co. PC

Heinfeld, Meech & Co., P.C.
Tucson, Arizona

MANAGEMENT'S DISCUSSION AND ANALYSIS

We are pleased to provide this overview and analysis of the financial activities of the Tucson Supplemental Retirement System (TSRS) for the plan year ended June 30, 2019. We encourage readers to consider the information presented here in conjunction with additional information that we have furnished in our Letter of Transmittal, which begins on page ii of this report.

Financial Highlights

- The net position of TSRS as of the close of the plan year ended June 30, 2019 was $836,583,028 (net position restricted for pensions). The net position is available to meet TSRS's ongoing obligations to plan participants and their beneficiaries.

- TSRS's increase in total net position restricted for pension benefits was $12,949,510. The increase of 1.6% over the prior year was primarily a result of investment income.

- TSRS's funding objective is to establish and receive contributions, which will remain approximately level from year to year and thereby minimize inter-generational cost transfers. As of June 30, 2019, the date of our last actuarial valuation, the funded ratio for TSRS was 72.8% on an actuarial basis, 74.1% using the market value basis.

- Revenues (Additions to Plan Net Position) for the year were $90,187,191, which includes member and employer contributions plus transfers from other systems and contributions from other sources totaling $40,414,746, investment earnings income and securities lending income and expense of $14,594,202 and a net gain in fair value of investments of $40,058,019 reduced by investment expenses of $4,879,176.

- Expenses (Deductions from Plan Net Position) increased from $76,363,951 in the prior year to $77,238,281 or approximately 1.1%. The net increase in deductions is primarily the result of an increase in pension benefits paid, partially offset by a reduction in the refunds paid. The increase in benefits is a result of having more retirees; there were 3,031 at June 30, 2018 and 3,101 at June 30, 2019. The decrease in refunds issued is a result of fewer individuals refunding their accounts upon separation.

Overview of the Financial Statements

The following discussion and analysis is intended to serve as an introduction to TSRS's financial statements, which are comprised of these components:

1. Statement of Fiduciary Net Position
2. Statement of Changes in Fiduciary Net Position
3. Notes to the Financial Statements

Please note that this report also contains other supplementary information in addition to the basic financial statements themselves, including details of the system's investments, actuarial analysis, and various statistical information found in sections under those names.

The Statement of Fiduciary Net Position is a snapshot of account balances at year-end. It indicates the assets available for future payments to retirees and any current liabilities that are owed at this time.

The Statement of Changes in Fiduciary Net Position, on the other hand, provides a view of current year additions to and deductions from the plan.

Both statements comply with applicable Governmental Accounting Standards Board (GASB) Statements. These pronouncements require certain disclosures and require state and local governments to report using the full accrual method of accounting. TSRS complies with all material requirements of these pronouncements.

The Statement of Fiduciary Net Position and the Statement of Changes in Fiduciary Net Position report information about TSRS's activities. These statements include all assets, deferred outflows, liabilities and deferred inflows, using the full accrual basis of accounting, which is similar to the accounting used by most private-sector companies. All of the current year's revenues and expenses were taken into account regardless of when cash is received or paid. All investment gains and losses are shown at trade date, not settlement date. In addition, both realized and unrealized gains and losses are shown on investments, and all capital assets (fixed assets) are depreciated over their useful lives.

TSRS's net position restricted for pensions is displayed on the Statement of Fiduciary Net Position as the difference between assets and liabilities. Over time, increases and decreases in TSRS's net position is one indicator of whether its financial condition is improving or deteriorating. (See TSRS's financial statements on pages 8 and 9 of this report).

Notes to the Financial Statements provide additional information that is essential to a full understanding of the data provided in the financial statements. (See Notes to Financial Statements on pages 10-25 of this report).

The Required Supplementary Information that follows immediately after the notes to financial statements provides new information and schedules due to the GASB 67 implementation in fiscal year 2014. These schedules started with one year as of June 30, 2014, but eventually will build up to ten years of information.

Financial Analysis

As previously noted, net position may serve over time as a useful indication of TSRS's financial position (see table on page 5). The total assets of TSRS exceeded its liabilities at the close of the plan year ended June 30, 2019 with $836,583,028 in net position held in trust for payment of ongoing obligations to plan participants and their beneficiaries.

Net Position of the Plan

Assets	June 30, 2018	June 30, 2019	Change
Cash, cash equivalents, and receivables	$ 3,352,975	$ 12,393,560	269.6%
Investments	821,882,684	840,603,564	2.3%
Securities lending cash collateral	35,243,677	2,614,584	-92.6%
Total assets	860,479,336	855,611,708	-0.6%
Liabilities			
Accounts payable and other payables	454,720	5,712,680	1,156.3%
Due to securities lending borrowers	35,243,677	2,614,584	-92.6%
Due to brokers	1,147,421	10,701,416	832.7%
Total liabilities	36,845,818	19,028,680	-48.4%
Total net position	$ 823,633,518	$ 836,583,028	1.6%

At June 30, 2019, cash, cash equivalents and receivables was higher than the prior year by $9,040,585 (269.6%) due primarily to wire disbursement that was delayed by the bank system on June 30, 2019. This delayed resulted in a $5,480,741 receivable being recorded, in addition to this there was a normal variation within the amounts due from brokers for investments. Securities lending cash collateral and the due to securities lending borrowers was reduced by 92.6% compared to the prior year as the City held securities as pledged collateral and the securities are not reported on the financial statements. In addition, the accounts payable and other payables were higher primarily due to the cash which was not received from the investment account and was instead borrowed from the General Fund of the City. The amount due to brokers was significantly higher than last year as the transactions of the investment managers resulted in an increase to the number of transactions that were not yet complete and had to be recorded as payable. Finally, the total net position restricted for pension of $836,583,028 was available for payment of pension benefits, as shown in the Statement of Plan Position on page 8. This amount represents an increase of 1.6% from June 30, 2018.

Additions to Plan Net Position

	June 30, 2018	June 30, 2019	Change
Employer contributions	$ 31,795,197	$ 32,589,204	2.5%
Employee contributions	8,561,747	7,779,477	-9.1%
Net gain (loss) in fair value of investments	56,654,404	40,058,019	-29.3%
Investments and securities lending income (net)	13,043,184	9,761,091	-23.1%
Total additions	$ 110,054,532	$ 90,187,791	-17.8%

Employer contributions increased by $794,007; or 2.5%, and employee contributions decreased by $782,270, or 9.1% due to changes in the salary of individual employees and the contribution rates applicable to the three different tiers of employee members. Net gain in Fair Value of Investments decreased by $16,596,385, or 29.3% compared to the prior year. This is due to market variability and poor investment returns for the period October 1, 2018 through December 31, 2018. It is important to note the return will be variable, and the investment strategy should be evaluated over multiple years (as seen on page 26). Finally, income from investment and securities lending decreased for the current year by $3,282,093 or 25.2%. This change is due to normal variability in income from investments.

Deductions from Plan Net Position

The principal purpose for which the System was created was to provide supplemental retirement annuities, survivor benefits, and total and permanent disability benefits to qualified members and their beneficiaries. The costs of such programs include recurring benefit payments as required by the plan design, refunds of contributions to terminated employees, the cost of administering the System and expenses incurred in the investment of the Systems assets.

	June 30, 2018	June 30, 2019	Change
Payments to participants	$ 72,445,792	$ 74,928,771	3.43%
Refunds and transfers to other plans	3,172,406	1,657,445	-47.8%
Administrative expense	745,753	652,065	23.5%
Total deductions	$ 76,363,951	$ 77,238,281	1.5%

Total deductions for fiscal year 2019 were $77,238,281 representing an increase of 1.5% from fiscal year 2018 deductions. An increase in the payment of retirement benefits of 3.4%, or $2,482,979, was the largest factor contributing to the increase in deductions. This was offset by a decrease in the payment of refunds and transfers to other plans of $1,514,961.

Reserves

Within net position, the System internally places an amount into a separate reserve for employee contributions for all amounts contributed by members. Deductions are made from this account when the member retires, transfers balances to other retirement systems, or when a member terminates employment and requests a refund. As of the plan year ended June 30, 2019, the balance in this reserve account decreased by $2,775,603 to $135,645,102.

Upon retirement, the system places an amount in reserves for retirement benefits equivalent to the present value of the actuarial benefit selected by the member. When the present value is determined, amounts are added to this reserve from amounts in the reserve for employee contributions and from the unreserved net position balance to fully fund the expected liability. As a result of the change in market value of the system assets, the reserve increased for the plan year ended June 30, 2019 by $57,455,209 to $774,206,327.

The impact of gains or losses recognized during the plan year ended June 30, 2019 affects the amount remaining in the unreserved net position. Employer funding is added to the unreserved net position. At retirement, amounts needed to fully fund retirement benefits are transferred from the unreserved net position to the reserves for retirement benefits. As a result of the change in market values of the system's assets and the recognition of the liabilities for the new actuarial assumptions, the unreserved net position decreased by $41,730,096 to a negative ending balance of $73,268,401.

TSRS's Fiduciary Responsibilities

TSRS's Board of Trustees and management staff are fiduciaries of the pension trust fund. Under the City of Tucson Code the assets can only be used for the benefit of plan participants and their beneficiaries.

Requests for Information

This financial report is designed to provide the Retirement Board of Trustees, our membership, taxpayers, investment managers and other interested parties with a general overview of TSRS's finances and to account for the money it receives. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to:

Tucson Supplemental Retirement System
Attention: TSRS Pension Administrator
City Hall, 3rd floor
255 West Alameda Street
Tucson, Arizona 85701
(520) 791-4598

Tucson Supplemental Retirement System
Statement of Fiduciary Net Position
June 30, 2019

Assets:	
Interest & Dividends Receivable	$ 2,007,094
Due from Brokers	10,386,466
Short Term Investments	26,032,930
Securities Lending Cash Collateral	2,614,584
U.S. Treasuries, Agencies & Other Governmental Bonds	113,295,403
Bonds and Preferred Stock	54,216,957
U.S. Equities	275,104,868
International Bonds & Other Fixed Income Instruments	46,749,395
International Equity & Commingled Equity Funds	208,519,269
Real Estate & Commingled Real Estate Funds	77,625,268
Infrastructure Investment Funds	39,059,474
Total Assets:	855,611,708
Liabilities:	
Accounts Payable	188,083
Accrued Payroll Liabilities	8,529
Due to Other Funds	5,516,068
Due to Securities Borrowers	2,614,584
Due to Brokers	10,701,416
Total Liabilities:	19,028,680
Net Position:	
Restricted for Pensions	$ 836,583,028

See accompanying notes to financial statements

Tucson Supplemental Retirement System
Statement of Changes in Fiduciary Net Position
Year Ended June 30, 2019

Additions:	
Employer Contributions	$ 32,589,204
Employee Contributions	7,779,477
Net Increase (Decrease) in Fair Value of Investments	40,058,019
Interest, Dividends and Other Income	14,516,767
Securities Lending Income	129,014
Less: Investment Activity Expense	(4,879,176)
Less: Securities Lending Expense	(51,579)
Miscellaneous Additions	46,065
Total additions:	$ 90,187,791
Deductions:	
Payments to Participants	74,928,771
Refunds and Transfers to Other Plans	1,657,445
Administrative Expense	652,065
Total deductions:	77,238,281
Changes in net position:	12,949,510
Net position, beginning of year	823,633,518
Net position, end of year	$ 836,583,028

See accompanying notes to financial statements

Tucson Supplemental Retirement System
Notes to Financial Statements
Year Ended June 30, 2019

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND DISCUSSION OF PLAN NET POSITION

A. Reporting Entity – The Tucson Supplemental Retirement System (the System) is a single-employer defined benefit plan established by the City and administered by a seven-member Board of Trustees. Although the system is a separate legal entity, its sole purpose is to provide services exclusively for the benefit of the City; therefore, it is included as a blended component unit of the City, identified as the Pension Trust Fund in the City's Comprehensive Annual Financial Report.

B. Basis of Accounting - The System's financial statements are prepared using the accrual basis of accounting and economic resources measurement focus. Employee and employer contributions are recognized when due, pursuant to formal commitments. Benefits and refunds are recognized when due and payable in accordance with the plan provisions.

C. Investments - Investments are reported at fair value. Securities traded on a national or international exchange are valued at the last reported sales price at current exchange rates. The fair value of real estate investments is based on independent appraisals. Investments that do not have an established market are reported at estimated fair value, which is determined by the System custodian in consultation with the System's investment managers.

The cost of common stock sold is determined on the average cost method. Realized and unrealized gains or losses are reflected in revenues.

D. Cash and Cash Equivalents – Amounts reported as cash and cash equivalents represent the System's proportionate share of the City's Investment Pool Account.

E. Deposits - In accordance with the City Charter and state statutes, the System is authorized to deposit money in certificates of deposit and interest-bearing accounts provided that deposits in excess of the insured amount are collateralized. State statutes require collateral pledged for deposits to be held in the System's name by a bank other than the pledging bank or by the pledging bank's trust department.

F. Capital Assets – Capital assets of the System currently include moveable equipment items and the capitalized cost of pension administration software, stated at historical cost net of accumulated depreciation. The straight-line method of depreciation for capitalized equipment and software is used over an estimated useful life of 6 years. The capitalization threshold is $5,000. The capital assets were fully depreciated as of June 30, 2019.

G. Administrative Costs - All costs of administering the plan are financed by the employer and member contributions made, based upon recommended contribution rates in effect for the year, applied on active member covered payroll.

H. Net Pension Liability – The components of the net pension liability as of June 30, 2019 are as follows:

Total Pension Liability	$	1,129,491,900
Plan's Fiduciary Net Position		836,583,028
Net Pension Liability		292,908,872
Plan Fiduciary Net Position as a Percentage of Total Pension Liability		74.07%
Covered Employee Payroll	$	123,822,602
Net Pension Liability as a Percentage of Covered Employee Payroll		236.55%

I. Tax Status of the Plan – The System applied for an IRS determination letter in January 2015, and received a favorable determination (qualified status) from the IRS on January 11, 2017.

2. DESCRIPTION OF THE PLAN

A. *Authorization, Purpose, and Administration of the System* - The Tucson Supplemental Retirement System (the "System" or "TSRS") is a single-employer defined benefit plan for City of Tucson, Arizona ("City") employees. It was established in the City Charter to provide its members with a supplement to the retirement and disability benefits of the social security system. The System is governed by a seven member Board of Trustees: a chairman who is appointed by the Mayor and Council, the City's directors of human resources and of finance, two members elected by the membership of the System, a retired member elected by the System's retirees, and one member appointed by the City Manager. Benefit provisions and changes in benefits or funding are recommended by the Board of Trustees and must be approved by Mayor and Council.

B. *Plan Membership* - The System covers substantially all City of Tucson, Arizona, employees, except for appointed officials and staff who may elect not to join, commissioned police and fire personnel, and elected officials, who are covered under other plans. Employees participate in the System immediately upon beginning employment with the City. Employee membership data as of June 30, 2019 is as follows:

Membership – number of:	
Retirees and Beneficiaries	3,101
Inactive, Non-retired Members (151 non vested)	479
Active plan participants	2,508
Total Membership	6,088

C. *Plan Benefits*

1. *Retirement Benefits*:

Tier I benefit plan: Any employee hired prior to July 1, 2011, who has attained the earlier of age 62, or a combination of the employee's age and years of creditable service equaling the sum of 80, is entitled to receive monthly retirement benefits calculated at 2.25% of average final monthly compensation multiplied by the number of years of creditable service. Employees hired after July 1, 2009 receive the same benefit, but are required to have a minimum of five years accrued service. Average final monthly compensation is defined as the highest compensation of 36 consecutive months during the 120 months immediately preceding retirement. Accrued unused sick leave and vacation leave at the final salary is included in the member's service period and is substituted for an equal number of hours at the beginning of the 36 month period for determining the average final salary calculation.

Tier II benefit plan: Any employee hired after June 30, 2011, who has attained the minimum retirement age of age 60, and who also has a combination of employee age and years of service equaling the sum of 85, is entitled to receive monthly retirement benefits calculated at 2.00% of average final monthly compensation multiplied by the number of years of creditable service. Average final monthly compensation is defined as the highest compensation of 60 consecutive months during the 120 months immediately preceding retirement. Accrued unused sick leave and vacation leave at the final salary is not included for member service credits or as a substitution for an equal number of hours at the beginning of the 60 month period final average salary calculation.

An employee who retires after attaining age 55 with 20 or more years of creditable service under Tier I; or after attaining age 60 with 20 or more years of credited service under Tier II, is entitled to early retirement benefits reduced to the actuarial equivalent of the amount to which the employee would have been entitled upon attaining normal retirement.

An employee is always fully vested in his/her individual contributions. Upon termination of employment for reasons other than retirement, employees having five or more years of creditable service (terminated vested participants) may leave their contributions in the System as a deferred retirement, and begin drawing a retirement allowance when they reach either their normal or early retirement eligibility date.

2. *Disability Benefits* - Employees with ten or more years of accrued service, who are not yet eligible to retire and who have a total and permanent disability may apply for disability retirement.

3. *Death Benefits* - The beneficiary of an employee who pre-selected a retirement option and died while eligible to retire, shall receive a benefit based upon the selected option if the member has made such an election by June 30, 2009.

   The spousal beneficiary of an employee who died while eligible to receive benefits but who had not pre-selected a benefit option by June 30, 2009, may choose to receive a benefit equal to a 100% joint and survivor annuity based on the member's years of credited service and average final monthly compensation at the time of the member's death, or may elect to receive a lump sum payment of twice the members account balance plus interest, measured on the date of death.

The named beneficiary of an employee who is other than the spouse of the employee who died while eligible to receive benefits but who had not pre-selected a benefit option by June 30, 2009, may choose to receive a benefit equal to a 15 year term certain benefit to the named beneficiary, or the beneficiary may elect to receive a lump sum payment of twice the members account balance plus interest, measured on the date of death.

Multiple designated beneficiaries of an employee who died while eligible to receive benefits but who had not pre-selected a benefit option by June 30, 2009, receive a lump sum payment of twice the member's account balance plus interest, measured on the date of death.

The beneficiary of an employee who was not eligible for any retirement benefits, but had more than five years of creditable service, may receive a lump sum payment of twice the member account balance plus interest, measured on the date of death.

3. CONTRIBUTIONS AND RESERVES

A. Funding Requirements

1. *Employee Contributions* - Employee contributions are fixed for all employees hired prior to June 30, 2006. The rate is fixed at 5% of active member covered payroll. Employees hired after June 30, 2006 are contributing at a variable rate based on the normal cost of retirement as determined annually by the system Actuary. All member contributions are made by payroll deductions applied to regular pay, based on the appropriate contribution rates established by the system Actuary, applied as a percent of payroll. There are no long-term contracts for employee contributions to the plan, and all contributions are made on a bi-weekly basis.

2. *Employer Contributions* – Employer contributions are based on the annual required contribution rate determined by the Actuary, and are equal to the difference between the recommended total contribution rate and the employee rates, based on a level percentage of payroll method. The contribution rate is determined by the actuary at a level necessary to finance employee participation in the System and to fund the costs of administering the System. The annual rate determined by the Actuary is recommended to the Board of Trustees and considered for approval and adoption by Mayor and Council. There are no long-term contracts for employer contributions to the plan, and all contributions are made on a bi-weekly basis.

Effective July 1, 2013, the City adopted a funding policy to enhance the funded status of the retirement system. The policy is applied to both the employee rates and the employer rates. For employees subject to variable contribution rates (those employees hired after June 30, 2006); the policy requires a contribution rate that is equal to a range of between 50% and 100% of the normal cost of the members' benefit Tier, and this cost will be rounded up to the nearest 0.25%. For the employer, the policy sets a minimum contribution rate of 27.50%.

Tier	Actuarially Determined/ Minimum Rate	Additional Round-Up	Total Employee Rate	Actuarially Recommended Employer Rate	Total Employer Rate
Tier 1 (prior to June 30, 2006)	5.00%	N/A	5.00%	23.59%	27.50%
Tier 1 Variable (between June 30, 2006 and July 1, 2011)	6.50%	0.25%	6.75%	22.09%	27.50%
Tier 2 (hired after July 1, 2011)	4.85%	0.25%	5.25%	23.74%	27.50%

B. Net Position

Two general types of net position reserves are maintained within the System. The Reserve for Employee Contributions contains the employee contributions for all contributing members of the System, plus allocated interest earnings. At the time an employee retires or defers retirement, the actuarial value of the individual's retirement benefits is transferred to the Reserve for Retirement Benefits, which is decreased by payments to retirees and increased by investment earnings. The reserves for employee contributions and retirement benefits are fully funded.

Earnings of the System are allocated semi-annually (at June 30 and December 31) to the reserves which comprise net position. For the year ended June 30, 2019, allocations were based on rates of return of 3.00% per annum. Any unallocated earnings remain in unreserved net position.

The net position at June 30, 2019, consisted of the following components:

Reserved for employee contributions	$ 135,645,102
Reserved for retirement benefits	774,206,327
Unreserved net position (deficit)	(73,268,401)
Net Position	$ 836,583,028

4. INVESTMENTS

The System is governed by a Board of Trustees. The Board of Trustees is required by City Code, in making investment decisions, to exercise the judgment and care under the circumstances then prevailing which persons of ordinary prudence, discretion and intelligence exercise in management of their own affairs, not in regard to speculation, but in regard to the permanent disposition of their funds, considering the probable income there from, as well as the probable safety of the capital. Investments of the System are held and managed by investment professionals separately from those of other City funds. Quoted market prices have been used to value investments as of June 30, 2019.

For those investments that do not have established market exchanges, the fair value is estimated as objectively as possible by third party appraisals. Real Estate and Infrastructure investment managers utilize third party appraisals to determine fair value of assets under investment. Infrastructure investments pertain to forms of “real” property used for general public purposes that typically involve partnerships between governmental and private entities. Examples of infrastructure investments are toll roads, bridges, pipelines, airports, shipping ports, etc. The System currently participates in two pooled infrastructure funds as well as two real estate funds.

The System’s investments at June 30, 2019 are listed below. These investments are either held by the System or its agent in the System’s name and are insured, registered or collateralized. A portion of these investments are subject to credit risk (including custodial credit risk and concentrations of credit risk), interest rate risk and/or foreign currency risk. The Government Accounting Standards Board (GASB) Statement No. 40 requires the System to disclose such risks which are all discussed in the sections that follow.

All System investments are reflected in the following schedule at fair value net of accruals with the exception of amounts held in the City’s investment pool account. The City maintains an investment pool account for City funds. Bi-weekly contributions for the Tucson Supplemental Retirement System are held in the City’s investment pool account and are used to pay recurring expenditures. At June 30, 2019, the system had no cash in the City investment pool account. The System’s investment in the City’s investment pool would represent a proportionate interest in the pool’s portfolio; however, the System’s portion is not identified with specific investments and is not subject to custodial credit risk.

Investments in infrastructure are measured at fair value on a recurring basis, do not have a readily determinable fair value, and have a Net Asset Value per share calculated for reporting purposes. The fair value of the investment in Macquarie European Infrastructure Fund III was measured on March 31, 2019 at $12,707,974, with no unfunded commitment. This is a partnership, targeting investments in infrastructure and related assets in the European Union member states. The fair value of the investment in Steel River Infrastructure North America was measured on March 31, 2019 at $26,351,500, with an unfunded commitment of $462,964. This is a partnership, investing in infrastructure assets predominantly located in the United States and Canada. Investment in these partnerships cannot be redeemed by the System. Liquidation of the underlying assets and distributions to the System is expected to be complete in 2021 for both the Macquarie European Infrastructure Fund II and the Steel River Infrastructure North America fund.

The System categorizes its fair value measurements within the fair value hierarchy established by Generally Accepted Accounting Principles. The hierarchy is based on the valuation inputs used to measure the fair value of assets. The fair value hierarchy, which as 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. The System has the following recurring fair value measurements as of June 30, 2019:

Investments	Fair Value	Level 1	Level 2	Level 3
U.S. Issues not on Securities Loan:				
U.S. Treasuries, Agencies, Governmental Bonds & Commingled U.S. Debt	$ 113,295,404	920,184	671,939	111,703,280
U.S. Corporate Bonds & Other Fixed Income Instruments	53,796,609	52,306,667	1,489,942	-
U.S. Equity & Commingled Equity Funds	254,270,352	159,684,324	16,044	94,569,984
Non-U.S. Issues not on Securities Loan:				
International Bonds & Other Fixed Income Instruments	46,340,986	46,003,495	337,492	-
International Equity & Commingled Equity Funds	208,064,217	84,895,622	62,755	123,105,840
Subtotal	675,767,568	343,810,292	2,578,172	329,379,104
Investments Held by Broker-Dealers Under Securities Loans with Cash Collateral:				
U.S. Corporate Bonds & Other Fixed Income Instruments	420,348	420,348	-	-
U.S. Equity	20,834,516	20,834,516	-	-
International Bonds & Other Fixed Income Instruments	408,409	408,409	-	-
International Equity	455,052	455,052	-	-
Subtotal	22,118,325	22,118,325	-	-
Other Investments:				
Securities Lending Cash Collateral Short-Term-Investment-Pool	2,614,584	-	-	2,614,584
Money Market Funds/Short-Term Investments	26,032,930	17,741,699	7,932,804	358,427
Real Estate & Commingled Real Estate Funds	77,625,269	0	0	77,625,269
Infrastructure Investment Funds	39,059,474	0	0	39,059,474
Subtotal	145,332,257	17,741,699	7,932,804	119,657,754
Total Deposits and Investments	$ 843,218,150	383,670,316	10,510,976	449,036,858

U.S. treasuries, agencies, money market, and equity securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for identical securities.

Governmental bonds, corporate bonds, other fixed income instruments, and international bonds classified in Level 2 of the fair value hierarchy are valued based on significant other observable inputs, which may include, but are not limited to, quoted prices for similar assets or liabilities in markets that are active, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable for the assets or liabilities (such as interest rates, yield curves, volatilities, prepayment speeds, loss severities, credit risks and default rates) or other market corroborated inputs.

Securities valued at Level 3 are based on significant unobservable outputs based on all information available in the circumstances to the extent observable outputs are not available. The fair value of comingled U.S. debt, comingled equity funds, and related short-term investments classified in 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. Real estate, comingled real estate funds, and infrastructure investment funds are valued using discounted cash flow techniques.

Investment Policy – TSRS Investment Policy and asset class allocations are established by the TSRS Board of Trustees and may be amended by majority vote of its members. The TSRS Board establishes investment policies to pursue an investment strategy that reduces risk through prudent diversification of the portfolio across a broad selection of distinct asset classes.

Long-term Expected Return on Plan Assets - Expected rates of return are determined using a building-block method in which best-estimated ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return were adopted by the Plan's trustees after considering input from the Plan's investment consultant and actuary. For each major asset class that is included in the Plan's adopted target asset allocation as of June 30, 2019, these best estimates are summarized in the table shown below:

Asset Class	**Target Allocation**	**Expected Arithmetic Returns**
U.S. Equities	34%	8.5%
International Equities	25%	9.2%
Fixed Income	27%	3.8%
Real Estate	9%	7.3%
Infrastructure	5%	8.2%
Total	100%	
Weighted Average Arithmetic Returns, in proportion to asset allocation		7.3%

Concentrations – TSRS did not hold investments (other than those explicitly guaranteed by the U.S. Government in any one organization that represents 5 percent or more of the Plan's fiduciary net position at June 30, 2019.

Rate of Return – For the year ended June 30, 2019, the annual money-weighted rate of return on the Plan's investments, net of pension plan investment expenses, was 6.21%. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

<u>Sensitivity of Net Pension Liability to the Single Discount Rate Assumption</u>

Below is a table providing the sensitivity of the net pension liability to changes in the discount rate. In particular, the table presents the plan's net pension liability, if it were calculated using a single discount rate that is 1 percentage-point lower or 1 percentage-point higher than the single discount rate:

1% Decrease 6.00%	Current single discount rate assumption 7.00%	1% Increase 8.00%
$ 412,965,749	$ 292,908,872	$ 191,267,529

Credit Risk – As defined by GASB Statement No. 40, credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations. Associated with credit risk is concentration of credit risk and custodial credit risk. Concentration of credit risk is the risk of loss attributed to the magnitude of a government's investment in a single issuer. Custodial credit risk for deposits and investments is the risk that, in the event of the failure of a depository financial institution or the counterparty to a transaction, a government will not be able to recover deposits or will not be able to recover collateral securities that are in the possession of an outside party.

The System presently maintains two externally managed fixed income (bond) accounts which are exposed to some form of credit risk. The assets in the first account are actively managed while the assets in the second account are invested in a commingled bond index fund (passively managed).

The TSRS Board has given the actively managed account manager discretion to invest in a broad array of public and private asset classes, instruments and investment vehicles in order to meet or exceed the agreed upon investment return custom benchmark. However, the following specific investment policy guidelines pertain to this manager:

- The maximum position in a single issuer (excluding obligations of U.S. Government and its Agencies) should not exceed 5% of the portfolio's assets at current market value
- The portfolio should maintain an average quality of at least "BB+"
- Money market instruments must be rated in one of the two highest categories by a nationally recognized rating agency
- The minimum rating of individual issues should be CCC (based on market value) as rated by Moody's, Standard & Poor's or Fitch

The passive fund is expected to replicate, as close as possible, the characteristics, quality and performance of its underlying index, the BC Aggregate Bond Index.

The System currently does not have a policy regarding custodial credit risk for deposits or investments as defined in the Credit Risk section above.

The System had the following credit risk structure as of June 30, 2019:

Investment Type		Holdings	Average Credit Rating (1)	Fair Value	Percent of Total
Cash & Short Term Investments:					
Cash & Cash Equivalents		46	Aa1	$ 26,032,930	
	Subtotal:	46		26,032,930	10.8%
U.S. Agency & Other Governmental Obligations:					
Municipal Bonds		4	B2	920,184	
Futures		4	Aaa	671,939	
BlackRock U.S. Debt Fund		2	Aaa	111,703,281	
	Subtotal:	10		113,295,404	47.1%
U.S. Corporate Bonds & Other Fixed Income Instruments:					
Collateralized Mortgage Obligations		4	Baa2	162,974	
Banking & Finance		16	Ba1	5,210,216	
Communications		6	B1	1,459,138	
Retail & Leisure		2	Ba2	199,979	
Oil, Gas & Chemicals		14	Baa3	3,293,688	
Utilities		6	Baa2	1,370,359	
Real Estate		5	Ba1	685,561	
Fixed Income Swaps & Options		58	Aaa	4,839,788	
PIMCO Private Placements		20	A1	30,126,426	
Other Corporate Issues		44	B2	6,868,828	
	Subtotal:	175		54,216,957	22.6%
International Bonds & Other Fixed Income Instruments:					
Automobile		2	Ba1	3,740,002	
Banking & Finance		37	Baa3	14,465,850	
Fixed Income Swaps & Options		37	A1	(404,822)(2)	
Communications		4	B1	863,260	
Health Care		5	Ba2	686,007	
Oil, Gas & Chemicals		4	Ba2	2,303,232	
Utilities		3	Ba1	419,847	
Other Corporate Issues		45	Baa3	13,060,570	
Government Debt		36	B1	11,615,449	
	Subtotal:	173		46,749,395	19.5%
TOTAL:		404		$ 240,294,686	100.0%

Footnotes

(1) Per Moody's Investors Service, Inc. (Moody's)
(2) A negative value in any of the instruments noted above is the result of netting long and short positions against each other. This strategy is utilized as a means to mitigate interest rate risk from holding long positions in mortgages and / or corporate bonds.

Interest Rate Risk – As defined by the Government Accounting Standards Board (GASB) in Statement 40, interest rate risk is the risk that changes in interest rates will adversely affect the fair value of investments. For fixed income securities, there is an inverse relationship between the change in interest rates and their fair value. For example, in a rising interest rate environment the value of fixed income securities will tend to fall by varying degrees depending on the length of their maturities. In general, the value of fixed income securities with a longer duration will tend to decrease more than shorter duration securities in a rising interest rate environment.

The System's investment policy regarding interest rate risk for the actively managed fixed income account, is to limit duration to within 30% of the custom benchmark which is defined as 25% BC Mortgage Index, 25% BC Credit Index, 25% BC High Yield Index and 25% JPM EMBI Global Index. The passive fund should match, as close as possible, the maturity structure and duration of the BC Aggregate Bond Index.

The System had the following maturity structure as of June 30, 2019:

Investment Type	Less than 1 year	1 – 5 years	6 – 10 years	More than 10 years	Fair Value
Cash & Short Term Investments	$ 26,032,930				$ 26,032,930
U.S. Agency & Other Governmental Obligations	-		$ 515,787	$ 1,076,336	1,592,123
BlackRock U.S. Debt Fund	-		111,703,281	-	111,703,281
U. S. Corporate & Other Fixed Income Instruments	6,487,303	$ 16,099,640	15,617,942	8,544,510	46,749,395
International Bonds & Other Fixed Income Instruments	31,806,277	8,823,807	8,998,063	4,588,810	54,216,957
TOTAL:	$ 64,326,510	$ 24,923,447	$ 136,835,073	$ 14,209,656	$ 240,294,686

Effective Duration of Active Account: 5.79 years
Effective Duration of Passive Account: 5.28 years

Foreign Currency Risk – As defined by the Governmental Accounting Standards Board (GASB) in Statement 40, foreign currency risk is the risk that changes in exchange rates will adversely affect the fair value of an investment or a deposit.

The TSRS Board has given the System's international equity managers discretion to invest in a broad array of common and preferred stocks, convertibles and warrants of companies headquartered outside of the United States in order to meet or exceed their agreed upon investment return benchmarks. However, the following specific investment policy guidelines pertain to these managers:

- Investments in any single country market should not exceed more than 4 times the weight of the country in the benchmark index or 50% of portfolio assets, whichever is lower

- If a country has a greater than 50% weight in the index, the maximum exposure to that country in the portfolio may be as high as its weight in the index

- No more than 35% of each manager's portfolio should be invested in "emerging markets" (i.e., markets that are not included in the Morgan Stanley Capital International Europe, Australia and Far East Index)
- Managers are permitted to enter into hedging strategies, including cross-currency hedges, using forward currency exchange contracts and currency options
- Derivatives should not be used for the purpose of speculation or for leveraging the portfolio

Foreign Currency Risk (continued from previous page)

The TSRS fund had the following foreign currency risk exposure as of June 30, 2019:

Currency of:	Cash & Cash Equivalents	Fixed Income	Equity	Real Estate	Infrastructure	Fair Value	%
ARGENTINA PESO	$ 1,649	$ -	$ -	$ -	$ -	$ 1,649	0.00%
AUSTRALIAN DOLLAR	(30,524)[(1)]	-	-	-	-	(30,524)	0.00%
BRAZIL REAL	26,298	1,139,530	-	-	-	1,165,828	0.14%
CANADIAN DOLLAR	1,234,478	-	3,478,720	-	-	4,713,198	0.56%
CHINESE YUAN RENMINBI	86	-	-	-	-	86	0.00%
EURO CURRENCY UNIT	1,741,426	14,267,277	15,656,628	-	12,707,974	44,373,305	5.28%
JAPANESE YEN	99,694	-	9,413,388	-	-	9,513,082	1.13%
MEXICAN PESO	34	-	-	-	-	34	0.00%
POLISH ZLOTY	190	-	-	-	-	190	0.00%
POUND STERLING	132,544	5,419,562	19,799,702	-	-	25,351,807	3.02%
SINGAPORE DOLLAR	428	-	-	-	-	428	0.00%
SOUTH AFRICAN RAND	8,915	-	-	-	-	8,915	0.00%
SWISS FRANC	(6)[(1)]	-	5,201,114	-	-	5,201,108	0.62%
TURKISH LIRA	21	-	-	-	-	21	0.00%
U.S. DOLLAR	22,817,696	193,435,387	430,074,585	77,625,269	26,351,500	750,304,436	89.26%
Total:	$26,032,930	$214,261,755	$483,624,138	$77,625,269	$39,059,474	$840,603,565	100.0%

(1) A negative value in the instruments above is the result of netting long and short positions against each other. This strategy is utilized as a means to mitigate interest rate risk obtained from holding long positons in mortgages and/or corporate bonds.

5. SECURITIES LENDING

The Board of Trustees for the Tucson Supplemental Retirement System permits the custodian bank, BNY Mellon, to lend securities to broker-dealers and other entities. Each loan is executed with a simultaneous agreement to return the collateral for the same securities in the future. The custodian bank lends U.S. securities for collateral initially valued at 102% of the fair value of the securities plus any accrued interest. Non-U.S. securities are loaned for collateral initially valued at 105% of the fair value of the securities plus any accrued interest. Collateral is marked-to-market daily. As of June 30, 2019, the carrying amount and fair value of securities on loan was $22,118,325. If the fair value of the pledged collateral falls below the specified levels, additional collateral is required to be pledged by the close of the next business day.

In the event of a borrower's default, the custodian bank is obligated to indemnify the lender if, and to the extent that, the fair value of the collateral is insufficient to replace the loaned securities. BNY Mellon's responsibilities include performing appropriate borrower and collateral investment credit analysis, demanding adequate types and levels of collateral, and complying with applicable Department of Labor and Federal Financial Institutions Examination Council regulations covering securities lending.

Although the average term of the security loans is one week, each loan can be terminated at will by either the lender or the borrower. Cash collateral is invested in a short-term investment pool, which on average had a weighted maturity of 30 days. The relationship between the maturities of the investment pool and the security loans are affected by the maturities of the loans made by other entities that use the agent's pool.

The lender cannot pledge or sell collateral securities received until, and unless, a borrower defaults. There were no significant violations of legal or contractual provisions and no borrower or lending agent default losses known to the securities lending agent during the fiscal year. As of June 30, 2019, the lenders had no credit risk exposure to borrowers because the fair value of collateral held exceeded the fair value of securities loaned.

6. DERIVATIVES

The Tucson Supplemental Retirement System permits the limited use of derivatives by its international equity and external fixed income managers. Examples of derivative instruments permitted, but not limited to, are forward foreign currency exchange contracts, financial futures, options, swaps and swaptions. All derivative instruments utilized are considered "Investment Derivative Instruments" as defined in GASB 53 "Accounting and Financial Reporting for Derivative Instruments." The statement addresses the recognition, measurement, and disclosure regarding derivative instruments entered into by the System.

The following table is a summary of the various derivative instruments utilized by the System's external fixed income manager as of June 30, 2019. Changes in Fair Value are included as part of the overall Increase (Decrease) in Fair Value of Investments in the Statement of Changes in Plan Net Position. Fair Value is included as part of investments listed under Corporate Bonds & Other Fixed Income Instruments in the Statement of Plan Net Position.

Investment Derivative Instrument	Notional Amount (1)	Changes in Fair Value	Fair Value (2)	Principal Risk
Government Futures	23,800,000	4,007,409	32,392,471	Interest Rate Risk
Options	(20,100,000)	2,882	(21,622)	Credit Risk
Currency Forwards	(8,155,645,892)	283,355	18,761,376	Foreign Currency
Forward Transactions	(400,000)	307,726	407,476	Interest Rate Risk
Swaps	(59,250,000)	466,057	(37,995)	Interest Rate Risk

(1) The Notional Amount is the number of currency units (stated in U.S. and/or foreign currencies), shares or other units specified in the derivative instrument. It is a stated amount on which payments depend.
(2) The notional fair value of the underlying securities is reported in this schedule. Fair market value as reported in the financial statements is presented net of long and short positions.

Whenever possible, the investment manager bases the valuation of derivatives on market information; however, where market quotes are not readily available, an independent third party pricing vendor is utilized. Exchange traded derivatives are an example of derivatives where market quotes are available, whereas over-the counter (OTC) derivatives are not traded over standardized markets.

In addition to the principal risks noted above, Forward Foreign Currencies, Credit Default Swaps and Interest Rate Swaps are also subject to counterparty risk. In general, counterparty risk is the risk of loss of an amount expected to be delivered under an agreement in the event of the default or bankruptcy of the counterparty. Generally, counterparty risk is controlled through dealing with a number of different counterparties reasonably deemed to be creditworthy by the investment manager and using agreements with counterparties that permit netting of obligations. Counterparty risk with swaps is limited by execution under standardized International Swap and Derivatives Association Agreements. These contracts allow for the mutual exchange of collateral should an overall unsecured market value exceed a certain threshold (e.g., $250,000).

Credit, interest rate and foreign currency risks are addressed in previous sections of Note 4. These risks, applicable to other fixed income and foreign investments, are not substantially different from principal risks associated with derivative instruments.

7. ACTUARIAL METHODS AND ASSUMPTIONS

The total pension liability was determined by an actuarial valuation with a measurement date and report date of June 30, 2019, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Salary increases	3.00% to 6.00% including inflation
Investment Rate of Return	7.00%

Mortality rates were based on the RP-2014 Employee Mortality Table for males and females, projected with the ultimate rates of the MP-2018 projection scale. The actuarial assumptions used in the June 30, 2019 valuation were based on the results of an actuarial experience study for period July 1, 2013 – June 30, 2018.

Additional Details: In the June 30, 2019 actuarial valuation, the level-percent contribution requirements and actuarial present values are calculated using the entry age normal actuarial cost method. The actuarial assumptions included (a) 7.00 percent investment rate of return (net of administrative expenses); (b) projected salary increases at 3.00% compounded annually; and (c) additional projected salary increases of 0.00% to 3.50% attributable to seniority / merit. The assumptions do not include post-retirement benefit increases or inflation assumptions, because there is no guarantee or requirement that future increases will be granted.

The projection of benefits for financial accounting purposes also does not explicitly incorporate the potential effects of legal or contractual funding limitations, since they do not apply. The actuarial value of assets was determined using techniques that spread the effects of short term volatility in the market value of assets over a five-year smoothing period, which was first adopted for the plan year ended June 30, 2009. The Unfunded Actuarial Accrued Liability is being amortized as a level percentage of payroll on an open period of 20 years; the new amortization period was first adopted for the plan year ended June 30, 2013. There were no benefit changes during the year ended June 30, 2019.

The assumptions are selected based upon the recommendation of the plan's actuary and adopted by the Board of Trustees.

Measurement of Net Pension Liability: The net pension liability is measured as the total pension liability, less the amount of the pension plan's fiduciary net position. In actuarial terms, this will be the accrued liability less the market value of assets not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirements.

A single discount rate of 7.00% was used to measure the total pension liability, which was a decrease of 0.25% from the prior year. This single discount rate was based on the expected rate of return on pension plan investments of 7.00%. The projection of cash flows used to determine this single discount rate assumed that plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the difference between actuarially determined contribution rates and the member rate. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investment was applied to all period of projected benefit payments to determine the total pension liability.

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of changes in net pension liability*

	2019	2018	2017
Total pension liability			
Service cost	$ 14,130,993	$ 13,104,720	$ 13,130,902
Interest on total pension liability	75,605,853	72,893,717	72,547,402
Difference between expected and actual experience of the total pension liability	5,030,045	6,919,468	(6,472,776)
Changes of assumptions	57,324,201		
Benefit payments, including refunds of employee contributions	(76,586,216)	(75,618,198)	(73,213,157)
Net change in total pension liability	75,504,876	17,299,707	5,992,371
Total pension liability - beginning	1,053,987,024	1,036,687,317	1,030,694,946
Total pension liability - ending	$ 1,129,491,900	$ 1,053,987,024	$ 1,036,687,317
Plan fiduciary net position			
Contributions - employer	$ 32,589,204	$ 31,795,197	$ 31,823,694
Contributions - member	7,779,477	8,561,747	7,439,065
Net investment income	49,819,110	69,447,542	97,535,597
Benefit payments, including refunds of member contributions	(76,586,216)	(75,618,198)	(73,213,157)
Administrative expense	(652,065)	(745,753)	(756,268)
Other	0	250,046	331,127
Net change in plan fiduciary net position	12,949,510	33,690,581	63,160,058
Plan fiduciary net position - beginning	823,633,518	789,942,937	726,782,879
Plan fiduciary net position - ending	$ 836,583,028	$ 823,633,518	$ 789,942,937
Net pension Liability - ending	$ 292,908,872	$ 230,353,506	$ 246,744,380

*Schedule is presented on a prospective basis from FY 2014 and will eventually include 10 years of data.

Schedule of changes in net pension liability*

	2016	2015	2014
Total pension liability			
Service cost	$ 14,279,065	$ 15,753,944	$ 14,825,019
Interest on total pension liability	72,013,831	70,688,775	66,915,612
Difference between expected and actual experience of the total pension liability	(6,529,764)	(7,815,270)	325,889
Changes of assumptions		(31,210,057)	76,945,563
Benefit payments, including refunds of employee contributions	(70,445,750)	(67,612,351)	(66,002,013)
Net change in total pension liability	9,317,382	(20,194,959)	93,010,070
Total pension liability - beginning	1,021,377,564	1,041,572,523	948,562,453
Total pension liability - ending	$ 1,030,694,946	$ 1,021,377,564	$1,041,572,523
Plan fiduciary net position			
Contributions - employer	$ 33,175,307	$ 33,985,523	$ 34,189,288
Contributions - member	7,083,385	7,531,845	7,338,543
Net investment income	17,820,325	30,684,188	119,729,154
Benefit payments, including refunds of member contributions	(70,445,750)	(67,612,351)	(66,002,013)
Administrative expense	(786,028)	(650,405)	(735,739)
Other	142,093	118,247	171,077
Net change in plan fiduciary net position	(13,010,668)	4,057,047	94,690,310
Plan fiduciary net position - beginning	739,793,547	735,736,500	641,046,190
Plan fiduciary net position - ending	$ 726,782,879	$ 739,793,547	$ 735,736,500
Net pension Liability - ending	$ 303,912,067	$ 281,584,017	$ 305,836,023

*Schedule is presented on a prospective basis from FY 2014 and will eventually include 10 years of data.

Schedule of net position liability last six years*

FY Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of total pension liability	Covered payroll	Net Pension liability as a % of covered payroll
2014	1,041,572,523	735,736,500	305,836,023	70.64%	126,206,305	242.33%
2015	1,021,377,564	739,793,547	281,584,017	72.43%	123,583,720	227.85%
2016	1,030,694,946	726,782,879	303,912,067	70.51%	120,637,480	251.92%
2017	1,036,687,317	789,942,937	246,744,380	76.20%	115,722,524	213.22%
2018	1,053,987,024	823,633,518	230,353,506	78.14%	115,618,898	199.24%
2019	1,129,491,900	836,583,028	292,908,872	74.07%	123,822,602	236.56%

Schedule of Pension Investment Returns*

FY	Annual Money-Weighted Rate of Return, Net of Investment Expense
2014	19.17%
2015	4.17%
2016	2.38%
2017	14.26%
2018	8.85%
2019	6.06%

*Schedules are presented on a prospective basis from FY 2014 and will eventually include 10 years of data.

Schedule of Contributions

Fiscal Year Ending June 30,	Actuarially Determined Contribution (ADC)		Actual Contribution		Contribution Deficiency (Excess)	Covered Payroll	Actual contributions in relation to ADC expressed as a % of covered payroll
	Dollars	% of pay	Dollars	% of pay			
2010	27,601,156	16.84%	27,601,156	16.84%	n/a	163,902,352	n/a
2011	28,756,890	18.02%	28,756,890	18.02%	n/a	159,583,185	n/a
2012	34,824,621	23.38%	34,824,621	23.38%	n/a	148,950,475	n/a
2013	34,523,315	28.77%	34,523,315	28.77%	n/a	119,997,619	n/a
2014	34,189,288	27.09%	34,189,288	27.09%	n/a	126,206,305	n/a
2015	33,305,813	26.95%	33,985,523	27.50%	(679,710)	123,583,720	100.5%
2016	32,608,311	27.04%	33,175,307	27.50%	(566,996)	120,637,480	100.5%
2017	29,532,388	25.52%	31,823,694	27.50%	(2,291,306)	115,722,524	102.0%
2018	29,806,552	25.78%	31,795,197	27.50%	(1,988,645)	115,618,898	101.7%
2019	27,825,255	23.48%	32,589,204	27.50%	(4,763,949)	118,506,196	104.0%

Summary of Actuarial Methods and Assumptions

NOTES TO SCHEDULE OF CONTRIBUTIONS

Valuation Date:	June 30, 2017
Notes	Actuarially determined contribution rates are calculated for the fiscal year beginning one year after the valuation date (one year lag). The actuarial valuation as of June 30, 2017 determines the contribution for fiscal year ending June 30, 2019.
Methods and Assumptions Used to Determine Contribution Rates:	
Actuarial Cost Method	Entry Age Normal
Amortization Method	Level Percentage of Payroll, Open
Remaining Amortization Period	20 years
Asset Valuation Method	5 Year smoothed market
Inflation	3.00%
Salary Increases	3.00% to 6.50% including inflation
Investment Rate of Return	7.25%
Retirement Age	Tier 1: Age-based table for those ages 62+, the Rule of 80 retirement rates only apply if the Rule of 80 is attained by age 62. Tier 2: Age-based table for those ages 65+, the Rule of 85 retirement rates only apply if the Rule of 80 is attained by age 65.
Mortality	Pre and Post-retirement: RP-2000 Combined Mortality Table for males and females projected with Scale BB to 2020. Disabled retirement: RP-2000 Disabled Mortality Table for males and females.
Other Information:	
Notes	There were no benefit changes during the year.

OTHER SUPPLEMENTAL INFORMATION

Schedule of administrative expenses

Personal services		
Staff salaries	$	249,961
Fringe benefits		113,230
Total personal services		363,191
Professional services		
Accounting services		96,000
Actuarial services		50,867
Audit services		-
Physician services		-
Legal services		26,695
Total professional services		173,562
Other administrative expenses		
Computer software maintenance & hosting		40,095
Insurance		34,596
Other administrative expenses		5,987
Postage		11,044
Printing and supplies		11,441
Professional development		12,150
Total other administrative expenses		115,313
Total administrative expenses	$	652,065
Investment services expenses		
Trust and custody	$	289,029
Investment consultant		204,000
Carried interest cost		2,055,755
Investment management		2,330,392
Total investment expenses	$	4,879,176

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November 11, 2019

The Board of Trustees
Tucson Supplemental Retirement System
255 W. Alameda Street
Tucson, AZ 85701

Dear Board Members,

This letter reviews the general economic environment, capital markets, and investment performance of the Tucson Supplemental Retirement System (TSRS) for the fiscal year ended June 30, 2019.

Economic Overview as of June 30, 2019

The 2019 fiscal year was dominated by persistent political themes and concerns over the future of global GDP growth. The specter of escalating trade tensions between the U.S. and China, which emerged in the first half of 2018, continued to haunt markets throughout the 2019 fiscal year. Similarly, the U.K. remained mired in indecision while negotiating with the European Union over the nation's looming succession. Despite the contentious geopolitical landscape, developed global equities began the 2019 fiscal year in positive territory. In the U.S., the economy continued to grow at an impressive pace in the third quarter of the 2018 calendar year, demonstrating its resiliency to trade barriers. Corporate earnings were also strong, supported by consumer confidence which, in September recorded the highest levels since 2000. Given the healthy economic environment, the Federal Reserve continued to execute its contractionary policy with two additional 25 basis point rate hikes in the second half of the 2018 calendar year. However, risk appetite quickly evaporated in the fourth quarter of the 2018 calendar year as equity prices plummeted and investors flocked to safe haven asses such as U.S. Treasuries. Concerns over tighter monetary policy and the global withdrawal of stimulus measures, unresolved trade disputes, falling oil prices, and slower global growth overshadowed other robust aspects of the U.S. economy.

Following a turbulent fourth quarter in the 2018 calendar year, the U.S. entered 2019 in the midst of a partial government shutdown and wavering investor sentiment. Fortunately, markets rebounded as corporate earnings remained strong during the first quarter and both the Federal Reserve and the European Central Bank took more accommodative approaches to monetary policy. China, facing slowing GDP growth, announced a fiscal stimulus policy of tax cuts and infrastructure growth. In the U.S., economic data generally proved favorable throughout the first half of the 2019 calendar year. U.S. GDP continued to grow at a healthy rate, unemployment remained low, and consumer confidence remained high. Despite these positive signals, concerns over the sustainability of growth drove the Federal Reserve to take a more dovish tone, the combination of which was a boon to both fixed income and equity markets. Stocks approached record highs and the 10-year U.S. Treasury yield hit a multi-year low of 1.87% on June 28, 2019. In Europe, the picture was less rosy as a protectionist global trade environment took a heavier tool on the export-based economy. Manufacturing PMI data in the region measured below the neutral level of 50, indicating contraction and year-over year GDP growth slowed to 1.2% for the 2019 fiscal year.

U.S. GDP growth slowed from the prior fiscal year, but remained strong in 20198. The third estimate of second quarter GDP growth in the U.S. reported an annualized rate of 2.0%. In contrast, European Union GDP grew at an annualized 0.80% in the second quarter of the 2019 calendar year.

Total Fund Review

In fiscal year 2019, TSRS returned 6.60% before investment management fees, which ranked in the 34th percentile versus other public defined benefit plans. TSRS returned 6.21% net of fees for the fiscal year, which was just shy of the benchmark return of 6.28%. TSRS uses a time weighted rate of return methodology. Returns are calculated by an independent third party using data provided by the custodian bank.

Domestic Equity Overview
U.S. equities produced solid returns in the fiscal year ended June 30, 2019. The Russell 3000 Index, a broad market indicator for the U.S. stock market, recorded an 8.98% gain. Small cap stocks dramatically underperformed their large cap peers over the period. The Russell 1000, a gauge of large cap stock performance, generated a 10.60% return, while the Russell 2000, a gauge of small cap stock performance, lost 3.31% during the fiscal year. Growth equities continued to outperform value equities in the 2019 fiscal year, albeit by a much narrower margin than in the 2018 fiscal year. The Russell 3000 Growth Index climbed 10.60%, while the Russell 3000 Value Index advanced 7.34%. During the fiscal year ended June 30, 2019 the TSRS domestic equity investments returned 9.69% net of fees.

International Equity Overview
International equities, both developed and emerging, trailed the performance experienced in domestic markets. Developed market equities, represented by the MSCI EAFE Index, advanced a meager 1.08% during the 2019 fiscal year. As with U.S. equities, international growth equities outpaced their value counterparts. The MSCI EAFE Growth Index advanced 4.24% for the trailing twelve-months ended June 30, 2019, while the MSCI EAFE Value Index declined by 2.10%. Emerging Markets only modestly outperformed developed international equities, with the MSCI Emerging Markets Index appreciating 1.22%. For the fiscal year of 2019, the international equity asset class incurred a loss of 2.15%, net of fees, for TSRS.

Domestic Fixed Income Overview
The U.S. bond market, as measured by the Bloomberg Barclays Aggregate Bond Index, had an outstanding 2019 fiscal year, recording a 7.87% gain. The yield curve shifted lower and even partially inverted throughout the period, which led to capital gains across fixed income markets. The Bloomberg Barclays Government Index appreciated 8.52%, while the higher duration Bloomberg Barclays Government Long Index advanced 12.28%. Over the trailing 12-month period ended June 30, 2019, the Bloomberg Barclays Credit Index climbed 10.34%, while the Bloomberg Barclays Corporate High Yield Index trailed at 7.48% growth. For the fiscal year 2019, TSRS's domestic fixed income investments returned 9.14% net of fees.

Real Estate Overview
The NCREIF Property Index, a measure of the private real estate market, gained 6.51% during the 2019 fiscal year. The index was positive in each of the four quarters, extending its winning streak to 38 straight quarters. During the year ended June 30, 2019 TSRS's real estate portfolio returned 1.78% net of fees.

Infrastructure Overview
By definition, infrastructure assets are essential to the economic health and productivity of civilized society. They include the basic facilities, services, and installations needed for the functioning of a community, such as transit and communications systems; both potable and sewage water lines; and electricity access. They also include such public entities as schools, post offices, and incarceration facilities. Most of these facilities have traditionally been owned and regulated by municipalities and states. The private sector's participation has been limited, to varying degrees, to the areas of design, construction, and operation. Budget and fiscal pressures limit the ability of public authorities to maintain existing infrastructure, much less to build the new facilities required by a growing population. In response to these problems, many municipalities and states have sold or are contemplating the sale of their infrastructure assets to private investors. Over the trailing 12-month period ended June 30, 2019, the infrastructure investment program for TSRS returned 19.74% net of fees.

Cordially,

Paul Erlendson
Senior Vice President

Gordon Weightman, CFA
Senior Vice President

Outline of Investment Policies

The asset allocation policy includes a 59% allocation to equity securities: 26% to large U.S. stocks; split among S&P 500 index, enhanced index, large capitalization growth and value accounts; 8% to mid-cap and small-cap U.S. stock accounts; and 25% to foreign stock accounts. There is also an allocation of 27% to fixed income, 9% to equity real estate and 5% to infrastructure.

The Board has set an asset allocation target range on each asset class, sub-class, and manager. The Board of Trustees has adopted a policy of rebalancing the portfolio when the actual allocation falls above or below the target range.

Over the long term, asset allocation policy will be the primary determinant of the returns generated by the TSRS pension fund and the associated volatility of returns. In particular, the level of equity exposure is the key element within the TSRS pension investment policies.

In developing asset allocation policies for its pension plan, the Board examined asset and liability projections to evaluate possible results over the next ten years. These projections examined the risk/return tradeoffs of alternative asset classes, as well as alternative levels of equity exposure. Through incorporating the results of these projections with its risk posture, as well as considering typical practices and practical investment issues, the Board has developed the following asset mix guidelines:

	Percent of Total Pension Fund		
	Minimum	**Target**	**Maximum**
Equities:			
Large Capitalization	21%	26%	31%
Small/Mid Capitalization	4%	8%	12%
International	20%	25%	30%
Total Equities	**54%**	**59%**	**64%**
Fixed Income	**22%**	**27%**	**32%**
Real Estate	**7%**	**9%**	**11%**
Infrastructure	**3%**	**5%**	**7%**

Separate target ranges are also set for each investment manager within an asset class and are monitored in conjunction with the overall asset allocation. TSRS monitors its asset mix and rebalances its portfolio mix at any time that a primary asset class (i.e., equities, fixed-income, and real estate), secondary asset class (i.e., domestic equities, international equities), portfolio style, or manager reaches the minimum or maximum allocation specified. Staff is authorized to direct rebalancing and report to the Board.

Investment Objectives

Total Pension Fund Performance Objectives:[1]

The TSRS Pension Fund's return will be, in part, a function of the capital market environment in which the plan's investment managers operate. Therefore, regardless of whether or not the market environment permits the achievement of substantial real returns, the TSRS expects any active investment managers that it retains to produce results that are above average relative to other actively-managed funds and relative to passive alternatives. Investment managers should cover the fees paid and provide a return increment that justifies the risk assumed in active management.

On a rolling three-year basis, the annualized total return of the portfolio should exceed the annualized total return of the following custom index:

- Standard & Poor's 500 Stock Index (26% weight)
- Russell 2500 Stock Index (8% weight)
- MSCI All Country World, ex-U.S. Investable Market Index (25% weight)
- Barclays Capital Aggregate Bond Index (27% weight)
- NCREIF ODCE Real Estate Index (9% weight)
- CPI + 4% (5% weight)

[1] The investment objectives defined herein assume that performance comparisons will be based on a before-fee analysis, unless otherwise indicated.

Individual Managers Performance Objectives

On a rolling three-year basis, the annualized total return earned by an actively managed portfolio should place the account in a competitive ranking (i.e., top 40%) relative to a peer group of managers. In addition, the managers should outperform the following market index benchmarks:

T. Rowe Price (Large Cap Growth Equity)
- Exceed the annualized total return of the Russell 1000 Growth Index

BlackRock Value (Russell 1000 Value Index)
- Match the annualized total return of the Russell 1000 Value Index

Alliance Capital (S&P 500 Index)
- Match the annualized total return of the S&P 500 Index

PIMCO StocksPlus (Enhanced Index)
- Exceed the annualized total return of the S&P 500 Index

Champlain Investment Partners (Mid Cap Core Equity)
- Exceed the annualized total return of the Russell Mid Cap Index

Fidelity Institutional Asset Management (Small Cap Equity)[1]
- Exceed the annualized total return of the Russell 2000 Stock Index

Aberdeen Asset Management (International Core Equity)
- Exceed the annualized total return of the MSCI AC World ex-U.S. Index

Causeway Capital Management (International Value Equity)
- Exceed the annualized total return of the MSCI AC World ex-U.S. Index

American Century Investments (International Small Cap)
- Exceed the annualized total return of the MSCI AC World ex-U.S. Small Cap Index

PIMCO (Custom Fixed Income)
- Exceed the annualized total return of a customized fixed income benchmark composed of 25% BC Mortgage, 25% BC Credit, 25% BC High Yield and 25% JP Morgan EMBI index

BlackRock U.S. Debt Index Fund (U.S. Investment Grade Fixed Income)
- Match the annualized total return of the BC Aggregate Bond Index

JP Morgan Strategic Property Fund (Core Real Estate)
- Exceed the annualized total return of the NCREIF ODCE Real Estate Index

JP Morgan Income & Growth Fund (Value Added Real Estate)
- Exceed the annualized total return of the NCREIF ODCE Real Estate Index

Macquarie European Infrastructure Fund 3 (European Infrastructure)
- Exceed the annualized total return of the CPI + 4%

SteelRiver Infrastructure Fund North America (North America Infrastructure)
- Exceed the annualized total return of the CPI + 4%

[1] This Manager was formerly known as Pyramis Global Advisors

Investment Results by Year
Last Ten Fiscal Years Ended June 30, 2019

Year Ended	Annual Return	3-Year Annualized Return	5-Year Annualized Return	10-Year Annualized Return
6/30/19	6.2%	9.7%	7.0%	10.2%
6/30/18	9.9%	8.9%	10.1%	7.5%
6/30/17	14.8%	7.1%	11.0%	6.0%
6/30/16	2.4%	8.1%	8.0%	5.7%
6/30/15	4.6%	12.9%	12.6%	7.1%
6/30/14	19.6%	12.1%	14.1%	7.5%
6/30/13	14.8%	13.2%	5.0%	7.4%
6/30/12	2.4%	12.1%	1.2%	6.2%
6/30/11	23.2%	2.8%	4.0%	5.1%
6/30/10	11.6%	-5.6%	1.8%	2.1%

Schedule of Investment Results
For Periods Ended June 30, 2019

		Annualized Returns (1)	
	One Year	**Three Years**	**Five Years**
TOTAL PORTFOLIO			
TSRS	6.21%	9.70%	6.98%
Custom Benchmark (2)	6.28%	8.73%	6.43%
EQUITY FUNDS			
Alliance S&P 500 Index	10.37%	14.10%	10.64%
S & P 500 Index	10.42%	14.19%	10.71%
PIMCO Stocks Plus	10.64%	14.57%	10.68%
S & P 500 Index	10.42%	14.19%	10.71%
BlackRock Russell 1000 Value Index	8.57%	10.26%	7.51%
Russell 1000 Value Index	8.46%	10.19%	7.46%
T. Rowe Price Large Cap Growth	10.16%	23.15%	15.16%
Russell 1000 Growth Index	11.56%	18.07%	13.39%
Champlain Investment Partners	15.57%	18.24%	13.40%
Russell Mid Cap Index	7.83%	12.16%	8.63%
Fidelity Institutional Asset Management Small Cap	2.54%	13.04%	9.39%
Russell 2000 Index	(3.31%)	12.30%	7.06%
Causeway International Value Equity	(2.75%)	8.49%	1.68%
MSCI EAFE Index	1.29%	9.39%	2.57%
Aberdeen EAFE Plus Equity	2.70%	7.41%	0.25%
MSCI All Country World ex-U.S. Index (Net)	1.29%	9.39%	2.16%
American Century Non U.S. Small Cap (Inception date: 5/16) (4)	(10.00%)	9.91%	N/A
MSCI All Country World ex-U.S. Small Cap	(5.94%)	7.76%	N/A
FIXED INCOME FUNDS			
BlackRock U.S. Debt Fund	7.96%	2.37%	3.01%
Bloomberg Aggregate Bond Index	7.87%	2.31%	2.95%
PIMCO Custom Fixed Income	10.30%	6.07%	4.73%
Custom Index (3)	9.53%	4.01%	3.99%
REAL ESTATE FUNDS			
JP Morgan Strategic Property Fund	1.15%	4.87%	7.33%
NFI-ODCE Equal Weight Net	5.99%	6.97%	9.12%
JP Morgan Income and Growth Fund	3.11%	5.62%	8.00%
NFI-ODCE Equal Weight Net	5.99%	6.97%	9.12%

Notes: All data provided by independent investment consultant, Callan Associates Inc.

(1) Geometrically compounded, time-weighted rates of return (all returns reported gross of fees)

(2) Custom Benchmark = 36% S&P 500 Index + 10% Russell 2500 + 15% MSCI ACWI ex-U.S (Net) + 26% Barclays Capital Aggregate + 8% NCREIF ODCE + 5% CPI+4%

(3) Custom Index = 25% Barclays Capital Mortgage + 25% Barclays Capital Credit + 25% Barclays Capital High Yield + 25% JP Morgan EMBI Global

(4) As the American Century Non-U.S. Small Mid Cap Strategy was funded in May of 2016, the five year annualized return data is not yet available.

Schedule of Investment Results
For Periods Ended June 30, 2019 (Continued)

		Annualized Returns (1)	
	One Year	**Three Years**	**Five Years**
INFRASTRUCTURE FUNDS			
Macquarie European Infrastructure Fund 3 (Funding Completed)	40.10%	28.24%	15.04%
CPI + 4%	5.44%	6.01%	5.25%
SteelRiver Infrastructure Fund North America (Funding in progress)	11.77%	4.88%	7.18%
CPI + 4%	5.44%	6.01%	5.25%

Notes: All data provided by independent investment consultant, Callan Associates Inc.
(1) Geometrically compounded, time-weighted rates of return (all returns reported gross of fees)

Asset Summary
By Manager and Type of Investment (in thousands)
June 30, 2019

Manager	Style	Large U.S. Stocks	Small/Mid U.S. Stocks	Foreign Stocks	Fixed Income	Real Estate	Infra-structure	Short Term	Total
Alliance Capital	S & P 500 Index	$ 67,192	$ -	$ -	$ -	$ -	$ -	$ 153	$ 67,345
T. Rowe Price	Large Cap Growth	59,150						1,080	60,230
BlackRock Russell Value	Large Cap Value Index	60,420							60,420
PIMCO StocksPlus	Enhanced Index	34,150							34,150
Champlain Investments	Mid-Cap Core		33,275					1,015	34,290
Fidelity Institutional Asset Mgmt.	Small-Cap Core		34,520					435	34,955
Causeway Capital	Foreign Stocks-Value			75,876				2,656	78,532
Aberdeen Asset Mgmt	Foreign Stocks-Core			83,450					83,450
American Century Investments	Foreign Stocks-Small Cap			39,656					39,656
BlackRock U.S. Debt	U.S. Govt/Credit Bonds				111,703				111,703
PIMCO Custom Fixed Income	U.S. & Foreign Bonds				98,493			16,120	114,613
JPM Strategic Property Fund	Core Real Estate					51,853		1	51,854
JPM Income & Growth Fund	Value Added Real Estate					25,645			25,645
Macquarie (MEIF3)	European Infrastructure						12,708		12,708
SteelRiver IFNA	North American Infrastructure						26,256		26,256
Liquidity Fund	Cash & Cash Equivalents							830	830
	TOTAL	$ 220,912	$ 67,795	$198,982	$210,196	$ 77,498	$ 38,964	$22,290	$836,637

Notes:

(1) The Asset Summary does not include the City pooled investment account. (2) Assets are reflected on a trade date basis.
(3) Short-term investments have been adjusted for the net impact of unsettled transactions in order to report on a trade date
basis. (4) Each asset class includes receivables and payables.

Manager and Asset Diversification (in thousands)

June 30, 2019

Manager	Actual Amount	Actual Percentage	Target Amount	Target Percentage
Alliance Capital	$ 67,345	8.0%	$ 66,931	8.0%
T. Rowe Price	60,230	4.1%	58,565	7.0%
BlackRock Russell Value	60,420	7.2%	58,565	7.0%
PIMCO StocksPlus	34,150	7.2%	33,465	4.0%
Large U.S. Stocks	**222,145**	**26.5%**	**217,526**	**26.0%**
Champlain Investment Partners	34,290	4.1%	33,465	4.0%
Fidelity Institutional Asset Mgmt.	34,955	4.2%	33,465	4.0%
Small/Mid-Cap U.S. Stocks	**69,245**	**8.3%**	**66,930**	**8.0%**
Causeway Capital	78,532	9.4%	83,664	10.0%
Aberdeen Asset Management	83,450	10.0%	83,664	10.0%
American Century Investments	39,656	4.7%	41,832	5.0%
Foreign (International) Stocks	**201,638**	**24.1%**	**209,160**	**25.0%**
Total Equities	**493,028**	**58.9%**	**493,616**	**59.0%**
BlackRock U.S. Debt	111,703	13.3%	112,946	13.5%
PIMCO Custom Fixed Income	114,613	13.7%	112,946	13.5%
Fixed Income (Bonds)	**226,316**	**27.0%**	**225,892**	**27.0%**
JPM Strategic Property Fund	51,854	6.2%	50,198	6.0%
JPM Income & Growth Fund	25,645	3.1%	25,099	3.0%
Real Estate	**77,499**	**9.3%**	**75,297**	**9.0%**
Macquarie (MEIF3)	12,708	1.5%	20,916	2.5%
SteelRiver IFNA	26,256	3.2%	20,916	2.5%
Infrastructure	**38,964**	**4.7%**	**41,832**	**5.0%**
Liquidity Fund	830	0.1%	-	0.0%
Total	**$ 836,637**	**100%**	**$ 836,637**	**100%**

Asset Allocation by Asset Class
Last Five Fiscal Years

Asset Class	2019	2018	2017	2016	2015
U.S. Stocks	35%	36%	35%	34%	51%
Foreign (International) Stocks	24%	25%	25%	23%	13%
Total Equities	59%	61%	60%	57%	64%
Fixed Income (Bonds)	27%	26%	26%	27%	22%
Real Estate	9%	9%	10%	9%	8%
Infrastructure	5%	4%	4%	7%	6%
Cash	0%	0%	0%	0%	0%
Total Assets	100%	100%	100%	100%	100%

Ten Largest Bond Holdings
(By Market Value)
June 30, 2019
(dollars in thousands)

Par Value	Bond	Coupon Rate	Due	Rating (1)	Fair Value
$ 1,550	UBS AG/Stamford CT	7.625%	08/17/22	A3	$ 1,739
1,700	Tallgrass Energy Partners 144A	5.500%	01/15/28	Ba3	1,719
1,500	Petroleos Mexicanos	6.625%	06/15/35	Baa3	1,386
1,200	Ukraine Government Intern Regs	7.750%	09/01/20	Caa1	1,238
1,100	Perusahaan Penerbit SBSN 144A	3.400%	03/29/21	Baa2	1,112
827	Ally Financial Inc	8.000%	11/01/31	Ba2	1,093
1,000	International Lease Finance Co	8.250%	12/15/20	Baa3	1,079
1,000	Altice France SA/France 144A	7.375%	05/01/26	B2	1,025
800	Pertamina Persero PT 144A	6.500%	11/07/48	Baa2	989
900	Royal Bank of Scotland Group P	4.890%	05/18/29	Baa2	961

(1) Per Moody's Investors Service, Inc.

Ten Largest Stock Holdings
(By Market Value)
June 30, 2019
(dollars in thousands)

Shares	Stock	Fair Value
3,832	Amazon.com Inc.	$ 7,256
52,382	Microsoft Corp	7,017
25,705	Facebook, Inc.	4,961
3,650	Alphabet, Inc, Cass A	3,952
22,479	Visa, Inc.	3,901
10,037	The Boeing Company	3,654
16,853	Apple Inc.	3,336
68,900	Takeda Pharmaceutical Co Ltd	2,445
179,702	Unicredit SPA	2,215
2,015	Alphabet, Inc Class C	2,178

A complete list of portfolio holdings is available by contacting:
City of Tucson Supplemental Retirement System,
255 W. Alameda Street, 3rd floor, Tucson, AZ 85701-1303

Schedule of Fees
June 30, 2019

Investment manager fees:	Assets under management	Fees
Fixed income managers		
BlackRock U.S. Debt	$ 111,703,222	$ 57,466
PIMCO (Custom fixed income)	114,613,049	392,557
Total fixed Income	226,316,271	450,023
Equity Managers		
Alliance Capital Management	67,345,430	20,292
BlackRock Russell Value Index	60,419,879	22,992
T. Rowe Price	60,229,565	222,955
Causeway Capital Management	78,532,446	217,531
Fidelity Institutional Asset Management	34,955,130	190,930
Aberdeen Asset Management	83,449,553	533,857
American Century Investments	39,656,482	540,245
PIMCO Stock Plus	34,150,105	-
Champlain Investment Partners	34,290,459	240,989
Total Equity	493,029,049	1,989,790
Liquidity Account	830,226	
Real Estate Managers		
JP Morgan Strategic Property Fund	51,853,651	513,230
JP Morgan Income & Growth Fund	25,644,966	272,912
Total Real Estate	77,498,617	786,142
Infrastructure Managers		
Macquarie (MEIF3)	12,707,974	71,084
SteelRiver (IFNA)	26,255,691	173,734
Total Infrastructure	38,963,665	244,818
Total assets		
Total investment management fees	$ 836,637,828	$ 3,470,773
Other investment service fees		
Carried interest, Macquarie (MEIF3)		948,588
Carried interest, SteelRiver (IFNA)		1,107,167
Partnership Adjustments, SteelRiver (IFNA)		64,928
Partnership Adjustments, Macquarie (MEIF3)		(1,205,309)
Trust & custodian fees, BNY Mellon		289,029
Security lending - Bank & Administration Fees, BNY Mellon		51,579
Consulting & performance management, Callan Associates Inc.		204,000
Total Other investment service fees		$ 1,459,981

Schedule of Commissions

June 30, 2019

Broker Description	Shares	Commissions	Commissions Per Share
CREDIT SUISSE, NEW YORK (CSUS)	408,493	$ 7,914	0.01937
MORGAN STANLEY & CO INC, NY	318,379	5,024	0.01578
MERRILL LYNCH INTL LONDON EQUITIES	322,702	4,937	0.01530
GOLDMAN SACHS & CO, NY	247,649	4,086	0.01650
CITIGROUP GLOBAL MARKETS LTD, LONDON	125,458	2,943	0.02346
MERRILL LYNCH PIERCE FENNER SMITH INC NY	203,938	2,709	0.01328
J P MORGAN SECS LTD, LONDON	59,786	2,130	0.03562
J.P. MORGAN SECURITIES LLC, NEW YORK	115,876	2,110	0.01821
UBS SECURITIES LLC, STAMFORD	137,618	1,988	0.01445
HSBC BANK PLC (MIDLAND BK)(JAC), LONDON	95,701	1,878	0.01962
UBS WARBURG, LONDON	139,242	1,868	0.01342
UBS EQUITIES, LONDON	121,906	1,835	0.01505
JEFFERIES & CO INC, NEW YORK	74,871	1,796	0.02398
BARCLAYS CAPITAL, LONDON (BARCGB33)	125,136	1,700	0.01359
COWEN AND CO LLC, NEW YORK	122,376	1,670	0.01365
LIQUIDNET INC, NEW YORK	63,071	1,451	0.02301
DAIWA SECS AMER INC, NEW YORK	20,900	1,364	0.06528
RBC CAPITAL MARKETS LLC, NEW YORK	153,557	1,167	0.00760
DEUTSCHE BK SECS INC, NY (NWSCUS33)	62,201	1,007	0.01618
INSTINET CORP, NEW YORK	72,763	1,002	0.01377
Various Brokers, less than $1,000	997,151	17,528	
TOTAL	**3,988,774**	**$ 68,107**	
AVERAGE COMMISSION RATE			**$0.0233**

Actuarial

P: 720.274.7270 | F: 303.694.0633 | www.grsconsulting.com

December 5, 2019
The Board of Trustees
Tucson Supplemental Retirement System
Tucson, Arizona

Re: June 30, 2019 Actuarial Valuation and CAFR Information

Dear Board Members:
The purpose of this letter is to provide the certification related to materials presented in the Comprehensive Annual Financial Report (CAFR) for the City of Tucson Supplemental Retirement System (TSRS).

Actuarial Valuation Used for Funding Purposes

The valuation report presents the results of the June 30, 2019 actuarial valuation of the Tucson Supplemental Retirement System. The report describes the current actuarial condition of the Tucson Supplemental Retirement System, determines recommended annual employer and employee contribution rates, and analyzes changes in these required rates. This report should not be relied on for any purpose other than the purpose described in the primary communication. Please refer to that report for any information concerning the funding, assumptions and methods of the TSRS.

Certification

The valuation report includes the following exhibits which provide further related information necessary to complete your annual financial report:

- Summary of Actuarial Assumption and Methods
- Schedule of Active Members Counts by Age and Service
- Schedule of Funding Progress
- Schedule of Employer Contributions
- Solvency Test
- Comparative Schedule of Annual Pension Benefits Paid
- Schedule of Retirees and Beneficiaries Added to and Removed from Rolls
- Summary of Benefit Provisions
- Schedule of Active Member Average Salary By Age and Service

The Schedules which are required to contain 10 years/ worth of information will be completed with each passing year.

The Board of Trustees
December 5, 2019
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We certify that the information included herein and contained in the June 30, 2019 Actuarial Valuation Report is accurate and fairly presents the actuarial position of the Tucson Supplemental Retirement System as of the valuation date.

The TSRS Board is responsible for establishing the funding policy, and an outline of that policy can be found in the appendix of the June 30, 2019 actuarial valuation report. The actuarial methods and assumptions used in the valuation are adopted by the TSRS Board based upon the experience studies and in consideration of the recommendations of the TSRS' actuary. The actuarial assumptions and methods employed in the funding valuation are the same as those used for financial reporting purposes under GASB 67 and GASB 68.

Contribution Rates

There are no recommended changes to the contribution rates for FY 2021 for the employer rate or the employee rate for those hired prior to July 1, 2006. Based on the TSRS funding policy, the recommended employer rate will remain 27.5%, and the recommended employee rate will remain at 5.00% for the members hired prior to July 1, 2006. We do recommend an increase to the employee rates from 6.75% to 7.00% for the Tier I variable class and from 5.25% to 5.50% for the Tier II variable class. Full details of these calculations are in the June 30, 2019 actuarial valuation report.
The contribution rate in the June 30, 2019 actuarial valuation report is determined using the actuarial assumptions and methods disclosed in Section G of the valuation report. The report does not include an assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the System's financial condition.

Financing Objectives

The employer contributions, when combined with the contributions made by members, are intended to cover the Actuarially Determined Contribution (ADC), which is the sum of the Normal Cost and expenses, plus a 20-year open level percent-of-pay amortization payment of the Unfunded Actuarial Accrued Liability (UAAL). The ADC is then rounded up in accordance with the Board's rounding policy. Based on this funding policy, the System is projected to reach full funding in 2034. Contributions less than the ADC will extend the period to attain full funding.

Benefit Provisions

All of the benefit provisions reflected in the June 30, 2019 actuarial valuation are those which were in effect on June 30, 2019. There were no changes to the benefit provisions since the prior valuation. The benefit provisions are summarized in Section D of the valuation Report.

The Board of Trustees
December 5, 2019
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Assumptions and Methods

The Board has sole authority to determine the actuarial assumptions used for the Plan. The assumptions that are based upon the actuary's recommendations are internally consistent and are reasonably based on the actual past experience of the Plan.

The assumptions have been updated since the prior valuation as follows:

Economic Assumption Updates:

- Inflation reduced from 3.00% to 2.50%
- Productivity component of the salary scale has been increased from 0% to 0.5%
- Investment return assumption reduced from 7.25% to 7.00%

Demographic Assumption Updates:

- Updated the mortality tables to the RP-2014 mortality tables (specific to healthy employees, healthy retirees, and disabled retirees for the pre-retirement, post-retirement and post-disablement assumptions, respectively) and a fully generational approach using the ultimate rates of the MP-2018 Projection Scales.
- Slightly increased service-based termination rates for active members with less than five years of service. Increased age-based termination rates by 5% of current rates.
- Slightly reduced early retirement and Rule of retirement rates. Modify age-based pattern of rates for those not qualifying for "Rule of" based on observed experience.

The current assumptions were adopted by the Board in 2019 for first use in the June 30, 2019 valuation following a regularly scheduled experience study. The rationale for all of the current assumptions is included in that report, dated January 8, 2019.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The actuarial calculations presented in this Report are intended to provide information for rational decision making.

Data

The valuation was based upon information as of June 30, 2019, furnished by Tucson Supplemental Retirement System staff, concerning Plan 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 Tucson Supplemental Retirement System staff.

The Board of Trustees
December 5, 2019
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Actuarial reports used for GASB 67 and GASB 68 reporting

For the GASB 67 and GASB 68 reporting purposes, the valuation date, measurement date of the Net Pension Liability and the reporting date are all June 30, 2019. Please refer to the Tucson Supplemental Retirement System GASB Statement Nos. 67 and 68 Accounting and financial reporting for pensions - June 30, 2019 report for further information on the financial reporting.

We prepared the following scheduled for inclusion in the Financial Section of the TSRS CAFR:

- Schedule of Changes in Net Pension Liability and Related Ratios
- Sensitivity of Net Pension Liability to the Single Discount Rate Assumption
- Schedule of Contributions

Compliance with ASOPs and Qualification Standards

The assumptions and methods which support 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 the plan sponsor. Dana Woolfrey is and Enrolled Actuary and both Dana Woolfrey and Paul Wood are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. Finally, both of the undersigned are experiences in performing valuation for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Dana Woolfrey

Dana Woolfrey, FSA, FCA, EA, MAAA
Consultant

Paul T Wood

Paul Wood, ASA, FCA, MAAA
Consultant

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS

Valuation Date

The valuation date is July 1st 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.

I. 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 funding approach, and consist of a normal cost contribution and an accrued liability contribution.

3. The normal contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each new participant during the entire period of his anticipated covered service, would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf. Effective July 1, 2013 the TSRS funding policy requires the computation of normal cost separately for those members in Tier 1 and Tier 2 (the variable rate tiers).

4. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability and amortizing the result over 20 years from the valuation date as a level percentage of pay. It is assumed that payments are made throughout the year.

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS (continued)

5. Administrative expenses for the recent year will be added to the employer normal cost in the current valuation and will be reflected in the recommended employer rate for the upcoming fiscal year.

II. Actuarial Value of Assets

The actuarial value of assets is based on recognizing gains and losses over a five-year period where gains and losses are determined by comparing the projected market value return (based on the prior year's market value of assets, cash flows during the year and expected investment returns on those amounts) to the actual market investment return.

III. Actuarial Assumptions

A. Economic Assumptions

1. Investment return: 7.00% per annum, compounded annually, composed of an assumed 2.50% inflation rate and a 4.50% real rate of return. This rate represents the assumed return, net of all investment expenses.

2. Salary increase rate:

Sample Attained Age	Percentage Increase in Salary with Less than Five Years of Service		
	Merit	Inflation	Total
0	3.50 %	2.50 %	6.00 %
1	3.50	2.50	6.00
2	3.00	2.50	5.50
3	2.75	2.50	5.25
4	2.50	2.50	5.00

Sample Attained Age	Percentage Increase in Salary with Five or More Years of Service		
	Merit	Inflation	Total
25	3.00 %	2.50 %	5.50 %
30	2.75	2.50	5.25
35	2.40	2.50	4.90
40	1.70	2.50	4.20
45	1.10	2.50	3.60
50	0.75	2.50	3.25
55	0.50	2.50	3.00
60	0.50	2.50	3.00
65	0.50	2.50	3.00

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS (continued)

3. Payroll growth rate: In the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 3.00% per year. This increase rate is primarily due to the effect of inflation on salaries, with no allowance for future membership growth.

B. Demographic Assumptions

1. Mortality rates – Healthy Pre-Retirement Mortality RP-2014 Employee Mortality Tables projected with the ultimate rates of the MP-2018 projection scale. Healthy Post-Retirement Mortality RP- 2014 Healthy Annuitant Mortality Tables projected with the ultimate rates of the MP-2018 projection scale. Disabled Mortality RP-2014 Disabled Mortality Tables projected with the ultimate rates of the MP-2018 projection scale. Mortality rates were adjusted to include margin for future mortality improvement as described in the table name above. Sample 2019 rates shown below:

Sample Attained Ages	Probability of Death Pre-Retirement		Sample Attained Ages	Probability of Death Post-Retirement		Sample Attained Ages	Probability of Death Post-Disability	
	Men	Women		Men	Women		Men	Women
20	0.04 %	0.02 %	20	0.04 %	0.02 %	20	0.05 %	0.02 %
25	0.05	0.02	25	0.06	0.03	25	0.19	0.08
30	0.04	0.02	30	0.08	0.06	30	0.47	0.22
35	0.05	0.03	35	0.12	0.10	35	0.82	0.40
40	0.06	0.04	40	0.17	0.14	40	1.21	0.63
45	0.09	0.06	45	0.26	0.20	45	1.60	0.87
50	0.16	0.10	50	0.39	0.26	50	1.94	1.13
55	0.27	0.16	55	0.55	0.34	55	2.22	1.38
60	0.45	0.23	60	0.74	0.49	60	2.53	1.62
65	0.79	0.35	65	1.05	0.77	65	3.01	1.98
70	1.32	0.60	70	1.59	1.22	70	3.84	2.68
75	2.21	1.02	75	2.55	1.99	75	5.16	3.90
80	3.69	1.75	80	4.25	3.31	80	7.29	5.80
85	7.19	4.49	85	7.37	5.75	85	10.78	8.60
90	13.12	9.86	90	12.97	10.22	90	16.51	12.66

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS (continued)

3. Disability rates. Sample rates shown below:

Sample Attained Ages	Probability of Disablement Next Year	
	Men	Women
25	0.01 %	0.01 %
30	0.07	0.07
35	0.09	0.09
40	0.14	0.14
45	0.17	0.17
50	0.25	0.25
55	0.36	0.36
60	0.48	0.48

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

Sample Attained Age	Years of Credible Service	Probability of Termination
Any	0	19.00 %
	1	14.00
	2	11.00
	3	9.00
	4	9.00
20	5 & over	7.40
25		7.40
30		6.98
35		4.88
40		3.83
45		3.10
50		2.68
55		2.57

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS (continued)

5. Forfeiture rates: The percentages below represent the probability that a vested terminated member will take a refund of contributions rather than receive a deferred annuity benefit.

Sample Ages	% of Vested Terminating Members Choosing Refund at Termination
Under 30	50 %
30	45
35	40
40	35
45	30
50	25
55	20
60 and Over	0

1. Retirement rates for Tier 1. For those ages 62+, the Rule of 80 retirement rates only applies if the Rule of 80 is attained by age 62.

Attained Age	Tier 1 Members Percentage of Those Eligible Retiring During the Year		
	Rule of 80	Age Based	Early
50-54	24.0 %		
55-59	24.0		6.0 %
60	24.0		
61	24.0		
62	24.0	33.0 %	
63-65	24.0	18.0	
66	24.0	40.0	
67-69	24.0	30.0	
70 & Over	100.0	100.0	

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS (continued)

Retirement rates for Tier 2. For those ages 65+, the Rule of 85 retirement rates only applies if the Rule of 85 is attained by age 65.

Attained Age	Tier 2 Members Percentage of Those Eligible Retiring During the Year		
	Rule of 80	Age Based	Early
60	24.0 %		6.0 %
61	24.0		6.0
62	24.0		6.0
63	24.0		6.0
64	24.0		6.0
65	24.0	18.0 %	
66	24.0	40.0	
66-69	24.0	30.0	
70 & Over	100.0	100.0	

Deferred vested members are assumed to retire at age first eligibility for unreduced benefits.

C. Other Assumptions

1. Percent married: 80% 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. Cost of living adjustment: None.
4. Optional forms: Members are assumed to elect the normal form of benefit.
5. Current and future deferred vested participants are assumed to retire at the earlier of age 62 and eligibility for rule of 80 for Tier 1 and the earlier of age 65 and eligibility for the rules of 85 (but at least 60) for Tier 2.
6. Administrative expenses: Administrative expenses are added to the employer normal cost, before application of the round up policy.
7. Pay increase timing: End of year.
8. Decrement timing: Decrements of all types are assumed to occur mid-year.
9. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

SUMMARY OF ACTUARIAL ASSUMPTION AND METHODS (concluded)

10. Decrement relativity: Decrement rates are used directly, without adjustment for multiple decrement table effects.

11. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.

12. Benefit and Eligibility Service due to Accrued Sick and Vacation Leave at Retirement and Termination: Tier 1 Members are assumed to have an additional 0.019 years per year of benefit and eligibility service at early or normal retirement and termination due to accrued sick and vacation leave. This assumption was developed using sick and vacation leave and service amounts for active members included in the actuarial valuation as of June 30, 2013.

Summary of Active Member Counts by Age and Service as of July 1, 2019

Age	Service							
	0-4	5-9	10-14	15-19	20-24	25-29	Over 30	Total
Under 20	7	0	0	0	0	0	0	7
20-24	59	0	0	0	0	0	0	59
25-29	132	19	0	0	0	0	0	151
30-34	123	53	14	0	0	0	0	190
35-39	132	64	51	17	0	0	0	264
40-44	108	66	66	44	16	0	0	300
45-49	87	53	81	71	89	11	0	392
50-54	78	44	62	67	85	36	6	378
55-59	66	49	63	67	56	34	27	362
60-64	45	33	51	59	59	28	27	302
65-69	16	12	11	13	8	6	17	83
Over 70	4	1	6	2	2	1	4	20
Total	857	394	405	340	315	116	81	2,508

Schedule of Funding Progress
$ in thousands

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Unfunded AAL (UAAL)	Funded Ratio	Covered Payroll	UAAL as a Percentage of Covered Payroll
(1)	(2)	(3)	(4)=(3)-(2)	(5)=(2)/(3)	(6)	(7)=(4)/(6)
6/30/1991	$ 164,268	$ 175,537	$ 11,269	93.6%	$86,830	13.0%
6/30/1992	179,570	187,812	8,242	95.6%	86,205	9.6%
6/30/1993	197,282	208,024	10,742	94.8%	92,867	11.6%
6/30/1994	213,541	230,026	16,485	92.8%	94,180	17.5%
6/30/1995	237,713	249,049	11,336	95.4%	99,847	11.4%
6/30/1996	266,740	269,186	2,446	99.1%	105,230	2.3%
6/30/1997	304,684	297,490	(7,194)	102.4%	110,189	-6.5%
6/30/1998	353,057	348,966	(4,090)	101.2%	113,729	-3.6%
6/30/1999	402,875	400,224	(2,651)	100.7%	126,817	-2.1%
6/30/2000	453,954	437,750	(16,204)	103.7%	134,088	-12.1%
6/30/2001[1]	470,672	486,702	16,030	96.7%	145,059	11.1%
6/30/2001[2]	470,672	495,359	24,687	95.0%	145,059	17.0%
6/30/2002	463,102	553,947	90,845	83.6%	153,580	59.2%
6/30/2003	458,857	601,173	142,316	76.3%	143,164	99.4%
6/30/2004	494,987	645,351	150,364	76.7%	149,782	100.4%
6/30/2005	538,789	693,871	155,082	77.6%	162,149	95.6%
6/30/2006[1]	588,228	734,377	146,149	80.1%	155,855	93.8%
6/30/2006[2]	588,228	735,793	147,565	79.9%	155,855	94.7%
6/30/2007[1]	634,763	758,427	123,663	83.7%	159,250	77.7%
6/30/2007[2,3]	634,763	763,539	128,776	83.1%	159,250	80.9%
6/30/2008	650,227	822,205	171,978	79.1%	153,982	111.7%
6/30/2009	665,298	859,485	194,187	77.4%	149,925	129.5%
6/30/2010	641,819	904,480	262,662	71.0%	141,459	185.7%
6/30/2011	624,665	928,609	303,944	67.3%	121,631	249.9%
6/30/2012	597,107	940,939	343,832	63.5%	125,003	275.1%
6/30/2013	600,330	948,562	348,232	63.3%	125,858	276.7%
6/30/2014	655,998	1,012,393	356,396	64.8%	126,639	281.4%
6/30/2015	706,774	1,021,378	314,604	69.2%	123,415	254.9%
6/30/2016	732,927	1,030,695	297,768	71.1%	115,183	258.5%
6/30/2017	767,988	1,036,687	268,699	74.1%	117,006	229.6%
6/30/2018	803,439	1,053,987	250,548	76.2%	118,152	212.1%
6/30/2019	822,835	1,129,492	306,657	72.8%	123,823	247.7%

[1] *Before benefit changes*
[2] *After benefit changes*
[3] *Reflects an ad-hoc pension increase*

The funded status measure may be appropriate for assessing the need for future contributions. The funded status is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

Schedule of Employer Contributions

Fiscal Year Ended June 30,	Annual Required Contribution	Actual City Contribution	Percentage Contributed
1996	8.55 %	8.18 %	95.67 %
1997	8.05	8.38	104.10
1998	8.05	8.38	104.10
1999	7.41	7.91	106.75
2000	6.07	7.35	121.09
2001	6.77	7.35	108.57
2002	6.30	7.35	116.67
2003	8.41	8.41	100.00
2004	11.17	11.17	100.00
2005	14.06	14.06	100.00
2006	14.83	14.83	100.00
2007	15.04	15.04	100.00
2008	15.21	15.21	100.00
2009	14.37	14.37	100.00
2010	16.84	16.84	100.00
2011	18.02	18.02	100.00
2012	23.38	23.38	100.00
2013	28.77	28.77	100.00
2014	27.09	27.09	100.00
2015	26.95	27.50	102.04
2016	27.03	27.50	101.74
2017	25.52	27.50	107.76
2018	25.78	27.50	106.67
2019	23.48	27.50	117.12
2020	21.99	N/A	N/A
2021	24.71	N/A	N/A

Solvency Test

Valuation Date	Aggregate Accrued Liabilities For: (1) Active Member Contributions	(2) Retirants and Beneficiaries	(3) Active Member (Employer Financed Portion)	Valuation Assets	Portion of Accrued Liabilities Covered by: (1)	(2)	(3)
6/30/1991	$ 44,496,039	$ 72,419,436	$ 86,372,322	$164,268,13	100.0 %	100.0 %	54.8 %
6/30/1992	49,238,019	80,342,604	86,902,648	179,569,85	100.0	100.0	57.5
6/30/1993	55,146,786	85,832,484	98,492,344	197,281,86	100.0	100.0	57.2
6/30/1994	60,424,161	95,449,308	105,838,311	213,540,66	100.0	100.0	54.5
6/30/1995	66,316,408	102,511,728	113,211,848	237,712,86	100.0	100.0	60.8
6/30/1996	72,294,235	109,572,672	118,739,900	266,740,00	100.0	100.0	71.5
6/30/1997	78,991,358	119,508,312	128,878,531	304,684,44	100.0	100.0	82.4
6/30/1998	85,106,175	129,345,816	134,514,294	353,056,57	100.0	100.0	103.0
6/30/1999	92,367,491	139,805,832	168,050,794	402,875,15	100.0	100.0	101.6
6/30/2000	100,413,022	150,527,136	186,809,583	453,953,72	100.0	100.0	108.7
6/30/2001	108,696,394	161,740,968	224,921,223	470,671,66	100.0	100.0	89.0
6/30/2002	118,913,979	187,508,568	247,524,186	463,101,52	100.0	100.0	63.3
6/30/2003	110,195,709	275,193,384	215,784,329	458,856,83	100.0	100.0	34.0
6/30/2004	123,643,527	286,698,084	235,009,321	494,986,79	100.0	100.0	36.0
6/30/2005	135,346,297	298,395,396	260,129,138	538,788,82	100.0	100.0	40.4
6/30/2006	140,387,532	326,828,088	268,577,863	588,227,84	100.0	100.0	45.1
6/30/2007	136,028,896	371,497,680	256,012,354	634,763,19	100.0	100.0	49.7
6/30/2008	125,331,432	473,240,976	223,632,380	650,227,21	100.0	100.0	23.1
6/30/2009	133,633,947	494,923,021	230,928,190	665,298,49	100.0	100.0	15.9
6/30/2010	140,224,998	525,200,232	239,055,106	641,818,55	100.0	95.5	0.0
6/30/2011	119,049,097	614,497,202	195,062,492	624,664,88	100.0	82.3	0.0
6/30/2012	122,240,396	607,450,331	211,247,995	597,106,51	100.0	78.2	0.0
6/30/2013	138,342,388	609,558,963	200,661,102	600,330,06	100.0	75.8	0.0
6/30/2014	142,418,791	647,811,688	222,162,858	655,997,80	100.0	79.3	0.0
6/30/2015	143,648,835	661,292,061	216,436,668	706,773,63	100.0	85.2	0.0
6/30/2016	133,200,540	699,577,704	197,916,702	732,926,71	100.0	85.7	0.0
6/30/2017	133,917,363	706,495,829	196,274,125	767,988,40	100.0	89.7	0.0
6/30/2018	138,420,705	716,751,118	198,815,201	803,439,26	100.0	92.8	0.0
6/30/2019	135,645,102	774,206,327	219,640,471	822,834,62	100.0	88.8	0.0

Comparative Schedule of Annual Pension Benefits Paid

Year Ending June 30	Retired Members	Annual Pensions	% Increase	No. of Active Per Retired	Pensions as % of Active Payroll	Average Pensions	Actuarial Present Value of Pensions	Expected Removals No.	Expected Removals Pensions
1989 [1]	780	$5,344,719	17.6%	4.2 [2]	6.6 %	$ 6,852	$ 46,556,352	26.6	$ 133,860
1990	832	6,488,714	21.4	3.9	7.5	7,799	57,430,128	28.5	150,864
1991 [1]	918	8,111,103	25.0	3.5	9.3	8,836	72,419,436	29.8	172,608
1992	965	9,010,345	11.1	3.3	10.5	9,337	80,342,604	32.3	208,068
1993 [1]	989	9,704,929	7.7	3.3	10.5	9,813	85,832,484	34.3	235,068
1994	1,035	10,612,612	9.4	3.2	11.3	10,254	95,449,308	35.8	263,340
1995 [1]	1,065	11,429,402	7.7	3.1	11.4	10,732	102,511,728	35.8	270,600
1996	1,105	12,236,298	7.1	3.1	11.6	11,074	109,572,672	37.7	302,952
1997 [1]	1,156	13,391,185	9.4	3.0	12.2	11,594	119,508,312	39.4	325,440
1998	1,208	14,479,476	8.1	2.9	12.7	11,986	129,345,816	42.4	370,344
1999 [1]	1,260	15,721,865	8.6	2.8	12.4	12,478	139,805,832	44.2	402,504
2000 [1]	1,301	16,966,042	7.9	2.8	12.7	13,041	150,527,136	46.2	445,464
2001 [1]	1,355	18,505,247	9.1	2.7	12.8	13,657	161,740,968	47.1	484,776
2002 [1]	1,442	21,273,162	15.0	2.5	13.9	14,753	187,508,568	53.3	622,236
2003 [1]	1,742	29,767,500	39.9	1.9	20.8	17,088	275,193,384	58.2	742,908
2004 [1]	1,753	30,491,864	2.4	2.0	20.4	17,394	286,698,084	55.7	717,888
2005 [1]	1,793	32,027,305	5.0	2.0	19.8	17,862	298,395,396	58.3	781,152
2006 [1]	1,878	35,091,468	9.6	1.7	22.5	18,686	326,828,088	61.1	857,760
2007 [1]	2,018	39,883,032	13.7	1.6	25.0	19,764	371,497,680	66.3	977,328
2008	2,307	49,489,643	24.1	1.4	32.1	21,452	473,240,976	74.4	1,134,019
2009	2,365	50,810,927	2.7	1.3	33.9	21,485	494,923,021	63.8	994,553
2010	2,450	53,115,267	4.5	1.2	37.5	21,680	525,200,232	58.9	948,815
2011	2,709	61,710,576	16.2	1.0	50.7	22,780	614,497,202	63.5	1,059,171
2012	2,704	61,737,864	0.0	1.0	49.4	22,832	607,450,331	66.1	1,125,302
2013	2,719	62,548,233	1.3	1.0	49.7	23,004	609,558,963	69.0	1,200,744
2014	2,764	64,275,837	2.8	1.0	50.8	23,255	647,811,688	70.4	1,219,112
2015	2,809	66,133,217	2.9	0.9	53.6	23,543	661,292,061	73.7	1,301,409
2016	2,945	70,256,788	6.2	0.8	61.0	23,856	699,577,704	75.9	1,392,573
2017	2,974	71,524,930	1.8	0.8	61.1	24,050	706,495,829	77.4	1,457,270
2018	3,031	73,325,441	2.5	0.8	62.1	24,192	716,751,118	80.8	1,555,043
2019	3,101	75,540,971	3.0	0.8	61.0	24,360	774,206,327	78.3	1,550,696

Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

Fiscal Year	Added to Rolls		Removed from Rolls		Rolls End of Year		Average Annual Allowance	Percentage Increase in Allowance
	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowance		
6/30/2005	68	$3,498,948	42	$485,633	1,791	$ 31,990,842	17,796	
6/30/2006	101	$2,335,032	53	$656,383	1,878	$ 35,092,308	18,686	4.61%
6/30/2007	213	$6,055,096	36	$403,347	2,018	$ 39,883,032	19,764	5.77%
6/30/2008	313	$10,001,857	24	$395,246	2,307	$ 49,489,643	21,452	8.54%
6/30/2009	112	$2,005,399	54	$684,115	2,365	$ 50,810,927	21,485	0.15%
6/30/2010	141	$3,089,275	56	$784,935	2,450	$ 53,115,267	21,680	0.91%
6/30/2011	332	$9,880,306	73	$1,284,997	2,709	$ 61,710,576	22,780	5.07%
6/30/2012	64	$1,084,848	69	$1,057,560	2,704	$ 61,737,864	22,832	0.23%
6/30/2013	96	$2,027,292	81	$1,216,923	2,719	$ 62,548,233	23,004	0.75%
6/30/2014	114	$2,635,101	69	$907,497	2,764	$ 64,275,837	23,255	1.09%
6/30/2015	127	$3,157,078	82	$1,299,698	2,809	$ 66,133,217	23,543	1.24%
6/30/2016	214	$5,463,524	78	$1,339,953	2,945	$ 70,256,788	23,856	1.33%
6/30/2017	124	$2,912,641	95	$1,644,499	2,974	$ 71,524,930	24,050	0.81%
6/30/2018	136	$3,062,324	79	$1,261,813	3,031	$ 73,325,441	24,192	0.59%
6/30/2019	149	$3,665,023	79	$1,149,493	3,101	$ 75,540,971	24,360	0.70%

Schedule of Active Member Average Salary by Age and Service as of July 1, 2019								
Age	Service							
	0-4	5-9	10-14	15-19	20-24	25-29	Over 29	Total
Under 20	$ 31,866	*	*	*	*	*	*	$ 31,866
20-24	34,599	*	*	*	*	*	*	34,599
25-29	36,906	45,656	*	*	*	*	*	38,007
30-34	41,372	43,520	43,735	*	*	*	*	42,145
35-39	45,168	48,505	47,143	46,167	*	*	*	46,423
40-44	42,821	44,894	46,658	53,370	56,074	*	*	46,376
45-49	44,924	47,978	51,871	52,750	53,438	50,850	*	50,289
50-54	49,882	49,069	53498	50,294	56,273	62,241	62,823	53,273
55-59	50,194	48,364	44,456	53,097	56,997	63,915	57,836	52,396
60-64	46,786	51,070	46,738	55,403	54,251	68,528	72,343	54,688
65-69	52,978	49,868	64,921	50,022	50,310	81,678	74,393	59,852
Over 70	*	*	68,550	*	*	*	*	67,196
Total	$ 42,384	$ 47,315	$ 49,196	$ 52,491	$ 55,192	$ 64,604	$ 67,105	$ 49,371

** Data excluded when cell contains less than five active members.*

Summary of Active Member Valuation For previous ten fiscal years				
Year	Count of members	Annual Covered Payroll	Average Annual Compensation	% change in annual average pay
2010	2,982	141,459,257	47,438	n/a
2011	2,628	121,631,362	46,283	-2.43%
2012	2,718	125,003,023	45,991	-0.63%
2013	2,750	125,857,903	45,767	-0.49%
2014	2,714	126,639,423	46,662	1.96%
2015	2,665	123,414,560	46,309	-0.76%
2016	2,495	115,183,349	46,166	-0.31%
2017	2,526	117,006,431	46,321	0.34%
2018	2,455	118,152,118	48,127	3.90%
2019	2,508	123,822,602	49,371	2.58%

Note: Summary of Census Data was prepared by City management using actuarial valuation reports for the applicable year.

SUMMARY OF BENEFIT PROVISONS

NORMAL RETIREMENT (NO REDUCTION FACTOR)

Eligibility*:*

Tier 1 – Members hired before July 1, 2011. Age 62, or a combination of age and creditable service equal to 80 (for those hired on or after July 1, 2009, eligibility at age 62 requires a minimum of 5 years of accrued service).

Tier 2 – Members hired on or after July 1, 2011. Age 65 with 5 years of service or a combination of age and creditable service equal to 85 and the attainment of age 60.

Amount - Creditable service times 2.25% of average final compensation for Tier 1 and 2.00% of average final compensation for Tier 2.

Average Final Compensation - The average monthly creditable compensation for the period of 36 consecutive months during which the member's creditable compensation was the highest during the 120 months immediately preceding the date of retirement for Tier 1 and 60 consecutive months during which the member's creditable compensation was the highest during the 120 months immediately preceding the date of retirement for Tier 2. Effective July 1, 2000, accrued unused sick leave at the final salary may be substituted for an equal number of hours at the beginning of the 36 month period for Tier 1.

EARLY RETIREMENT (REDUCTION FACTOR)

Eligibility - Age 55 with 20 or more years of creditable service for Tier 1 and age 60 with 20 or more years of creditable service tor Tier 2.

Amount - An amount computed as for normal retirement but reduced by 1/2 of 1% per month for each month (6% per year) retirement precedes normal retirement.

DEFERRED RETIREMENT (VESTED TERMINATION)

Eligibility - 5 or more years of accrued service. Deferred retirement benefits for terminated vested employee becomes automatic at age 62 (age 65 for Tier 2) or when a combination of age and creditable service equals 80 (85 with the attainment of age 60 for Tier 2), unless the member elects to withdraw the employee contribution account in lieu of a deferred retirement benefit. In addition to the eligibility listed above, the term-vested member may chose an Early Retirement (minimum age of 55 for Tier 1 and 60 for Tier 2 and minimum service of 20 yrs) subject to the same reduction – reduced by ½ of 1% per month for each month (6% per year) retirement precedes normal retirement eligibility.

Amount - An amount computed as for normal retirement.

SUMMARY OF BENEFIT PROVISONS (continued)

DISABILITY RETIREMENT

Eligibility - Eligibility requires 10 or more years of credited service and a disability that is total and permanent.

Amount - An amount computed as for normal retirement. Disability Retirement Benefits are offset, if the combination of all employer-provided benefits exceeds 100% of the members adjusted income base, then members pension benefit from TSRS is reduced so income does not exceed the 100% maximum allowed.

PRE-RETIREMENT SURVIVOR BENEFITS

Eligibility - 5 or more years of accrued service and not eligible to retire.

Amount - Lump sum payment equal to twice the member's contributions, with interest.

Eligibility - After attaining eligibility for retirement, in the event the member dies prior to submitting an application for retirement benefits:

Amount - If the member is married, a default provision allows the member's spouse to elect to receive either a lump sum payment of twice the member's contributions account, or receive a lifetime annuity benefit determined as if the member had elected a joint & last survivor benefit of 100% survivor annuity prior to death. If the member is not married and has named a single non-spousal beneficiary, the beneficiary may elect to receive either a lump sum payment of twice the member's contributions account, or receive a 15 year annuity benefit determined as if the member elected payment of a 15 year term certain annuity. If the member has named multiple designated beneficiaries, a lump sum refund of the member's account balance will be paid to the named beneficiaries.

OTHER TERMINATION BENEFITS

Eligibility - Termination of employment without eligibility for any other benefit.

Amount - Accumulated contributions and interest in members account at time of termination.

EMPLOYEE CONTRIBUTIONS

Interest is credited to member accumulated contributions accounts as simple interest two times per year at an annual interest rate of 3.0%. For those hired prior to July 1, 2006, employee contributions are 5.00% of salary. For those hired between July 1, 2006 and June 30, 2011 (Tier I variable class) and for those hired after July 1, 2011 (Tier II variable class), employee contributions are 50% of the respective Normal Cost for each class, with a floor of 5.0%. The employee contributions for the Tier I and Tier II variable classes for FY 19/20 are 6.95% and 5.33%, respectively, before application of the floor or roundup policy.

SUMMARY OF BENEFIT PROVISONS (concluded)

CITY CONTRIBUTIONS

City Contributions are actuarially determined; which together with employee contributions and investment earnings will fund the obligations of the System in accordance with generally accepted actuarial principles. (Please refer to the Funding Policy in Section I of this report).

POST-RETIREMENT ADJUSTMENTS

The TSRS Board has established formal policies to determine whether the system shall fund an annual supplemental post-retirement benefit payment to retired members and beneficiaries.

Statistical

Discussion of Statistical Section

This section of the Tucson Supplemental Retirement System's comprehensive annual financial report (CAFR) provides detailed financial and non-financial information, often considered relevant to users. The statistical section presents certain information on a trend basis; that is, a summary of information that is provided for each year in a ten-year period. Other non-trend schedules present demographic and participation information for our active and retired membership. Each schedule is defined below with an explanation and an identification of the source of the data.

Statement of Changes in Plan 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 or not sufficient resources are available in the current fiscal year to cover plan benefits. This schedule is developed using the Statements of Changes in Plan Net Position for the past ten years.

Retired Members by Type of Benefit
This schedule provides the number of retired members by type of benefit. The TSRS plan benefits include payments for normal retirement benefits, disability benefits, survivor benefits, and term certain benefits paid to members, beneficiaries and alternate payees. The schedule is developed using TSRS' database.

Average Monthly Benefit Payments to New Retirees
This schedule provides the average monthly benefit payments made to new retirees, using six ranges of years of credited service by year. This information is provided to illustrate changes in benefit payments as the amount of service earned increases and indicates the number of employees retired during each of the last 10 years. This schedule is developed using TSRS' database.

Demographics of Retired and Active Members
This schedule provides the age demographics of all retirees, survivors and beneficiaries of retired members for this year only. Similarly, age demographics for the systems active membership are indicated as well as the relative composition of membership categorized by Tier. This schedule is developed using TSRS' membership database.

Employee and Employer Contribution Rates
This schedule provides the contribution rates paid by the Plan sponsor and by City employees during the past 10 years. This schedule is a historical summary of the actual rates paid.

Benefit and Refund Deductions from Net Position by Type
This schedule provides the benefits paid to all service and disability retirees during each of the last 10 years. In addition, the lump sum payments to members elected to participate in the End of Service program since 2007 and refunds associated with member deaths, separation from service and transfers to other retirement systems are summarized. This schedule is developed using the Statements of Changes in Plan Net Position for the past ten years.

Retiree Benefit and Service Summary
This schedule indicates average retiree benefits paid to retirees, based on the number of years retired, indicating eight age categories and the years of credited service served. This schedule is developed using TSRS' membership database.

Tucson Supplemental Retirement System
Statement of Changes in Net Plan Position – Last Ten Fiscal Years

For the Fiscal Years Ending June 30,

	2019	2018	2017	2016	2015
Additions					
City Contributions	$32,589,204	$ 31,795,197	$ 31,823,694	$ 33,175,307	$33,985,523
Employee Contributions	6,249,028	6,075,912	6,115,389	6,300,714	6,512,180
Purchase of Service	1,530,449	2,485,835	1,258,421	755,299	1,019,665
Contributions from Other Sources	-	-	-	-	-
Transfers from Other Systems	-	-	65,255	27,372	-
Total Contributions	$40,368,681	$ 40,356,944	$ 39,262,759	$ 40,258,692	$41,517,368
Investment Income					
Net Gain (Loss) in Fair Value of Investments	$40,085,019	$65,251,196	$89,165,007	$8,758,641	$22,467,139
Interest	6,493,541	5,934,621	6,638,087	6,649,353	6,393,666
Dividends	8,023,227	6,913,192	6,050,746	6,408,886	5,915,832
Securities Lending Income	129,014	136,768	142,453	148,059	163,140
Miscellaneous Income	46,065	113,278	189,575	105,713	20,783
Net Income from Investment Activity	$54,749,865	$78,349,055	$102,185,868	$22,070,652	$34,960,560
Less Investment Expenses:					
Securities Lending Fees	$ 51,579	$54,675	$56,952	$59,201	$65,676
Investment Services	4,879,176	8,596,792	4,261,291	3,937,354	4,092,449
Total Investment Expense	$ 4,930,755	$8,651,467	$4,318,243	$3,996,555	$4,158,125
Net Investment Gain	$49,819,110	$69,697,588	$97,867,625	$18,074,097	$30,802,435
Total Additions	$90,187,791	$110,054,532	$137,130,384	$58,332,789	$72,319,803
Deductions					
Benefits	$74,928,771	$72,445,792	$71,059,090	$67,910,496	$65,216,458
Refunds	1,657,445	3,172,406	2,147,211	2,499,342	2,395,893
Transfers to Other Systems	-	-	6,856	35,912	-
Administrative Expenses	652,065	745,753	756,268	786,028	650,405
Miscellaneous Deductions	-	-	901	111,679	-
Total Deductions	$77,238,281	$76,363,951	$73,970,326	$71,343,457	$68,262,756
Net Change in Plan Net Position	**$12,949,510**	**$33,690,581**	**$63,160,058**	**$(13,010,668)**	**$4,057,047**

Tucson Supplemental Retirement System
Statement of Changes in Net Plan Position – Last Ten Fiscal Years (continued)

	For the Fiscal Years Ending June 30,				
	2014	**2013**	**2012**	**2011**	**2010**
Additions					
City Contributions	$34,189,288	$34,523,315	$27,429,666	$23,432,916	$23,260,609
Employee Contributions	6,636,833	9,200,262	7,685,264	7,562,294	8,041,748
Purchase of Service	701,711	1,014,301	1,280,263	3,772,923	1,556,832
Contributions from Other Sources	-	-	50,000	50,000	50,000
Transfers from Other Systems	-	-	204,404	700,009	1,652,656
Total Contributions	$41,527,832	$44,737,878	$36,649,597	$35,518,142	$34,561,845
Investment Income					
Net Gain (Loss) in Fair Value of Investments	$111,063,362	$73,705,613	$566,661	$106,114,437	$40,143,355
Interest	5,901,539	4,174,559	6,319,874	6,361,246	7,441,435
Dividends	6,786,728	7,158,084	4,981,339	5,589,052	6,743,309
Securities Lending Income	134,036	184,733	157,562	124,158	91,625
Miscellaneous Income	91,630	98,400	16,833	45,681	3,640
Net Income from Investment Activity	$123,977,295	$85,321,389	$12,042,269	$118,234,574	$54,423,364
Less Investment Expenses:					
Securities Lending Fees	$ 54,589	$78,604	$68,370	$35,027	$25,401
Investment Services	4,022,476	3,805,861	3,460,730	3,871,641	4,096,007
Total Investment Expense	$ 4,077,065	$3,884,465	$3,529,100	$3,906,668	$4,121,408
Net Investment Gain	$119,900,230	$81,436,924	$8,513,169	$114,327,906	$50,301,956
Total Additions	$161,428,062	$126,174,802	$45,162,766	$149,846,048	$84,863,801
Deductions					
Benefits	$63,477,074	$62,191,480	$61,693,408	$58,247,882	$51,700,541
Refunds	2,524,939	2,631,221	2,247,225	2,350,626	2,110,360
Transfers to Other Systems	-	-	-	2,928,607	898,085
Administrative Expenses	735,739	689,252	550,604	728,642	672,622
Miscellaneous Deductions	-	-	-		
Total Deductions	$66,737,752	$65,511,953	$64,491,237	$64,255,757	$55,381,608
Net Change in Plan Net Position	**$94,690,310**	**$60,662,849**	**$(19,328,471)**	**$85,590,291**	**$29,482,193**

Tucson Supplemental Retirement System
Retired Members by Type of Benefit
As of June 30, 2019

Amount of Monthly Benefit		Number of Retirees	Type of retirement: 1	2	3	4
$ 1	$ 250	39	28	10	1	-
251	500	185	118	37	10	20
501	750	245	145	58	32	10
751	1,000	236	143	56	30	7
1,001	1,250	279	204	47	26	2
1,251	1,500	236	183	36	15	2
1,501	1,750	265	235	17	13	-
1,751	2,000	288	262	15	10	1
2,001	2,250	241	224	11	6	-
2,251	2,500	223	211	9	3	-
2,501	2,750	176	170	5	1	-
2,751	3,000	132	131	-	1	-
3,001	3,250	108	107	1	-	-
3,251	3,500	59	58	1	-	-
3,501	3,750	64	64	-	-	-
3,751	4,000	59	57	2	-	-
4,001	4,250	43	42	1	-	-
4,251	4,500	40	40	-	-	-
4,501	or more	183	182	1	-	-
		3,101	2,604	307	148	42

1 Normal Retirement
2 Beneficiary Payment, normal retirement
3 Disability Retirement
4 Beneficiary Payment, disability retirement

Amount of Monthly Benefit		Number of Retirees	Benefit option selected: 1	2	3	4	5	6	7
$ 1	$ 250	39	26	-	-	1	5	2	5
251	500	185	113	1	2	5	22	8	34
501	750	245	135	-	2	2	48	15	43
751	1,000	236	120	-	2	-	47	19	48
1,001	1,250	279	136	-	-	-	34	36	73
1,251	1,500	236	103	-	1	2	46	36	48
1,501	1,750	265	116	1	1	3	49	32	63
1,751	2,000	288	132	-	3	3	48	42	60
2,001	2,250	241	106	1	5	3	57	26	43
2,251	2,500	223	93	-	-	1	58	20	51
2,501	2,750	176	92	-	2	1	27	15	39
2,751	3,000	132	79	-	-	-	15	15	23
3,001	3,250	108	50	-	-	2	16	8	32
3,251	3,500	59	28	-	1	-	13	7	10
3,501	3,750	64	33	-	-	-	8	7	16
3,751	4,000	59	33	-	-	1	4	4	17
4,001	4,250	43	21	-	-	1	6	3	12
4,251	4,500	40	26	-	1	-	4	6	3
4,501	or more	183	94	-	1	3	27	24	34
		3,101	1,536	3	21	28	534	325	654

1 Lifetime benefit for member only
2 Remainder of 5-Year Term pays beneficiary
3 Remainder of 10-Year Term pays beneficiary
4 Remainder of 15-Year Term pays beneficiary
5 Beneficiary receives 50% for life
6 Beneficiary receives 75% for life
7 Beneficiary receives 100% for life

Tucson Supplemental Retirement System
Average Monthly Payments to New Retirees
As of June 30, 2019

Retirement Effective Dates For Fiscal Years Ending June 30:	Years of credited service: <5	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	>30
2019							
Avg monthly benefit	n/a	$515	$1,117	$1,337	$2,047	$2,902	$3,953
Avg monthly final avg comp	n/a	3,551	3,869	3,558	4,339	4,910	5,683
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2018							
Avg monthly benefit	n/a	$543	$929	$1,409	$2,116	$3,431	$3,422
Avg monthly final avg comp	n/a	3,774	3,386	3,919	4,512	5,671	5,290
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2017							
Avg monthly benefit	n/a	599	1,184	1,540	2,368	2,812	4,236
Avg monthly final avg comp	n/a	3,747	4,078	4,409	5,164	4,810	6,099
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2016							
Avg monthly benefit	n/a	677	1,001	1,439	2,155	2,868	3,854
Avg monthly final avg comp	n/a	3,829	4,076	3,883	4,465	4,977	5,660
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2015							
Avg monthly benefit	n/a	803	1,077	1,670	2,202	2,968	3,864
Avg monthly final avg comp	n/a	5,267	3,679	4,698	4,645	5,118	5,506
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2014							
Avg monthly benefit	n/a	635	1,024	1,665	2,364	2,693	4,188
Avg monthly final avg comp	n/a	4,040	4,005	4,255	4,870	4,617	6,061
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013							
Avg monthly benefit	507	578	1,275	1,669	2,060	2,956	3,876
Avg monthly final avg comp	5,609	3,077	4,497	4,121	4,041	4,680	5,124
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012							
Avg monthly benefit	237	563	923	1,829	1,428	2,401	2,745
Avg monthly final avg comp	2,728	3,355	3,240	4,787	2,767	3,869	3,745
Number of active/EOSP retirees	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011							
Avg monthly benefit	519	560	964	1,913	2,303	2,998	3,780
Avg monthly final avg comp	2,865	3,350	3,352	4,774	4,509	4,899	5,044
Number of active/EOSP retirees	5	12	18	24	83	107	58
2010							
Avg monthly benefit		481	931	1,466	2,374	2,386	3,376
Avg monthly final avg comp		3,229	2,976	3,841	5,148	4,251	4,871
Number of active/EOSP retirees		23	16	13	35	23	13

*Includes EOSP Participants still employed and alt. payees receiving benefits

Tucson Supplemental Retirement System
Demographics of Retired and Active Members

As of June 30, 2019

Retired Members

	Retirees			Survivor/Beneficiaries		
Ages	Female	Male	Total	Female	Male	Total
<55	25	19	44	10	3	13
55 - 59	99	58	157	9	1	10
60 - 64	205	252	457	25	3	28
65 - 69	302	419	721	31	3	34
70 - 74	208	417	625	47	6	53
75 - 79	134	236	370	69	3	72
80 - 84	71	139	210	58	4	62
85 - 89	34	79	113	44	4	48
90 - 94	17	27	44	18	0	18
95 - 100	5	5	10	9	2	11
101+	0	1	1	0	0	0
Total	1,100	1,652	2,752	320	29	349

Active Members

	Active Members			Percentage Distribution		
Ages	Female	Male	Total	Female	Male	Total
<20	3	6	9	0.12%	0.24%	0.36%
20 - 29	98	83	181	3.91%	3.31%	7.22%
30 - 39	196	253	449	7.81%	10.09%	17.90%
40 - 49	281	375	656	11.20%	14.95%	26.16%
50 - 59	306	470	776	12.20%	18.74%	30.94%
60 - 69	151	259	410	6.02%	10.33%	16.35%
70+	13	14	27	0.52%	0.56%	1.08%
Total	1,048	1,460	2,508	41.79%	58.21%	100.00%

Active Members by Tier

	Members	Payroll	% Payroll
Tier 1 - (Fixed Contribution Rate)	1,047	57,817,074	46.66%
Tier 1 - (Variable Contribution Rate	251	12,160,242	9.81%
Tier 2 - (Variable Contribution Rate	1,210	53,946,672	43.53%
	2,508	123,923,987	100.00%

Tucson Supplemental Retirement System
Employee and Employer Contribution Rates
As of June 30, 2019

Fiscal Year		Employee Rate (percentage)		Employer Rate (percentage)		Total Contribution (percentage)
		Fixed	Variable	Fixed	Variable	
08/09		5.0	7.788	14.47	11.682	19.47
09/10		5.0	8.852	17.13	13.278	22.13
10/11		5.0	9.428	18.57	14.142	23.57
11/12		5.0	11.62	24.05	17.43	29.05
12/13		5.0	13.976	29.94	20.964	34.94
13/14	Tier I	5.0		27.32		32.32
13/14	Tier I		6.715		25.61	32.32
13/14	Tier II		5.06		27.26	32.32
14/15	Tier I	5.0		27.22		32.22
14/15	Tier I		6.67		25.55	32.22
14/15	Tier II		5.14		27.08	32.22
15/16	Tier I	5.0		27.23		32.23
15/16	Tier I		6.62		25.61	32.23
15/16	Tier II		4.91		27.32	32.23
16/17	Tier I	5.0		27.23		30.69
16/17	Tier I		6.6		25.61	30.69
16/17	Tier II		4.89		27.32	30.69
17/18	Tier I	5.0		25.93		30.93
17/18	Tier I		6.55		24.38	30.93
17/18	Tier II		4.89		26.04	30.93
18/19	Tier I	5.0		23.59		28.59
18/19	Tier I		6.50		22.09	28.59
18/19	Tier II		4.85		23.74	28.59

Tucson Supplemental Retirement System
Benefit and Refund Deductions from Net Position by Type
As of June 30, 2019

	fiscal years ended June 30,									
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Type of Benefit										
Service Benefits:										
Retirees	$ 67,849,255	$ 65,869,174	$ 64,773,949	$ 61,959,726	$ 59,384,728	$ 57,542,260	$ 56,406,478	$ 48,475,837	$ 51,377,474	$ 45,580,606
EOSP lump sum [1]	-	-	-	-	-	-	-	7,656,801	1,517,252	997,448
Survivors [2]	4,668,534	4,153,521	3,863,588	3,550,465	3,422,222	3,533,539	3,397,302	3,166,737	2,951,507	2,757,941
Disability Benefits:										
Retirees	1,994,171	2,047,349	2,056,530	2,033,977	2,035,754	2,082,396	2,066,746	2,056,266	2,057,473	2,015,248
Survivors	416,811	375,748	365,023	366,328	373,754	318,879	320,954	337,767	344,176	349,299
Total Benefits	$ 74,928,772	$ 72,445,792	$ 71,059,090	$ 67,910,496	$ 65,216,458	$ 63,477,074	$ 62,191,480	$ 61,693,408	$ 58,247,882	$ 51,700,541
Type of Refund										
Death	$ -	$ 564,206	$ 231,486	$ 699,603	$ 316,820	$ 212,489	$ 316,495	$ 310,994	$ 305,536	$ 250,047
Separation	1,657,445	2,519,896	1,389,082	1,158,825	1,937,365	1,871,535	2,281,823	1,936,231	2,045,089	1,860,312
Transfers	-	88,304	533,499	676,826	141,708	440,915	32,903	-	2,928,607	898,085
Total Refunds	$ 1,657,445	$ 3,172,406	$ 2,154,067	$ 2,535,254	$ 2,395,893	$ 2,524,939	$ 2,631,221	$ 2,247,225	$ 5,279,232	$ 3,008,445

(1) EOSP - An End of Service Program benefit option became available for the first time in FY2007, allowing retiring employees to accumulate up to one year's worth of benefit payments during their final year of employment

(2) Includes Death in service pension benefits

Tucson Supplemental Retirement System
Retiree Benefit and Service Summary
As of June 30, 2019

# yrs Retired	Average Benefit [1]	Total Monthly Benefit	# of Retirees [2]	Age as of June 30, 2019								Years of Credited Service		
				<55	56 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85+	<10	10-19	20+
<5	2,132	1,257,852	590	36	109	222	166	40	11	3	3	187	110	293
5 - 9	2,269	1,416,038	624	8	40	164	237	148	23	3	1	82	122	420
10 - 14	2,325	1,722,693	748	10	13	75	222	261	126	37	4	92	148	508
15 - 19	2,022	1,124,204	556	2	4	13	103	202	157	69	6	45	117	394
20 - 24	1,355	378,101	279	1	1	8	16	25	98	80	50	33	70	176
25 - 29	1,394	256,451	184	-	-	2	4	7	21	59	91	26	40	118
30+	1,114	133,625	120	-	-	1	-	2	6	21	90	22	25	73
	2,033	6,288,964	3,101	57	167	485	748	685	442	272	245	487	632	1,982

Notes:
(1) Average Benefit for all retirees is $2,032 per month
(2) # of Retirees includes alternate payees and survivors