Worcester Retirement System

Worcester, Massachusetts

(A Component Unit of the City of Worcester, Massachusetts)

Annual Comprehensive Financial Report

Fiscal Year Ended December 31, 2022

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For the Fiscal Year Ended December 31, 2022

Prepared by the Staff of the
Worcester Retirement System

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Introductory Section

Worcester Retirement System
Room 103 City Hall Worcester Massachusetts 01608 Phone (508) 799 1062

September 1, 2023

Worcester Retirement Board
City Hall Room 103
455 Main Street
Worcester, MA 01608

Dear Members of the Board:

We are pleased to submit the Annual Comprehensive Financial Report of the Worcester Retirement System (WRS) for the year ended December 31, 2022. The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the WRS for its Annual Comprehensive Financial Report for the year ended December 31, 2021. This was the nineteenth consecutive year that the WRS has achieved this prestigious award. In order to be awarded a Certificate of Achievement, the WRS must publish an easily readable and efficiently organized Annual Comprehensive Financial Report. This report must satisfy both accounting principles generally accepted in the United States of America and applicable legal requirements. Management accepts responsibility for the contents of the report.

A Certificate of Achievement is valid for a period of one year. We believe that our current Annual Comprehensive 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.

GASB Statement No. 34 requires that management provide a narrative introduction, overview and analysis to accompany the basic financial statements in the form of Management's Discussion and Analysis (MD&A). This letter of transmittal is designed to complement the MD&A and should be read in conjunction with it. The WRS's MD&A can be found immediately following the report of the independent auditor.

History of the WRS

The WRS became operative as of January 1, 1945 under Massachusetts General Laws Chapter 32 (M.G.L. c.32). The WRS is a contributory defined benefit plan that covers eligible employees of the City of Worcester (except Worcester Public School teachers) and the Worcester Housing Authority (WHA). The WRS is administered by a five member Board consisting of the City Auditor, two representatives elected from the membership, a City Manager representative and a fifth member chosen by the other four who cannot be an employee, retiree or official of the City. One Board member is elected from the group to serve as Chairman.

Investment Results

The WRS has an Investment Policy Statement which establishes investment objectives and policies providing the framework for investments. This Policy is reviewed on an annual basis. A summary of the Investment Policy is included in the Investment Section. The System uses a custodian bank to safeguard the assets and ensure proper settlement and recording of transactions.

An integral part of the overall Investment Policy is the Asset Allocation Policy. This is designed to provide an optimal mix of asset classes to both preserve principal and provide adequate funds to pay pension benefits. Both traditional assets (cash, bonds, domestic stocks, domestic fixed income and mortgages) and nontraditional assets (real estate, international stock and fixed income, venture capital, mezzanine financing, hedge funds, timber, natural resources, infrastructure and leveraged buyouts) are part of the mix. The investment market results have demonstrated the importance of a diversified asset allocation.

WRS time-weighted investment return of (-8.32)% for 2022 was less than both the actuarial expected rate of return and the Investment Policy benchmark. Please refer to the Investment Section of this Annual Comprehensive Financial Report for more information on investment results.

Chapter 68 of the Acts of 2007, An Act to Reduce the Stress on Local Property Taxes Through Enhanced Pension Fund Investment, was signed into law July 25, 2007. This Act amends M.G.L. c.32 §22 and directs the Public Employee Retirement Administration Commission (PERAC) to conduct an annual analysis of all Massachusetts public pension plans. The assessment includes the investment performance and funded ratio of each system every January 1st in accordance with the established methodology and standard. Systems failing to meet the standard are mandated to transfer the system's assets to the Massachusetts Pension Reserve Investment Management (PRIM) Board. The WRS met these mandated standards for each year since 2007 and is not subject to the mandatory transfer of system assets.

Major Initiatives

Benefits

A cost-of-living adjustment (COLA) was granted to eligible retirees and survivors effective July 1, 2022. Pursuant to Chapter 269 of the Acts of 2022, the Board approved a one-time increase in the COLA from 3% to 5% effective July 1, 2022. The 5% COLA was paid on a base of $14,000 (maximum $700). The WRS has granted the maximum percent allowed by law since enactment of the legislation in 1997 in all but one year (2011- 2.5%).

Signed into law on November 18, 2011, Chapter 176 of the Acts of 2011 became effective February 16, 2012 and is thought to reform and modernize the pension laws for public employees in Massachusetts. The law creates a new benefit structure for employees hired on or after April 2, 2012. The new age factors established will increase the minimum age for retirement. Calculation of the pension will use a 5-year average and contains anti-spiking provisions for both new members and current employees.

Administration

Chapter 176 of the Acts of 2011 has a number of corporate governance provisions that require the WRS adhere to specific procurement procedures for investment management and related services. The Act also mandates training and financial disclosures of all Board members.

The WRS strives to provide quality service and information to active and retired members and their beneficiaries. To assist in this effort, we maintain and continually update our Internet site through the City web page, which includes our Annual Comprehensive Financial Report, at www.worcesterma.gov/retirement-board.

The WRS continues to focus on the education of its members both active and retired and in early 2017 published a newsletter which we have continued to release bi-annually. The newsletter is available on our website.

Internal and Budgetary Controls

The WRS management is responsible for maintaining a system of internal controls designed to provide reasonable, but not absolute, assurance that the financial statements are fairly stated in accordance with accounting principles generally accepted in the United States of America while adequately safeguarding the assets. We believe the current internal controls accomplish this goal. The concept of reasonable assurance recognizes that the cost of internal controls should not exceed their anticipated benefits (also, the evaluation of costs and benefits requires estimates and judgments by management).

The WRS budget is presented to and approved by the Board each year. All the expenditures are reviewed by the Board at its monthly meeting.

Accounting

This report has been prepared in accordance with accounting principals generally accepted in the United States of America. The basic financial statements are presented in accordance with the principles of the Government Accounting Standards Board (GASB), including guidelines established by GASB Statements No. 34, *Basic Financial Statements – and Management's Discussion and Analysis – for State and Local Governments*; No. 37, *Basic Financial Statements – and Management's Discussion and Analysis – for State and Local Governments; Omnibus*, No. 38, *Certain Financial Statement Note Disclosures*; No. 40 *Deposit and Investment Risk Disclosures* *(an amendment of GASB No. 3);* No. 63 *Financial Reporting of Deferred Outflows of Resources, Deferred Inflows of Resources, and Net Position;* and No. 67 *Financial Reporting for Pension Plans—an amendment of GASB Statement No. 25*.

CliftonLarsonAllen LLP, a firm of licensed certified public accountants, performed the audit for the WRS. The goal of the independent audit is to provide reasonable assurance that the financial statements for the year ended December 31, 2022 are free of material misstatements. The report of the independent auditors is included in the Financial Section of this report. CliftonLarsonAllen LLP has issued an unmodified opinion on the WRS's basic financial statements for the year ended December 31, 2022.

Actuarial Funding

The WRS has retained the services of The Segal Company, an independent actuarial firm, to conduct an annual actuarial valuation of the WRS. The funded ratio is one measure of the financial condition of the WRS. The funded ratio is calculated by dividing the net position of the WRS by the projected pension liability. The projected pension liability is a measure of the present value of total pension benefits estimated to be payable in the future to both current and future retirees and/or beneficiaries. A higher funding ratio gives the members a greater degree of assurance that their pension benefits are secure. As of January 1, 2023, the funded ratio of the WRS was calculated at 73.59%; a 0.67% increase on an actuarial basis from the prior year. On a market value basis the funded ratio has decreased from 81.02% to 71.58%.

Acknowledgements

We are pleased to have once again completed this report in accordance with the GFOA Certificate of Achievement guidelines. We are proud to provide an annual report to our members that is both easy to read and comprehensive. We feel it is important to provide an Annual Comprehensive Financial Report for our members and other interested parties to follow the progress of the WRS. The publication of this report represents the combined efforts of the WRS staff, auditor, actuary, and investment consultants. We would like to acknowledge and thank them for their hard work and collaboration.

Respectfully submitted,

Lisa M Poske

Lisa Poske
Executive Secretary

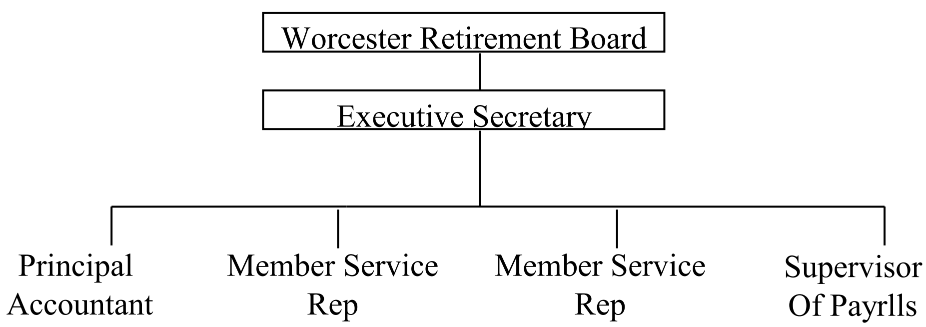
Retirement Board Members

Robert V. Stearns	Ex-Officio Member	01/08/2023 - 01/26/2026
Stephen F. Wentzell	City Manager Appointee	At the discretion of the City Manager
Elizabeth A. Early	Elected Member	11/01/2022 - 10/31/2025
John F. Mahan	Elected Member	01/01/2021 - 12/31/2023
Tamara Cullen	Appointed Member	11/08/2021- 11/07/2024

Administrative Staff

Lisa M. Poske	Executive Secretary
Nu Pham	Principal Accountant
Jennifer Wood	Supervisor of Payrolls
Lori Cutroni	Member Service Representitive
Vicki Cabezas	Member Service Representitive

Organizational Chart*



* Does not include investment professionals who provide services to the WRS. A list of these investment professionals is located on the following page. In addition, please refer to the Schedule of Fees and Commissions and 2022 Commissions to Brokers located within the Investment Section of this report, starting on page 52.

CONSULTANTS AND PROFESSIONAL SERVICES

DOMESTIC EQUITY MANAGERS

LMCG
Boston, MA
State Street Global Advisors
Boston, MA

DOMESTIC FIXED INCOME MANAGERS

Income Research & Management
Boston, MA
Loomis Sayles & Company, L.P.
Boston, MA

INTERNATIONAL EQUITY MANAGERS

Acadian Asset Management
Boston, MA
State Street Global Advisors
Boston, MA

ALTERNATIVE CAPITAL INVESTMENT MANAGERS

American Securities Partners
New York, NY
Ascent Venture Management
Boston, MA
Boston Millennia Partners
Boston, MA
Capital International Private Equity Fund
Irvine, CA
Charlesbank Capital Partners
Boston, MA
Eaton Vance Investment Managers
Chicago, IL
Global Infrastructure Partners
New York, NY
Harvest Partners, LLC
New York, NY
IFM Infrastructures
New Yrok, NY
Newstone Capital Partners, L.P.
Los Angeles, CA
Northstar Capital, LLC
Minneapolis, MN
Old Farm Partners
New York, NY
Ridgemont Equity Partners
Charlotte, NC
Standard Life Investments Limited
Edinburgh, UK
The Riverside Company
New York, NY
Vitruvian Partners
London, England
White Deer Energy TE L.P.
Houston, TX

REAL ESTATE MANAGERS

AEW Capital Management, L.P.
Boston, MA
RMK Timberland a div. of Regions Bank
Atlanta, GA
Mass PRIM
Boston, MA
TA Realty
Boston, MA

LEGAL ADVISORS

The Law Offices of Michael Sacco
Southampton, MA

DISABILITY INSURANCE CONSULTANTS

Umass Medical School
Worcester, MA

INDEPENDENT AUDITORS

CliftonLarsonAllen LLP
Lexington, MA

INVESTMENT ADVISORS

Meketa Investment Group
Westwood, MA

ACTUARIAL CONSULTANT

The Segal Company
Boston, MA

CUSTODIAN

Peoples United Bank
Beverly, MA

COMMISSION RECAPTURE BROKERS

Cowen Plan Sponsor Services
New York, NY

Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Worcester Retirement System
Massachusetts

For its Annual Comprehensive
Financial Report
For the Fiscal Year Ended

December 31, 2021

Executive Director/CEO

Financial Section

Independent Auditors' Report

To the Honorable Retirement Board
Worcester Retirement System

Report on the Audit of the Financial Statements

Opinion

We have audited the accompanying financial statements of the Worcester Retirement System (WRS), a component unit of the City of Worcester, Massachusetts, as of and for the year ended December 31, 2022, and the related notes to the financial statements, which collectively comprise WRS's basic financial statements as listed in the table of contents.

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the WRS as of December 31, 2022, and the change in fiduciary net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the WRS and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for 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.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the WRS's ability to continue as a going concern for twelve months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

To the Honorable Retirement Board
Worcester Retirement System

Auditors' Responsibilities for the Audit of the Financial Statements
Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit 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 WRS's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the WRS's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control related matters that we identified during the audit.

Required Supplementary Information
Accounting principles generally accepted in the United States of America require that the management's discussion and analysis, schedule of changes in employer net pension liability (asset) and related ratios, schedule of employer contributions and schedule of investment returns be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with GAAS, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion

or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Supplementary Information

Our audit was conducted for the purpose of forming an opinion on the financial statements that collectively comprise WRS's basic financial statements. The accompanying supplementary information as referenced in the Table of Contents is presented for purposes of additional analysis and is not a required part of the basic financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the supplementary information is fairly stated, in all material respects, in relation to the basic financial statements as a whole.

Other Information

Management is responsible for the other information included in the annual report. The other information comprises the introductory, investment, actuarial, and statistical sections, but does not include the basic financial statements and our auditors' report thereon. Our opinion on the basic financial statements does not cover the other information, and we do not express an opinion or any form of assurance thereon.

In connection with our audit of the basic financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the basic financial statements, or the other information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated September 1, 2023 on our consideration of the WRS'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 solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the WRS'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 WRS's internal control over financial reporting and compliance.

CliftonLarsonAllen LLP
Boston, Massachusetts
September 1, 2023

Management's Discussion & Analysis

Our discussion and analysis of the Worcester Retirement System's (WRS) financial performance provides an overview of the WRS's financial activities for the fiscal year ended December 31, 2022. Please read it in conjunction with the transmittal letter in the Introductory Section, at the front of this report, and the financial statements that follow this discussion. The Management's Discussion and Analysis (MD&A) is intended to serve as an introduction to the WRS's financial statements, as well as to offer readers of the WRS's financial statements a narrative view and analysis of the WRS's financial activities.

Financial Highlights

The WRS's funding objective is to meet long-term benefit obligations through contributions and investment income. As of December 31, 2022, the funded ratio was 73.59% based on the actuarial value of assets at that date.

Net position decreased during the year by $126.5 million or 9.4%, because of negative investment returns. Net position is the residual of the WRS's assets in excess of the WRS's liabilities as of the statement date. The WRS's assets are held in trust to meet future benefit payments.

Total investment losses were $110.7 million. The time weighted investment return was -8.32%, which was lower than the actuarial benchmark of 6.80% and the return of 19.67% in the previous year.

Overview of the Financial Statements

The financial statements are comprised of a Statement of Fiduciary Net Position, Statement of Changes in Fiduciary Net Position, Notes to the Financial Statements and Required Supplementary Information.

The ***Statement of Fiduciary Net Position*** presents information on the WRS's assets and liabilities and the resulting net position restricted for pensions. This is calculated using the following formula: Assets – Liabilities = Net Position restricted for pensions. This statement reflects the WRS's investments at fair value, as well as cash, receivables and other assets and liabilities. The Statement of Fiduciary Net Position reports the financial position of the WRS at December 31, 2022. Over time, the increase or decrease in net position serves as a useful indicator of the WRS's financial health.

The ***Statement of Changes in Fiduciary Net Position*** presents information showing how the WRS's net position restricted for pensions changed during the year ended December 31, 2022. It reflects contributions by members and participating employers along with deductions for retirement benefits, refunds, withdrawals, and administrative expenses. Investment income during the period is also presented showing income from investing activities.

The ***Notes to the Financial Statements*** provide additional information that is essential for the reader to gain a full understanding of the data provided in the financial statements.

The ***Required Supplementary Information*** includes this MD&A and schedules of the net pension liability and changes in the net pension liability, contributions and investment returns.

Management's Discussion & Analysis

Financial Analysis

The WRS's total assets as of December 31, 2022 were $1.2 billion and were primarily comprised of cash and cash equivalents, receivables, and investments. Total assets decreased $127 million, or -9.4%, from the prior year primarily due to investment losses.

Total liabilities as of December 31, 2022 were $5.7 million and were primarily comprised of amounts due to the Commonwealth of Massachusetts and other systems and payables for securities purchased. Total liabilities decreased by $516 thousand, or 8.4%, from the prior year.

The following tables present current and prior year data on the WRS's financial statements.

Fiduciary Net Position

Net position of the WRS was $1.212 billion at the close of the fiscal year, summarized as follows:

Statement of Fiduciary Net Position
(In thousands of dollars)

Assets	**2022**	**2021**
Cash and cash equivalents	$ 12,073	$ 17,018
Investments	1,202,705	1,325,966
Securities lending short-term collateral investment pool	774	
Receivables:		
Interest due and accrued	458	442
Due from Commonwealth of Massachusetts and other systems	1,531	1,120
Receivable for securities sold	1	18
Other	135	118
Total assets	1,217,677	1,344,682
Liabilities		
Accounts payable and accrued expenses	237	180
Due to Commonwealth of Massachusetts and other systems	4,830	3,711
Payable for securities purchased	589	2,281
Total liabilities	5,656	6,172
Net position restricted for pensions	$ 1,212,021	$ 1,338,510

Management's Discussion & Analysis

Changes in Fiduciary Net Position

The WRS's total net position decreased by $126.5 million during the current fiscal year and is summarized as follows:

Statement of Changes in Fiduciary Net Position
(In thousands of dollars)

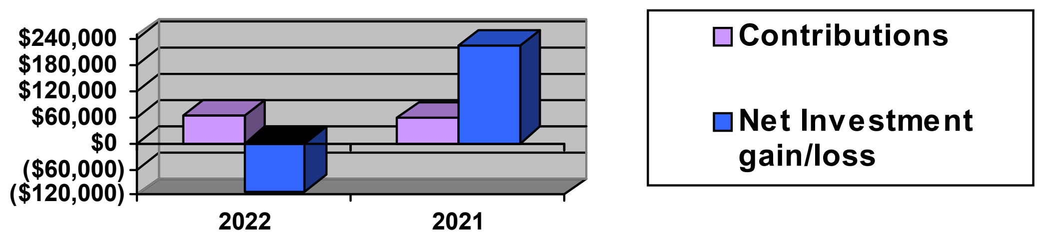
	2022	2021
Additions		
Contributions:		
Employers	$ 62,761	$ 59,025
Members	21,764	20,012
Net investment income:		
Interest and dividends	22,256	24,222
Net realized and unrealized gains (losses)	(125,734)	204,649
Less: management fees	(7,189)	(7,404)
Other	3,436	3,080
Total additions	(22,706)	303,584
Deductions		
Benefits payments to plan members and beneficiaries	95,994	92,267
Reimbursements to other systems	3,005	2,172
Refunds and transfers of plan member accounts to other systems	4,209	4,114
Administrative expenses	575	568
Total deductions	103,783	99,121
Change in net position	(126,489)	204,463
Net position restricted for pensions:		
Beginning of year	1,338,510	1,134,047
End of year	$ 1,212,021	$ 1,338,510

Management's Discussion & Analysis

Additions to Fiduciary Net Position

The amount needed to finance benefits is accumulated through the collection of employers' and plan members' contributions, reimbursements from the Commonwealth of Massachusetts for pre-1998 COLA's and through earnings on investments. Contributions and net investment losses for calendar year 2022 resulted in total additions to net position of -$22.7 million. Employers' contributions increased by $3.7 million in 2022. The WRS had a net investment loss of $110.7 million in 2022; compared to a gain of $221.5 million in 2021.

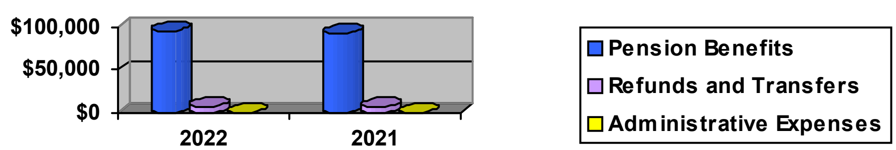
Additions to Plan Net Assets
(in thousands of dollars)



Deductions from Fiduciary Net Position

The primary deductions of the WRS include the payment of pension benefits to participants and beneficiaries, refunds of contributions, and the costs of administering the WRS. Total deductions from net position for 2022 were $103.8 million, which represents an increase of 4.7% over deductions of $99.1 million in 2021. The payment of pension benefits increased by $3.7 million, or 4.0%, over the previous year. The increase in these expenses resulted from an increase in benefit payments to new retirees with higher average compensation.

Deductions from Plan Net Assets
(in thousands of dollars)



Management's Discussion & Analysis

Overall Financial Position of WRS

Due to negative trends in the financial markets, the WRS has experienced a decrease in its investment portfolio for the fiscal year ending December 31, 2022. Management believes the WRS is in a solid financial position and will be able to meet its obligations.

Contacting WRS's Financial Management

This financial report is designed to provide the Board, our membership, taxpayers, investors, and creditors with a general overview of the WRS's financial results and to demonstrate WRS's accountability for the funding it receives. If you have any questions about this report or need additional financial information, contact the Worcester Retirement System, City Hall Room 103, 455 Main Street, Worcester, Massachusetts 01608.

WORCESTER RETIREMENT SYSTEM
(A Component Unit of the City of Worcester, Massachusetts)
Statement of Fiduciary Net Position
December 31, 2022

Assets		
Cash & Cash Equivalents	$	12,073,239
Investments:		
Equities		4
Fixed Income		87,608,141
Pooled Equities		275,904,577
Pooled Fixed Income		40,639,742
External Investment Pool		421,469,353
Real Estate		83,301,504
Alternative Investments		293,781,187
Total investments		1,202,704,508
Securities lending short-term collateral investment pool		774,036
Receivables:		
Accrued interest and dividends		457,829
Due from Commonwealth of Massachusetts and other systems		1,530,909
Receivable for securities sold		1,066
Other		135,060
Total receivables		2,124,864
Total assets		1,217,676,647
Liabilities		
Accounts payable and accrued expenses		237,164
Due to Commonwealth of Massachusetts and other systems		4,830,018
Payable for securities purchased		589,019
Total liabilities		5,656,201
Net position restricted for pensions	$	1,212,020,446

See the accompanying Notes to Financial Statements.

WORCESTER RETIREMENT SYSTEM

(A Component Unit of the City of Worcester, Massachusetts)

Statement of Changes in Fiduciary Net Position

Year ended December 31, 2022

Additions:		
Contributions:		
Employers	$	62,761,035
Members		21,764,386
Total contributions		84,525,421
Investment income:		
Interest and dividends		22,256,309
Net realized and unrealized gains (losses)		(125,734,005)
Less: management fees		(7,189,518)
Net investment income (loss)		(110,667,214)
Other		3,435,610
Total additions		(22,706,183)
Deductions:		
Benefit payments to plan members and beneficiaries		95,994,461
Reimbursements to other systems		3,004,865
Refunds and transfers of plan member accounts to other systems		4,208,532
Administrative expenses		575,104
Total deductions		103,782,962
Net decrease in net position		(126,489,145)
Net position restricted for pensions:		
Beginning of year		1,338,509,591
End of year	$	1,212,020,446

See the accompanying Notes to Financial Statements.

Notes to Financial Statements
December 31, 2022

1. _Summary of Significant Accounting Policies

(a) Financial Reporting Entity

Because of the significance of its operational and financial relationship with the City of Worcester, Massachusetts (City), the Worcester Retirement System (WRS) is included as a blended component unit in the City's financial statements.

(b) Basis of Accounting

The accompanying financial statements are presented on the accrual basis of accounting.

(c) Revenue Recognition

Contributions are recognized as additions in the period when they become due pursuant to formal commitments, statutory or contractual requirements. Investment income is recognized when earned.

(d) Benefits and Refunds

Benefits and refunds to WRS members and beneficiaries are recognized as deductions when due and payable in accordance with the terms of the WRS.

(e) Cash and Investments

Cash is considered to be cash on hand, demand deposits and short-term investments with an original maturity of three months or less from the date of acquisition.

Investments are reported at fair value. Fair values of investments are based on quotations from a national securities exchange except for pooled funds, alternative investments and real estate investments, for which fair values are estimated as detailed below.

Pooled Funds

The fair value of shares in managed investment pools is based on unit values reported by the funds.

Alternative Investments

Alternative investments are recorded at fair value as determined in good faith by the investment firms (such as general partners of venture capital firms) after consideration of pertinent information, including current financial position and operating results, price-earnings multiples and available market prices of similar securities, the nature of securities, marketability, restrictions on disposition and other appropriation and do not necessarily represent amounts which might ultimately be realized, since such amounts depend on future circumstances and cannot reasonably be determined until individual securities are liquidated.

Real Estate

The fair value of real estate funds is based on independent third-party appraisals. The investment managers of the funds are responsible for the reported value of those investments. However, because of the inherent uncertainty of valuation, those estimated values may differ significantly from the values that would have been used had a ready market for the real estate existed, and the differences could be material.

(f) Basis of Investment Transactions

Purchases and sales of investments are recorded on the trade date. Transactions remaining unsettled as of year-end are recorded as payables for securities purchased and as a receivable for securities sold.

(g) Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of additions and deductions during the reporting period. Fair values of real estate funds and venture capital funds have been estimated in the absence of readily available fair values, and these estimates may be materially different than values that would have been used had a ready market existed.

(h) Administrative Expenses

Administrative expenses are financed by investment income.

2. Plan Description

(a) General

The WRS is a cost-sharing multiple-employer public employee retirement system established by the City on June 12, 1944, under Massachusetts General Laws (MGL), Chapter 32, and is regulated by the Massachusetts Public Employee Retirement Administration Commission (PERAC). The WRS is a defined benefit pension plan that covers certain eligible employees of the City and the Worcester Housing Authority.

Membership in the WRS is mandatory immediately upon the commencement of employment for all permanent employees working at least 30 hours weekly (20 hours weekly if hired prior to August 23, 2017), except for City school teachers and school administrators, who participate in the Massachusetts Teachers' Retirement System.

Membership in the WRS was as follows at December 31, 2022:

Active employees	3,630
Pensioners and beneficiaries	2,761
Inactive employees not entitled to or not receiving benefits	1,130
Inactive employees entitled to or receiving benefits	167
Total members	7,688
Number of participating employers	2

The WRS is administered by a five-person Retirement Board (the Board) consisting of the City Auditor, who serves *ex-officio*; two members who are elected by the participants in or retired from the service of the WRS; a fourth member appointed by the City Manager; and a fifth member appointed by the other members.

(b) Significant Plan Provisions and Requirements

Benefit provisions and state law establishes contribution requirements of the WRS. Members of the WRS become vested after 10 years of creditable service. Normal retirement occurs at age 65 (age 67 if hired on or after April 2, 2012), except for special situations and the City's police officers and firefighters, whose normal retirement age is 55 (age 57 if hired on or after April 2, 2012).

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by (1) the number of years and full months of creditable service at the time of retirement and (2) a percentage based on age at retirement in accordance with a schedule provided by state law. Assuming normal retirement at age 65, this percentage is 2.5%, which is reduced for individuals who retire prior to age 65 to reflect the longer pay out period. A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.

For employees hired on or after April 2, 2012, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by (1) the number of years and full months of creditable service at the time of retirement and (2) a percentage based on age at retirement in accordance with a schedule provided by state law. Assuming normal retirement at age 67, this percentage is 2.5%. A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

Employees may elect early retirement after 20 years of service or at any time after attaining age 55 (age 60 if hired on or after April 2, 2012) with 10 years of eligible service. Plan members who become permanently and totally disabled may be eligible to receive a disability retirement allowance. The amount of benefits to be received depends on several factors, including the member's age, compensation, veteran status, years of service and whether or not the disability is work-related. In addition, certain death benefits exist for beneficiaries of employees who die in active service.

Under MGL, c.32 Section 3(8)(c), members leaving the City's employment to work for other Massachusetts governmental units requires the WRS transfers their accumulated account balances and creditable service to the retirement system of their new employer. Other such retirement systems are in turn required to make comparable transfers to the WRS for employees coming to work at the City or the Worcester Housing Authority. Per statute, the PERAC actuary shall consider length of service as well as acceptance of military service credit and salary cap provisions if applicable in calculating the liability.

3. Deposits and Investments

Investment Policy

Deposits and investments made by the WRS are governed by the MGL c.32. The WRS has the ability to invest in equity securities, corporate bonds, annuities and other specified investments in accordance with state laws and regulations.

The Board has the authority for establishing and amending investment policy decisions by majority vote. Asset allocation policies allocate investments across those asset classes that, based on historical and expected returns and risks, provide the highest likelihood of meeting the WRS's investment objectives. The Board has specifically indicated those asset classes that may be utilized when investing the WRS's assets. The Board specifies a long-term target allocation for each class of permissible assets expressed as a percentage of the WRS's overall fair value, surrounded by a band of permissible variation resulting from market forces. On at least an annual basis, if any strategic allocation is outside the specified target range, assets will be shifted to return the strategy to the target range. The specific plan for rebalancing will identify those assets that can be shifted at the lowest possible risk and cost, if the rebalancing cannot be accomplished solely by allocating contributions and withdrawals. Permanent changes in the WRS's target asset allocation will take place only in response to significant changes in the objectives and constraints of the WRS, or in response to material changes in the fundamental nature or appropriateness of the asset classes themselves. The following was the asset allocation policy as of December 31, 2022:

Asset Class	Target	Range
Domestic Equity	14%	9-19%
International Developed Market Equity	8%	4-12%
International Emerging Market Equity	8%	4-12%
Core Fixed Income	10%	5-15%
Value-Add Fixed Income	4%	2-6%
Real Estate	6%	4-8%
Private Equity	7%	4-10%
PRIT General Allocation (CORE) Fund	35%	0-50%
Portfolio Completion Strategies	3%	0-5%
Infrastructure	5%	2-8%
Cash	0%	< 5%

Rate of Return

For the year ended December 31, 2022, the annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was -8.20%. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

Deposits - Custodial Credit Risk

Custodial credit risk for deposits is the risk that, in the event of a bank failure, the WRS's deposits may not be recovered. The WRS's policy for custodial credit risk of deposits is to rely on FDIC insurance coverage, state insurance coverage and/or collateral agreements as applicable. As of December 31, 2022, the WRS's bank balance of $9,277,214 was not exposed to custodial credit risk.

Investments Summary

The WRS's investments at December 31, 2022 are presented below. All investments are presented by investment type, with debt securities presented by maturity (using segmented time distribution).

		Investment Maturities (in Years)			
Investment Type	Total Amount	Less Than 1	1 - 5	6 - 10	More Than 10
Debt Securities:					
U.S. Treasuries	$ 44,147,317	$ 297,322	21,985,128	17,645,310	4,219,557
U.S. Agencies	17,375,436	-	382,627	740,182	16,252,627
Corporate bonds	20,769,307	-	4,445,093	4,022,151	12,302,063
Money market mutual funds	4,398,032	4,398,032	-	-	-
External investment pool	421,469,353	421,469,353	-	-	-
Fixed income mutual funds	40,639,743	40,639,743	-	-	-
Mortgage backed securities	3,300,094	-	-	545,345	2,754,749
Asset backed securities	2,015,986	-	587,634	531,763	896,589
Total debt securities	$ 554,115,268	$ 466,804,450	$ 27,400,482	$ 23,484,751	$ 36,425,585
Other Investments:					
Equity securities	4				
Equity mutual funds	275,904,578				
Real estate investments	83,301,504				
Alternative investments	293,781,187				
Total other investments	652,987,273				
Total investments	$ 1,207,102,541				

Investments - Interest Rate Risk of Debt Securities

Interest rate risk for debt securities is the risk that changes in interest rates of debt securities will adversely affect the fair value of an investment. The WRS's policies for interest rate risk intend that the average duration of investments remain fairly stable over time and be focused in the intermediate range. The WRS's debt security managers are not permitted to make large-scale changes in portfolio duration in an attempt to anticipate interest rate changes. However, they are permitted to shift portfolio duration within a limited range (defined by their guidelines) in an effort to enhance performance.

Investments - Custodial Credit Risk

Custodial credit risk for investments is the risk that, in the event of the failure of the counterparty, the WRS will not be able to recover the value of its investments or collateral securities that are in the possession of an outside party. The WRS's policy for custodial credit risk of investments intends that investments are either insured and/or registered in the name of the WRS.

Investments - Credit Risk of Debt Securities

Credit risk for debt securities is the risk that an issuer or other counterparty to a debt security will not fulfill its obligations. The WRS does not have a policy for credit risk of debt securities. As of December 31, 2022, the credit quality ratings of the WRS's debt securities are summarized as follows:

	Investment Type							
Quality Ratings *	U.S. Agencies	Corporate Bonds	Money Market Mutual Funds	Fixed Income Mutual Funds	External Investment Pool	Mortgage Backed Securities	Asset Backed Securities	Total Amount
AAA..................	$ -	1,539,872	-	-	-	879,754	1,169,687	$ 3,589,313
AA+..................	538,856	314,462	-	-	-	-	-	853,318
AA....................	434,212	302,798	-	-	-	-	-	737,010
AA-....................	235,572	544,048	-	-	-	-	-	779,620
A+.....................	-	372,770	-	-	-	-	-	372,770
A.......................	-	803,981	-	-	-	-	-	803,981
A-......................	-	4,291,993	-	-	-	434,073	-	4,726,066
BBB+.................	-	3,782,888	-	-	-	-	292,270	4,075,158
BBB..................	-	3,077,553	-	-	-	-	303,318	3,380,871
BBB-..................	-	1,744,369	-	-	-	-	-	1,744,369
Unrated...............	16,166,796	3,994,574	4,398,032	40,639,743	421,469,353	1,986,267	250,711	488,905,476
Total..................	$ 17,375,436	$ 20,769,308	$ 4,398,032	$ 40,639,743	$ 421,469,353	$ 3,300,094	$ 2,015,986	$ 509,967,952

* Per the rating scale of Standard & Poor's, a national credit rating organization

Deposits and Investments – Foreign Currency Risk

Foreign currency risk is the risk that fluctuations in exchange rates will adversely affect the fair value of an investment or a deposit. The WRS's policy is to limit investments in non-U.S. dollar-denominated securities to not exceed 10% of the total fair value of investments at all times. As of December 31, 2022, the WRS was not exposed to foreign currency risk.

Investments – Concentration of Credit Risk

Concentration of credit risk is the risk of loss attributed to the magnitude of the WRS's investment in a single issuer. The WRS's policy for concentration of credit risk instructs investment managers not to invest more than 5% of their portfolio at fair value in a single security, or in the securities of a single issuer or its subsidiaries. U.S. Treasury, U.S. government agency, mutual fund and pooled fund investments are exempted from this restriction. As of December 31, 2022, the WRS was not exposed to concentration of credit risk.

Investments – Fair Value

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 the asset. Level 1 inputs are quoted market 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 December 31, 2022:

Investments by Fair Value Level	Fair Value	Fair Value Measurements Using: Quoted Prices in Active Markets for Identical Assets (Level 1)	Fair Value Measurements Using: Significant Other Observable Inputs (Level 2)
Debt Securities:			
U.S. Treasuries	$ 44,147,317	$ 44,147,317	$ -
U.S. Agencies	17,375,436	-	17,375,436
Corporate bonds	20,769,308	-	20,769,308
Fixed income mutual funds	40,639,743	-	40,639,743
Mortgage backed securities	3,300,093	-	3,300,093
Asset backed securities	2,015,986	-	2,015,986
Total Debt Securities	128,247,883	44,147,317	84,100,566
Equity Securities:			
Equity securities	4	4	-
Equity mutual funds	202,456,031	-	202,456,031
Total Equity Securities	202,456,035	4	202,456,031
Total Investments by Fair Value Level	330,703,918	$ 44,147,321	$ 286,556,597
Investments measured at the net asset value (NAV)			
Private equities	166,302,406		
Real estate	83,301,504		
External investment pool (PRIT)	421,469,353		
Pooled international equities fund (PRIT)	73,448,547		
Other pooled funds (PRIT)	127,478,781		
Total Investments Measured at the NAV	872,000,591		
Total Investments measured at Fair Value	$ 1,202,704,509		

Debt and equity securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Equity mutual funds classified in Level 2 of the fair value hierarchy are valued using a matrix pricing technique. Matrix pricing is used to value securities relationship to benchmark quoted prices.

Investments measured at the net asset value (NAV)

	Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Private equities (1)	$ 166,302,406	21,944,241	N/A(1)	N/A(1)
Real estate (2)	83,301,504	6,122,363	N/A(2)	N/A(2)
External investment pool (PRIT)(3)	421,469,353	-	N/A(3)	N/A(3)
Pooled international equities fund (PRIT)(3)	73,448,547	-	N/A(3)	N/A(3)
Other pooled funds (PRIT)(4)	127,478,781	47,677,242	N/A(4)	N/A(4)
Total Investments Measured at the NAV	872,000,591			

(1) *Private equities* - This investment type includes investments in 23 private equity funds that invest primarily in private domestic and international companies of diversified industries. The fair value measurements of this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. Approximately 41.6 percent of these investments can be redeemed quarterly with 90 days' notice. The remaining investments are illiquid. Distributions from each remaining fund will be received as the underlying investments of the funds are liquidated. For approximately 6.7 percent of the investments it is expected that the underlying assets of the funds will be liquidated over the next 1 to 5 years. For the remaining investments, it is expected that the underlying assets of the funds will be liquidated over the next 5 to 10 years.
(2) *Real estate* - This investment type includes investments in 6 funds that invest primarily in real estate and North American timberlands. The fair value measurements of this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. Approximately 86.8 percent of these investments can be redeemed on the first business day of the month following one day's notice. The remaining investments are illiquid. Distributions from each fund will be received as the underlying investments of the funds are liquidated. It is expected that the underlying assets of the funds will be liquidated over the next 1 to 7 years.
(3) *External investment pool and pooled international equities fund* - The System owns units, or shares in the PRIT external investment pool and pooled international equities funds. The investments are governed by Chapter 32 of the MGL. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership in the pool. The investments can be redeemed monthly on the first day of the month with one day's notice.
(4) *Other pooled funds* – The System owns units, or shares in PRIT's other pooled funds. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership in the pool. The investments are illiquid. Distributions from the fund will be received as the underlying investments of the fund are liquidated. It is expected that the underlying assets of the funds will be liquidated over the next 5 to 10 years.

4. Funding Policy

Chapter 32 of MGL governs the contributions of plan members and the City. Depending on their employment date, active System members must contribute anywhere between 5%-9% of their gross regular compensation. Members hired after December 31, 1978 must contribute an additional 2% of regular compensation in excess of $30,000. Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%. Employers are required to pay into the WRS its share of the system-wide actuarial determined contribution that is apportioned among the employers based on annual covered payroll. For the year ended December 31, 2022, active member contributions totaled $21,764,386 and employer contributions totaled $62,761,035.

Contributions are recognized as additions in the period when they become due pursuant to formal commitments, statutory or contractual requirements. Benefits and refunds are recognized as deductions when incurred and administrative expenses are funded through investment earnings.

Except for a portion of benefits owed due to cost-of-living adjustments granted through June 30, 1998, member employers are required to contribute the remaining amounts necessary to finance benefits. Member employer contributions are determined by the annual actuarial valuation.

COLA's granted through June 30, 1998 are reimbursed by the Commonwealth of Massachusetts (the Commonwealth). COLA's granted subsequent to June 30, 1998 must be granted by the Board and are the responsibility of the WRS. COLA may be approved in excess of the Consumer Price Index but not to exceed 3% of the base retirement allowance.

A cost-of-living adjustment (COLA) was granted to eligible retirees and survivors effective July 1, 2022. The 3% COLA was paid on a base of $13,500 (maximum $405), increasing to $15,000 on July 1, 2023, and to $16,000 on July 1, 2024. The WRS has granted the maximum 3% allowed by law since enactment of the legislation in 1997 in all but one year (2011- 2.5%).

5. Net Pension Liability

The components of the net pension liability of the WRS at December 31, 2022, were as follows:

Total pension liability	$	1,693,171,500
Plan fiduciary net position		(1,212,020,446)
WRS's net pension liability	$	481,151,054
Plan fiduciary net position as a percentage of the total pension liability		71.58%

Actuarial Assumptions

The total pension liability was determined by an actuarial valuation as of January 1, 2023, using the following actuarial assumptions, applied to all periods included in the measurement:

Amortization method	Total appropriation increases 4.79% per year through fiscal year 2025, 3.50% in fiscal year 2026 through fiscal 2033, with a 23.97% decrease in 2034.
Remaining amortization period	11 years from July 1, 2023
Asset valuation method	5-year smoothed fair value
Inflation	3.00%
Salary increases	4.00%
Investment rate of return	6.80%, net of pension plan investment expense, including inflation

Mortality rates were based on the following:

Pre-Retirement	RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2021
Healthy Retiree	RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2021
Disabled Retiree	RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate 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 for each major asset class included in the pension plan's target asset allocation as of December 31, 2022 (see the discussion of the WRS's investment policy) are summarized in the following table:

Asset Class	Long-Term Expected Real Rate of Return (%)
Domestic equity	6.59
International developed markets equity	6.87
International emerging markets equity	8.30
Core fixed income	1.53
High-yield fixed income	3.54
Real estate	3.44
Commodities	4.01
Hedge fund, global tactical asset allocation, risk parity	3.06
Infrastructure	5.44
Private equity	9.49

Discount Rate

The discount rate used to measure the total pension liability was 6.80 percent, which was the same discount rate used in the prior fiscal year. The projection of cash flows used to determine the discount rate assumed that plan member contributions will be made at the current contribution rate and that WRS's contributions will be made at rates equal to the actuarially determined contribution rates. Based on those 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 investments was applied to all periods of projected benefit payments to determine the total pension liability.

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

The following presents the net pension liability of the WRS calculated using the discount rate of 6.80 percent, as well as what the WRS's net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (5.80 percent) or 1-percentage-point higher (7.80 percent) than the current rate:

	1% Decrease (5.80%)	Current Discount Rate (6.80%)	1% Increase (7.80%)
WRS's net pension liability	$ 673,082,393	$ 481,151,054	$ 319,493,292

Required Supplementary Information
December 31, 2022

Schedule of Changes in Employers' Net Pension Liability and Related Ratios (1)

	2022	2021	2020	2019	2018
Total pension liability					
Service cost	$ 35,692,910	$ 34,521,663	$ 34,203,842	$ 32,665,206	$ 33,231,538
Interest	111,379,237	109,033,323	106,483,253	103,120,036	101,742,520
Change of benefit term	-	21,678,106	-	-	-
Differences between expected and actual experience	(6,251,568)	(13,682,272)	(10,567,983)	1,669,782	(8,340,855)
Changes of assumptions	-	2,637,615	-	-	1,608,506
Benefit payments, including refunds of member contributions	(99,772,248)	(95,473,388)	(91,485,398)	(89,017,374)	(84,275,963)
Net change in total pension liability	41,048,331	58,715,047	38,633,714	48,437,650	43,965,746
Total pension liability - beginning	1,652,123,169	1,593,408,122	1,554,774,408	1,506,336,758	1,462,371,012
Total pension liability - ending (a)	$ 1,693,171,500	$ 1,652,123,169	$ 1,593,408,122	$ $ 1,554,774,408	$ 1,506,336,758
Plan fiduciary net position					
Contributions - employer	$ 62,761,035	$ 59,024,767	$ 55,510,926	$ 52,206,269	$ 49,098,344
Contributions - member	21,764,386	20,012,226	20,534,325	20,740,274	19,969,060
Net investment income	(110,667,214)	221,467,014	117,030,633	147,174,441	(30,549,012)
Benefit payments, including refunds of member contributions	(99,772,248)	(95,473,388)	(91,485,398)	(89,017,374)	(84,275,963)
Administrative expense	(575,104)	(568,333)	(556,041)	(658,260)	(587,936)
Other	-	-	(579,138)	(1,319,129)	(1,632,787)
Net change in plan fiduciary net position	(126,489,145)	204,462,286	100,455,307	129,126,221	(47,978,294)
Plan fiduciary net position - beginning	1,338,509,591	1,134,047,305	1,033,591,998	904,465,777	952,444,071
Plan fiduciary net position - ending (b)	$ 1,212,020,446	$ 1,338,509,591	$ 1,134,047,305	$ 1,033,591,998	$ 904,465,777
WRS's net pension liability - ending (a) - (b)	$ 481,151,054	$ 313,613,578	$ 459,360,817	$ 521,182,410	$ 601,870,981
Plan fiduciary net position as a percentage of the total pension liability	71.58%	81.02%	71.17%	66.48%	60.04%
Covered payroll	$ 218,345,985	$ 199,971,632	$ 199,137,147	$ 196,970,554	$ 192,957,155
Net pension liability as a percentage of covered payroll	220.36%	156.83%	230.68%	264.60%	311.92%

Schedule of Changes in Employers' Net Pension Liability and Related Ratios (Continued) (1)

	2017	2016	2015	2014
Total pension liability				
Service cost	$ 28,844,823	27,155,573	$ 26,309,138	$ 24,977,553
Interest	98,349,284	95,556,357	92,787,477	89,852,374
Change of benefit term	-	-	-	-
Differences between expected and actual experience	(1,005,891)	(2,523,911)	(1,619,304)	(901,542)
Changes of assumptions	73,039,312	19,119,320	16,825,451	16,436,189
Benefit payments, including refunds of member contributions	(83,122,621)	(79,940,830)	(75,957,945)	(72,435,430)
Net change in total pension liability	116,104,907	59,366,509	58,344,817	57,929,144
Total pension liability - beginning	1,346,266,105	1,286,899,596	1,228,554,779	1,170,625,635
Total pension liability - ending (a)	$ 1,462,371,012	1,346,266,105	$ 1,286,899,596	$ 1,228,554,779
Plan fiduciary net position				
Contributions - employer	$ 46,188,470	44,411,990	$ 42,703,837	$ 41,200,578
Contributions - member	19,327,093	17,797,519	17,409,182	16,320,772
Net investment income	134,646,815	58,737,894	(10,490,024)	34,950,210
Benefit payments, including refunds of member contributions	(83,122,621)	(79,940,830)	(75,957,945)	(72,435,430)
Administrative expense	(583,404)	(565,669)	(572,743)	(587,157)
Other	(1,356,993)	(926,263)	(895,410)	(806,081)
Net change in plan fiduciary net position	115,099,360	39,514,641	(27,803,103)	18,642,892
Plan fiduciary net position - beginning	837,344,711	797,830,070	825,633,173	806,990,281
Plan fiduciary net position - ending (b)	$ 952,444,071	837,344,711	$ 797,830,070	$ 825,633,173
WRS's net pension liability - ending (a) - (b)	$ 509,926,941	508,921,394	$ 489,069,526	$ 402,921,606
Plan fiduciary net position as a percentage of the total pension liability	65.13%	62.20%	62.00%	67.20%
Covered payroll	$ 182,832,183	175,910,160	$ 173,759,691	$ 168,856,039
Net pension liability as a percentage of covered payroll	278.90%	289.31%	281.46%	238.62%

(1) Data is only available for the years presented and will be accumulated annually to present 10 years of the reported information.

Schedule of Employer Contributions
Last 10 Fiscal Years

	2022	2021	2020	2019	2018
Actuarially determined contribution	$ 62,761,035	59,024,767	55,510,926	52,206,269	49,098,344
Contributions in relation to the actuarially determined contribution	62,761,035	59,024,767	55,510,926	52,206,269	49,098,344
Contribution deficiency (excess)	$ -	-	-	-	-
Covered payroll	$ 218,345,985	199,971,632	199,137,147	196,970,554	192,957,155
Contributions as a percentage of covered payroll	28.74%	29.52%	27.88%	26.50%	25.45%

(continued)

	2017	2016	2015	2014	2013
Actuarially determined contribution	$ 46,188,470	44,411,990	42,703,837	41,200,578	38,148,683
Contributions in relation to the actuarially determined contribution	46,188,470	44,411,990	42,703,837	41,200,578	38,148,683
Contribution deficiency (excess)	$ -	-	-	-	-
Covered payroll	$ 182,832,183	175,910,160	173,759,691	168,856,039	166,094,906
Contributions as a percentage of covered payroll	25.26%	25.25%	24.58%	24.40%	22.97%

(concluded)

Schedule of Investment Returns (1)

	2022	2021	2020	2019	2018	2017	2016	2015	2014
Annual money-weighted rate of return, net of investment expense	-8.20%	19.82%	11.56%	16.11%	-3.00%	16.54%	7.87%	-1.46%	4.96%

(1) Data is available only for the years presented and will be accumulated annually to present 10 years of the reported information.

Notes to Required Supplementary Information
December 31, 2022

Changes of Assumptions

The investment return assumption was lowered to 7.75% as of January 1, 2013. As of January 1, 2015, it was lowered to 7.625%. As of January 1, 2016, it was lowered to 7.5%. As of January 1, 2017, it was lowered to 7.375%. As of January 1, 2018, it was lowered to 7.0%. As of January 1, 2019, it was lowered to 6.90%. As of January 1, 2022, it was lowered to 6.80%.

The salary increase assumption was lowered to 4.5% as of January 1, 2013. As of January 1, 2014, a select and ultimate assumption of 3.5% for 2014 and 2015 and 4.5% thereafter was used. As of January 1, 2015, a select and ultimate assumption of 3.5% for 2015 and 2016 and 4.5% thereafter was used. As of January 1, 2016, a select and ultimate assumption of 3.5% for 2016 and 2017 and 4.5% thereafter was used. As of January 1, 2018, a select and ultimate assumption of 3.5% for 2018 and 2019 and 4.5% thereafter was used. As of January 1, 2019, a select and ultimate assumption of 3.5% for 2019 and 4.0% thereafter was used.

The mortality assumption for healthy participants was changed from the 1994 Group Annuity Mortality Table to the RP-2000 Combined Healthy Mortality Table projected 12 years using Scale AA as of January 1, 2012. As of January 1, 2013, the pre-retirement mortality assumption was changed to the RP-2000 Employee Mortality Table projected 20 years using Scale AA. As of January 1, 2014, the pre-retirement mortality assumption was changed to the RP-2000 Employee Mortality Table projected generationally using Scale AA. As of January 1, 2016, the pre-retirement mortality assumption was changed to the RP-2000 employee Mortality Table projected generationally using Scale BB2D from 2009. As of January 1, 2018, the pre-retirement mortality assumption was changed to the RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017. As of January 1, 2022, the generational mortality improvement scale was updated to Scale MP-2021.

The mortality assumption for healthy retirees was changed from the RP-2000 Combined Healthy Mortality Table projected 12 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA as of January 1, 2013. As of January 1, 2014, the mortality assumption for non-disabled retirees was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA. As of January 1, 2016, the mortality assumption for non-disabled retirees was changed to the RP-2000 employee Mortality Table projected generationally using Scale BB2D from 2009. As of January 1, 2018, the mortality assumption for non-disabled retirees was changed to the RP-2014 Blue Collar Employee and Healthy Annuitant Mortality Table projected generationally with Scale MP-2017. As of January 1, 2022, the generational mortality improvement scale was updated to Scale MP-2021.

The mortality assumption for disabled participants was changed from the 1994 Group Annuity Mortality Table set forward 5 years to the RP-2000 Combined Healthy Mortality Table set forward 5 years projected 12 years using Scale AA, as of January 1, 2012. As of January 1, 2013, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected 5 years using Scale AA with a 3-year set forward for males. As of January 1, 2014, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males. As of January 1, 2015, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA with a 3-year set forward for males. As of January 1, 2016, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2015. As of January 1, 2018, the assumption was changed to the RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017. As of January 1, 2022, the generational mortality improvement scale was updated to Scale MP-2021.

Methods and Assumptions Used in Calculations of Actuarially Determined Contributions

The actuarially determined contribution rates in the schedule of WRS's contributions are calculated as of January 1, two years prior to the end of the fiscal year in which contributions are reported. The following actuarial methods and assumptions were used to determine contribution rates reported in that schedule:

Actuarial cost method (2013-2022):	Entry Age Normal
Amortization method (2013-2014):	Payment increases 4.00% per year
Amortization method (2015):	Appropriation increases 5.85% per year
Amortization method (2016):	Appropriation increases 4.00% per year through fiscal year 2018; 6.3% per year starting in fiscal year 2019
Amortization method (2017):	Appropriation increases 6.3% in fiscal year 2019 and 6.33% per year starting in fiscal year 2020 through 2033, with a 5.97% increase in 2034.
Amortization method (2018-2019):	Appropriation increases 6.3% in fiscal year 2019 and 6.33% per year starting in fiscal year 2020 through 2033, with a 10.29% increase in 2034.
Amortization method (2020):	Appropriation increases 6.33% per year starting in fiscal year 2020 through 2033, with a 69.68% decrease in 2034.
Amortization method (2021):	Appropriation increases 6.33% per year through fiscal year 2024, 3.50% in fiscal 2025 through fiscal 2033, with a 58.11% decrease in 2034.
Amortization method (2022):	Appropriation increases 4.79% per year through fiscal year 2025, 3.50% in fiscal year 2026 through fiscal 2033, with a 23.97% decrease in 2034.

Remaining amortization period (2013):	17 years
Remaining amortization period (2014):	18 years
Remaining amortization period (2015):	17 years
Remaining amortization period (2016):	16 years
Remaining amortization period (2017):	16 years
Remaining amortization period (2018):	15 years
Remaining amortization period (2019):	14 years
Remaining amortization period (2020):	13 years
Remaining amortization period (2021):	12 years
Remaining amortization period (2022):	11 years
Asset valuation method (2013-2022):	5-year smoothed market value
Inflation (2013-2014):	3.00% for the next 2 years; 4.00% thereafter
Inflation (2015, 2017):	2.50% for the next year; 3.50% thereafter
Inflation (2016):	2.50% for the next year and 3.50% thereafter
Inflation (2018):	2.50% for the next year and 3.00% thereafter
Inflation (2019-2022):	3.00%
Salary increases (2013-2015):	3.50% for the next 2 years; 4.50% thereafter
Salary increases (2016):	3.50% for the next year and 4.50% thereafter
Salary increases (2017):	3.50% for the next 2 years; 4.50% thereafter
Salary increases (2018):	3.50% for the next year and 4.00% thereafter
Salary increases (2019-2022):	4.00%
Investment rate of return (2013):	7.75%
Investment rate of return (2014):	7.625%
Investment rate of return (2015):	7.50%
Investment rate of return (2016):	7.375%
Investment rate of return (2017):	7.00%
Investment rate of return (2018-2020):	6.90%
Investment rate of return (2021-2022):	6.80%

Supplementary Information
December 31, 2022

Schedule of Administrative Expenses

The composition of administrative expenses for the year ended December 31, 2022 is as follows:

Personal services:	
Staff salaries	$ 286,342
Board Member compensation	20,625
Insurance	57,152
Total personal services	364,119
Professional services:	
Legal expenses	70,097
Actuarial fees	34,000
Audit fees	25,000
Medical fees	14,162
Total professional services	143,259
Miscellaneous:	
Travel	495
Other	67,231
Total miscellaneous	67,726
Total administrative expenses	$ 575,104

Schedule of Investment and Consultants' Expenses

Investment expenses		
Management fees:		
Domestic equity managers	$	29,315
Private equity capital fund managers		2,924,356
Domestic fixed income managers		266,337
Global fixed income manager		41,620
International equity managers		718,530
Real estate investments managers		702,321
External investment pool manager		2,177,341
Consultant fees		142,933
Custodial fees		186,765
Total investment expenses	$	7,189,518
Consultant expenses:		
Independent audit fees	$	25,000
Actuarial fees		34,000
Legal fees		70,097
Medical fees		14,162
Total consultant expenses	$	143,259

Investment Section

Report on Investment Activity

The information contained in the Investment Section of the Annual Comprehensive Financial Report (ACFR) has been prepared by Meketa Investment Group, acting as the investment consultant for the Worcester Retirement System (WRS). All investment information herein has been reconciled between the WRS, the investment managers hired by the WRS, WRS' custodian, and Meketa Investment Group. Performance for liquid, publicly-traded asset classes are presented utilizing time-weighted return calculations based upon market values. Alternative asset classes which are private and/or illiquid are presented utilizing dollar-weighted, rather than time-weighted returns.

Outline of Investment Policies

The purpose of this document is to set forth the goals and objectives of the WRS, and to establish guidelines for the implementation of investment strategy.

The Board of the WRS recognizes that a stable, well-articulated investment policy is crucial to the long-term success of the WRS. As such, the Board has developed this Investment Policy Statement with the following goals in mind:

- To clearly and explicitly establish the objectives and constraints that govern the investment of the WRS's assets,
- To establish a long-term target asset allocation with a high likelihood of meeting the WRS's objectives given the explicit constraints, and
- To protect the financial health of the WRS through the implementation of this stable long-term investment policy.

I. Worcester Retirement System Goals

The WRS was established to provide retirement income for the City of Worcester and WHA employees and their families. The WRS's assets are structured to provide real growth from capital gains and income, while maintaining sufficient liquidity to meet the WRS's benefit payments.

II. Investment Objectives

The investment strategy of the WRS is designed to ensure the prudent investment of funds in such a manner as to provide real growth of assets over time while protecting the value of the assets from undue volatility or risk of loss.

A. Risk Objectives

- To accept a level of market risk consistent with moderate interim volatility without sacrificing the potential for long-term real growth of assets.
- To use extensive diversification to minimize or eliminate completely exposure to company and industry-specific risks in the aggregate investment portfolio.
- To avoid extreme levels of volatility that could adversely affect WRS's portfolio.

- To limit the likelihood of investment return patterns that could negatively impact the funded status of the WRS.

B. Return objective

- Within the risk constraints outlined above, to achieve the highest real return possible.
- To achieve, over long time periods, investment returns consistent with the actuarial return on assets of 6.8%.

III. Investment Constraints

A. Legal and Regulatory

The WRS is a qualified defined benefit pension plan governed by the Massachusetts General Laws, Chapter 32 and Chapter 176. Investment procedures and restrictions stipulated under these regulations must be followed.

The Board intends to manage the assets of the WRS at all times in accordance with the provisions of the Public Employee Retirement Administration Commission (PERAC) and the Massachusetts General Laws, Chapter 32 and Chapter 176. The Board will retain legal counsel when appropriate to review contracts and provide advice with respect to applicable statutes and regulations.

B. Time Horizon

The WRS will be managed on a going-concern basis. The assets of the WRS will be invested with long-term time horizon (twenty years or more), consistent with the participant demographics and the purpose of the WRS.

C. Tax Considerations

The WRS is a tax-exempt entity. Therefore, investments and strategies will be evaluated only on the basis of expected risks and potential returns.

IV. Risk and Return Considerations

The WRS's Board recognizes that a persistent positive relationship exists between risk and return, whether risk is described as possibility of loss or as interim volatility. The Board also recognizes that investors are rarely compensated for risks that can be eliminated through diversification. Within the risk and return parameters discussed above, the Board accepts the risks associated with investing in the capital markets (market risks), but will minimize wherever possible those risks for which the WRS is unlikely to be compensated (non-market or diversifiable risks).

V. Diversification

The WRS's Board recognizes that a primary element of risk control is diversification. Therefore, investments will be allocated across multiple classes of assets, chosen in part for their low correlation of returns. Within each asset type, investments will be distributed across many individual holdings, thus further reducing volatility. In addition, each investment manager's guidelines will specify the largest permissible investment in any one asset, and the largest permissible investment in any group of related assets.

The WRS's aggregate equity portfolio will be diversified by individual issue, capitalization, and industry (international equity portfolios will also be diversified by country). The WRS's aggregate fixed income portfolio will, at a minimum, be diversified by individual issue, by issuer, by maturity, and by industry. Residual cash will be swept by the custody bank into a short-term fixed income investment pool that is broadly diversified across individual issue and issuer. The WRS's aggregate real estate portfolio will be invested across a spectrum of geographic regions and property types.

The specific degrees of diversification within the above asset classes will be addressed in each manager's investment guidelines.

VI. Asset Allocation

The Board recognizes that the allocation of monies to various asset classes will be the major determinant of the WRS return and risk experience over time. Therefore, the WRS will allocate investments across those asset classes that, based on historical and expected returns and risks, provide the highest likelihood of meeting the WRS's investment objectives.

A. Permissible Asset Classes

Because investment in any particular asset class may or may not be consistent with the objectives of the WRS, the Board has specifically indicated those asset classes that may be utilized when investing the WRS's assets, and are summarized on the following page:

Asset Type	Asset Class	Purpose
Equity	U.S. Common Stocks	Total Return Potential
Equity	Non-U.S. Common Stocks	Total Return Potential Diversification
Equity	Private Equity	Total Return Potential Diversification
Fixed Income	Investment Grade Bonds	Return Stability Income
Fixed Income	TIPS	Return Stability Income
Fixed Income	High Yield Bonds/ Bank Loans	Total Return Potential Diversification Income
Fixed Income	Emerging Market Debt	Total Return Potential Diversification Income
Real Estate	Real Estate	Total Return Potential Diversification Income
Real Estate	Timber	Total Return Potential Diversification Income
Hedge Funds	Absolute Return Strategies	Return Stability Diversification
Infrastructure	Private Infrastructure	Total Return Potential Diversification Income
Natural Resources	Public/Private Natural Resources	Total Return Potential Diversification
Fixed Income / Equity	Global Tactical Asset Allocation	Total Return Potential Diversification
Cash	Cash Equivalents	Liquidity Return Stability

B. Expected Returns, Risks, and Correlations for Permissible Asset Classes

The risk and return behavior of the WRS will be driven primarily by the allocation of investments across asset classes. In determining the appropriate allocation, the expected return and risk behavior of each asset class and the likely interaction of various asset classes in a portfolio must be examined.

C. Long-Term Target Allocations

Based on the investment objectives and constraints of the WRS, and on the expected behavior of the permissible asset classes, the Board will specify a long-term target allocation for each class of permissible assets. These targets will be expressed as a percentage of the WRS's overall fair value, surrounded by a band of permissible variation resulting from market forces.

The long-term target allocations are intended as strategic goals, not short-term imperatives. Thus, it is permissible for the overall System's asset allocation to deviate from the long-term target, as would likely occur during manager transitions, asset class restructurings, and other temporary changes in the WRS. Deviations from targets that occur due to capital market changes are discussed after the following table:

Asset Allocation Targets

	Target (%)	Range (%)
Domestic Equity	**14%**	**9-19%**
International Developed Market Equity	**8%**	**4-12%**
International Emerging Market Equity	**8%**	**4-12%**
Core Fixed Income	**10%**	**5-15%**
Value-Add Fixed Income	**4%**	**2-6%**
Real Estate	**6%**	**4-8%**
Private Equity	**7%**	**4-10%**
PRIT General Allocation (Core) Fund	**35%**	**0-50%**
Portfolio Completion Strategies	**3%**	**0-5%**
Infrastructure	**5%**	**2-8%**
Cash[1]	**0%**	**< 5%**

[1] The cash target of zero defines the System's objective of keeping cash balances as low as possible, at least below 5% at all times. The Retirement Board is aware, however, that a certain cash balance is needed for the efficient operation of the System and its various portfolios.

D. Rebalancing

In general, cash flows to and from the WRS will be allocated in such a manner as to move each asset class toward its target allocation.

The Board recognizes that, periodically, market forces may move the WRS's allocations outside the target ranges. The Board also recognizes that failing to rebalance the allocations would unintentionally change the WRS's structure and risk posture. However, the Board understands that constant rebalancing would result in a significant increase in explicit and implicit trading costs to the WRS. Consequently, the Board has established a process to rebalance the allocations periodically.

On at least an annual basis, if any strategic allocation is outside the specified target range, assets will be shifted to return the strategy to the target range. The specific plan for rebalancing will identify those assets that can be shifted at the lowest possible risk and cost, if the rebalancing cannot be accomplished solely by allocating contributions and withdrawals.

E. Changes to Asset Allocation

Once established, permanent changes in the WRS's target asset allocation will take place only in response to significant changes in the objectives and constraints of the WRS, or in response to material changes in the fundamental nature or appropriateness of the asset classes themselves.

VII. Review of Investment Policy, Asset Allocation, and Performance

The Investment Policy Statement will be reviewed at least annually, and specifically upon each actuarial valuation, to ensure that the objectives and constraints remain relevant. However, the Board recognizes the need for a stable long-term policy for the WRS, and major changes to this policy statement will be made only when significant developments in the circumstances of the WRS occur.

The asset allocation of the WRS will be reviewed on an on-going basis, and at least annually. When necessary, such reviews may result in a rebalancing of asset allocations. In general, the Board intends that the WRS will adhere to its long-term target allocations, and that major changes to these targets will be made rarely and only in response to significant developments in the circumstances of the WRS.

The Board will specifically evaluate the performance of the WRS relative to its objectives and to the returns available from the capital markets during the period under review. In general, the Board will utilize relative, rather than absolute, benchmarks in evaluating performance.

VIII. Trading and Proxy Voting by Investment Managers

In accordance with the fiduciary and other obligations imposed on investment managers by their agreements with the Board, all trades executed by managers must be for the exclusive benefit of the WRS's participants and beneficiaries. Managers are expected to seek best execution on all trades. This is addressed in the individual manager guidelines.

The Board recognizes that the right to vote proxies for securities held represents an asset of the WRS. As such, the Board has specifically delegated the responsibility for voting all security proxies to the individual managers. The Board believes that the voting of proxies constitutes an investment decision by the managers, and that prudent voting of proxies is important to the overall performance of the WRS. Investment managers are expected to execute all proxy votes in a timely fashion and to provide a full written accounting of proxy votes on an annual basis.

IX. Management Structure

To diversify the WRS's assets so as to minimize the risk associated with dependence on the success of one enterprise, the Board Members have decided to employ a multi-manager team approach to investing System assets.

A consultant will be employed whose responsibilities will be to: 1) provide risk and return assumptions for various asset classes, 2) to diversify WRS so as to minimize risk, while enhancing the probability of achieving the WRS's return objectives, and 3) to evaluate the performance and compliance of investment managers.

Investment managers will be employed to utilize individual expertise within their assigned area of responsibility. Each manager will be governed by individual investment guidelines.

X. Implementation

All monies invested for the WRS after the adoption of this investment policy statement shall conform to this statement.

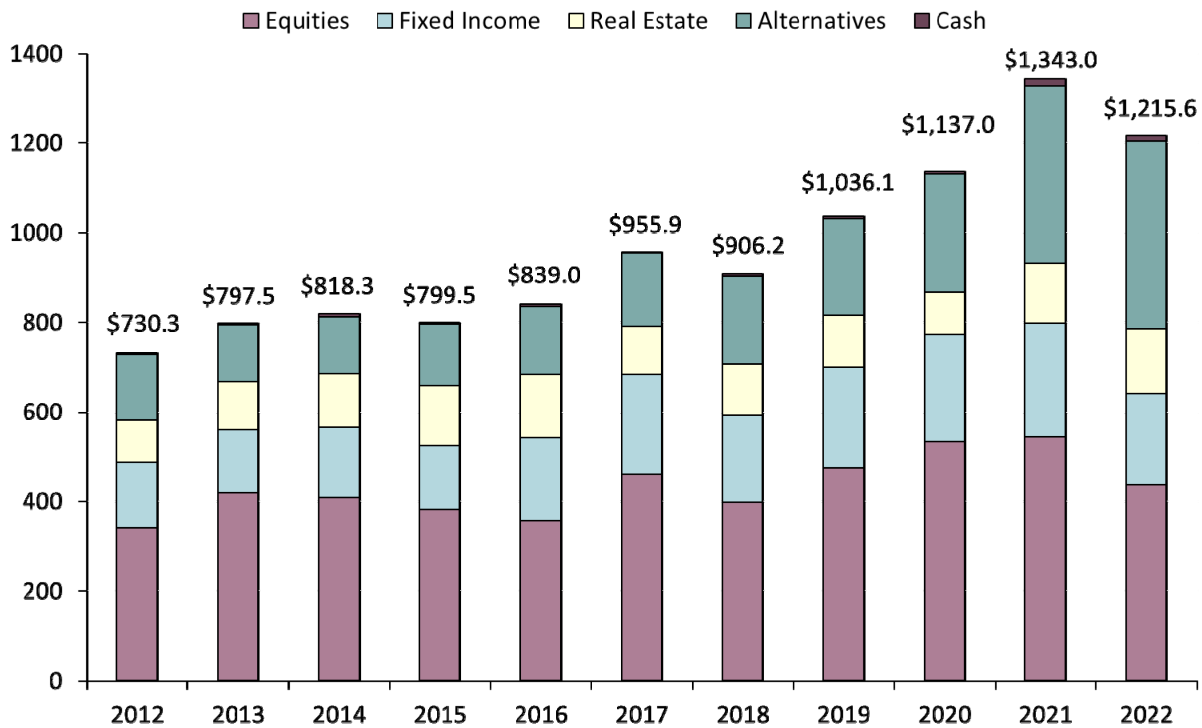
INVESTMENT RESULTS*

	4Q22	1 YR	3 YR	5 YR	10 YR	Since Inception	Inception Date
Total System**	**4.3**	**-8.3**	**7.0**	**6.7**	**7.3**	**7.5**	**10/1/1995**
Total System (net)**	**4.3**	**-8.4**	**6.9**	**6.6**	**7.2**	**7.3**	**10/1/1995**
CPI (inflation)	0.0	6.5	4.9	3.8	2.6	3.2	
Total Equity	**10.3**	**-18.1**	**3.6**	**4.5**	**8.0**	**6.4**	**4/1/1998**
Russell 3000	7.2	-19.2	7.1	8.8	12.1	6.7	
MSCI ACWI (ex. U.S.) IMI	14.1	-16.6	0.2	0.8	4.0	4.1	
Total Fixed Income	**2.9**	**-8.8**	**0.2**	**1.9**	**2.2**	**5.0**	**1/1/1998**
Bloomberg Barclays Universal	2.2	-13.0	-2.5	0.2	1.3	3.2	
Total Real Estate	**-0.4**	**7.1**	**10.3**	**9.8**	**10.2**	**8.2**	**10/1/2000**
NCREIF ODCE (net)	-5.0	7.5	9.9	8.7	10.1	8.2	
Total Balanced	**4.1**	**-11.4**	**6.0**	**6.2**	**-**	**8.0**	**6/1/2016**
60% MSCI ACWI / 40% Barclays Global Aggregate	7.7	-17.3	0.8	2.7	4.7	4.9	
Total Real Assets	**2.8**	**12.5**	**8.4**	**8.0**	**6.8**	**4.9**	**10/1/2006**
CPI +3%	0.7	9.6	8.1	6.9	5.7	5.4	

* The WRS's policy is a time weighted average of the representative asset class benchmarks.

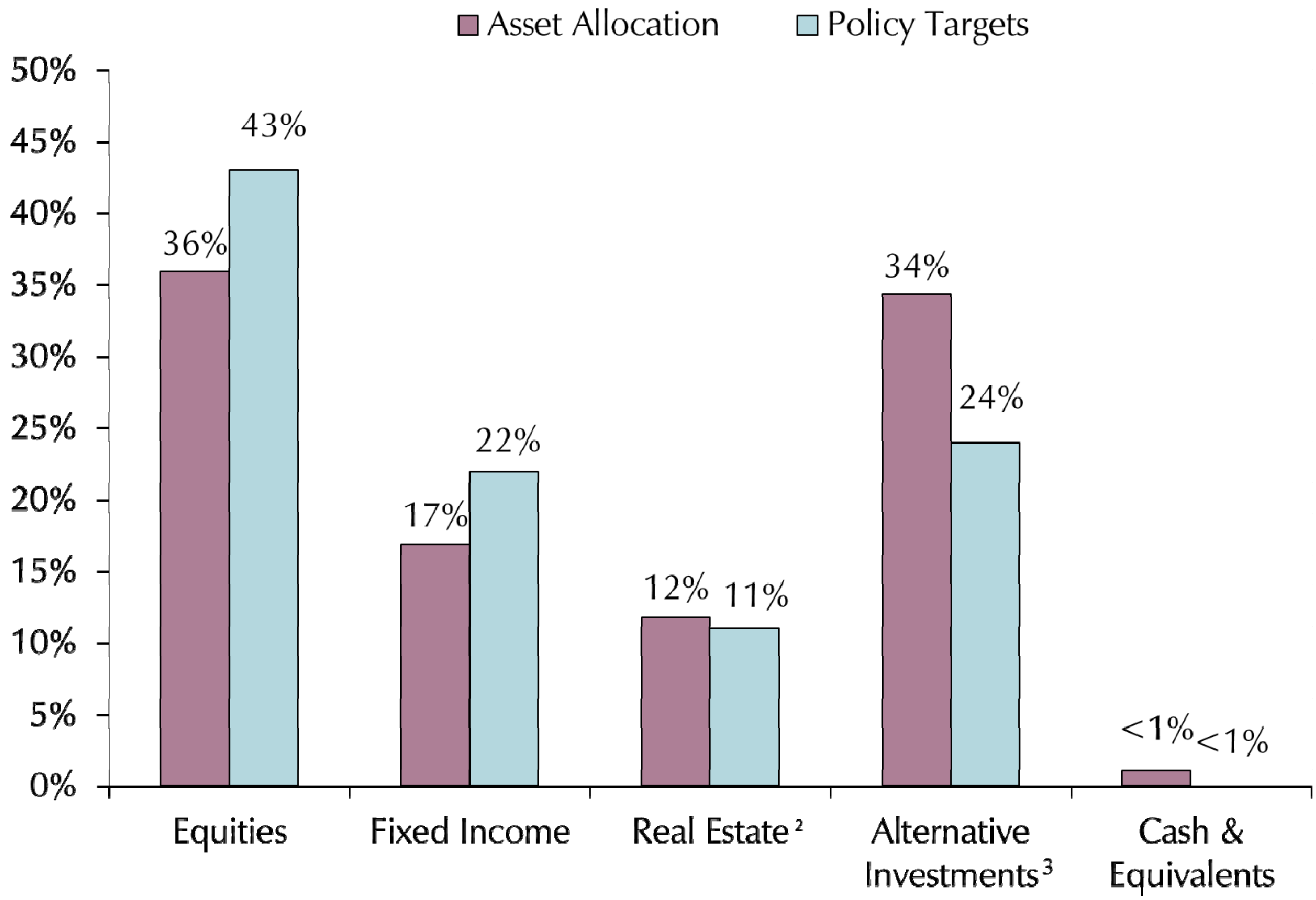
** Other alternative investments include private equity, infrastructure, and natural resources limited partnerships that are measured by dollar weighted, rather than time weighted returns. For the calendar year period covered by this report, the WRS's private equity investments increased by $14.9 million, including approximately $20.1 million in capital called and $11.6 million in distributions. The WRS's private infrastructure investments increased by $14.7 million, there was $10.9 million called and $4.5 million distributed. The WRS's private natural resources investments increased by $0.8 million, including $0.1 million called and $1.0 million distributed.

ASSET ALLOCATION - ASSET SIZE[1]



[1] Graph reflects the PRIT Core Fund's market value distributed among the System's asset classes in line with the Core Fund's underlying asset allocation as of December 31, 2022.

AGGREGATE ASSET ALLOCATION VS. POLICY TARGETS[1]



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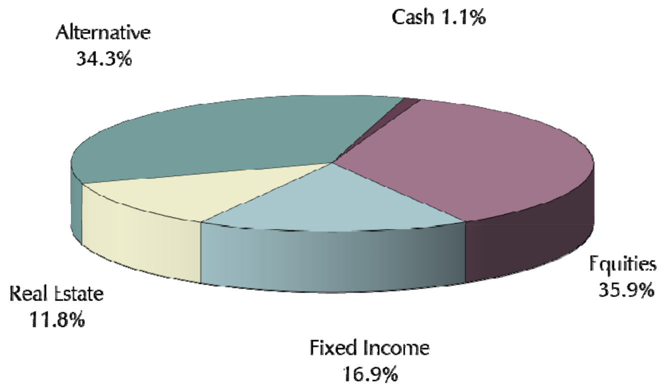
[1] Graph reflects the PRIT Core Fund's market value distributed among the System's asset classes in line with the Core Fund's underlying asset allocation as of December 31, 2022. Policy Targets include allocation of the System's 35% PRIT Core Fund's target in line with the Core Fund's underlying policy targets as of December 31, 2022.

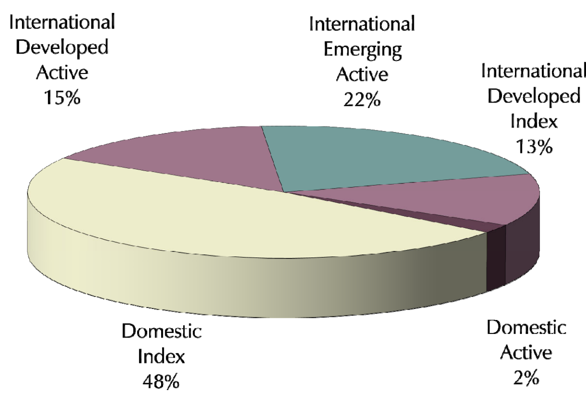
[2] The Real Estate policy target includes Timber.

[3] The Alternative Investments allocation includes Private Equity, Hedge Funds, Portfolio Completion, Infrastructure and Natural Resources assets.

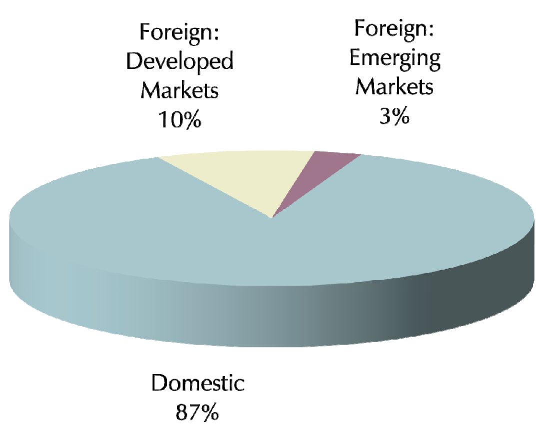
AGGREGATE ASSET ALLOCATION[1]



EQUITY ALLOCATION



FIXED INCOME ALLOCATION



[1] Graphs reflect the PRIT Core Fund's market value distributed among the System's asset classes in line with the Core Fund's underlying asset allocation as of December 31, 2022.

STOCK HOLDINGS BY FAIR VALUE

Company	Number of Shares	Fair Value	% of Total Equity	Industry
NORTEL NETWORKS CORP	7,884.000	3.94	< 0.1%	Telecom

TEN LARGEST FIXED INCOME HOLDINGS BY FAIR VALUE

Security	Coupon (%)	Maturity Date	Fair Value ($)	% of Fixed Income
US TREAS-CPI INFLAT	0.625%	1/15/2026	2,176,995	2.5%
US TREAS-CPI INFLAT	0.375%	7/15/2025	2,155,645	2.5%
US TREAS-CPI INFLAT	0.625%	1/15/2024	2,146,895	2.5%
US TREAS-CPI INFLAT	0.375%	1/15/2027	2,116,812	2.5%
US TREAS-CPI INFLAT	0.875%	1/15/2029	2,108,042	2.5%
US TREAS-CPI INFLAT	0.750%	7/15/2028	1,973,079	2.3%
US TREAS-CPI INFLAT	0.500%	1/15/2028	1,910,454	2.2%
US TREAS-CPI INFLAT	0.125%	7/15/2031	1,871,492	2.2%
U S TREASURY NOTE	1.500%	1/31/2027	1,870,583	2.2%
US TREAS-CPI INFLAT	0.250%	1/15/2025	1,692,952	2.0%

A complete portfolio is available upon request.

Schedule Of Fees & Commissions

Investment Manager Fees: December 31, 2022	
Acadian Asset Management	232,192
AEW VII	28,600
AEW IX	120,000
Ascent Venture Management V	18,576
Ascent Venture Management VI	84,375
Boston Millenia Partners II	724
Boston Millenia Partners III	11,960
Eaton Vance	41,620
EnTrust	34,110
Global Infrastructure Partners III	224,064
Global Infrastructure Partners IV	197,823
IFM	418,529
IR&M Core Bond	150,375
IR&M TIPS	20,067
Loomis Sayles & Company	95,896
Mass PRIM (EM)	473,508
Mass PRIM (General Allocation)	2,177,341
Mass PRIM (PEVY 2016)	109,940
Mass PRIM (PEVY 2017)	332,718
Mass PRIM (PEVY 2018)	382,100
Mass PRIM (PEVY 2019)	195,126
Mass PRIM (PEVY 2020)	280,798
Mass PRIM (PEVY 2021)	302,773
Mass PRIM (PEVY 2022)	44,897
Mass PRIM (Real Estate)	552,424
Newstone Capital Partners II	4,712
Northstar Capital V	0
Northstar Capital VI	40,890
Old Farm	127,206
Ridgemont	40,823
RMK Select Timberland Fund II	1,297
SSgA Daily EAFE Index	12,830
SSgA Russell 1000 Growth Index	8,307
SSgA Russell 1000 Value Index	8,478
SSgA S&P 500 Index	6,486

(Continued)

Schedule Of Fees & Commissions (Continued)

Investment Manager Fees: December 31, 2022		
SSgA S&P Midcap Index		2,866
SSgA Russell 2000 Index		3,177
TA XII		0
White Deer II		72,212
Total Investment Manager Fees	**$**	**6,859,820**
Peoples United (Custodian Bank Fee)		186,765
Meketa Investment Group (Consultant Fee)		142,933
Total Other Fees	**$**	**329,698**
Total Fees	**$**	**7,189,518**

2022 COMMISSIONS TO BROKERS

NO COMMISSIONS WERE PAID TO BROKERS IN 2022

INVESTMENT SUMMARY

	Fair Value 12/31/2022 ($ mm)	% of Total Fair Value[3]
Total System	**1,215.6**	**100%**
Total Equity Assets	**275.9**	**23%**
Equities	< 0.1	< 0.1%
Pooled Equities	275.9	23%
Total Fixed Income Assets	**128.2**	**11%**
Fixed Income	87.6	7%
Pooled Fixed Income	40.6	3%
Total Alternative Assets	**377.1**	**31%**
Alternative Assets	293.8	24%
Real Estate	83.3	7%
External Investment Pool	**421.7**	**35%**
PRIT General Allocation (Core) Fund	421.7	35%
Cash & Cash Equivalents	**12.8**	**1%**

[3] Figures may not sum to 100% due to rounding.

LIQUIDITY PROFILE

Benefits payments totaled approximately $97.8 million during the year and along with other payments of $2.0 million resulted in total cash outflows of $99.8 million in 2022. These payments were partially offset by a contribution of approximately $62.8 million from employers and other cash receipts of $21.8 million for a total of $84.5 million in 2022. This resulted in a negative cash flow of approximately $15.2 million for the fiscal year. Note that these figures do not incorporate expected income and asset gains from the WRS's investments. The WRS's portfolio is structured with a long-term expected return of 7.3%.

Actuarial Section

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July 11, 2023

City of Worcester Retirement Board
City Hall, Room 103
455 Main Street
Worcester, MA 01608

Dear Board Members:

Segal has performed a January 1, 2023 actuarial valuation of the City of Worcester Retirement System. This actuarial valuation has been completed in accordance with generally accepted actuarial principles and practices. The assumptions used in this actuarial valuation were selected by the Board based upon our analysis and recommendations. In our opinion, the assumptions are reasonable and take into account the experience of the Plan and reasonable expectations.

As part of performing the valuation, Segal was furnished member data by the City of Worcester Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary.

The funding objective of the plan is to provide for the current cost of benefits (i.e., normal cost) and to reduce the unfunded liability to zero by June 30, 2034. The normal cost is expected to remain approximately at a level percentage of payroll. As of July 1, 2023, the Special Legislation liability is amortized over a 11-year period (by June 30, 2034) with level payments. The remaining unfunded liability is amortized over a 11-year period. The fiscal 2024 appropriation of $66,733,809 was determined with the January 1, 2022 actuarial valuation and was calculated such that the total appropriation was 6.33% greater than the fiscal 2023 appropriation. For fiscal 2025, the total appropriation increases 4.79% over fiscal 2024, and for later years, each year's total appropriation increases 3.50% per year through fiscal 2033, then decreases 23.97% in fiscal 2034.

Actuarial valuations have been performed annually. This is consistent with the guidelines promulgated by PERAC and GASB. The previous valuation was performed as of January 1, 2022. The assumptions and methods used for funding purposes meet the parameters set by the Actuarial Standards of Practice (ASOPs).

Segal has prepared the following supporting schedules for the Actuarial Section and Statistical Section of the Annual Comprehensive Financial Report:

Actuarial Section

- Summary of Actuarial Assumptions and Actuarial Cost Method
- Schedule of Active Member Valuation Data
- Schedule of Retirees and Beneficiaries Added to and Removed from Rolls
- Solvency Test
- Analysis of Financial Experience
- Schedule of Funding Progress
- Summary of Plan Provisions
- Age Last Birthday at Date of Retirement (three schedules)

Statistical Section

- Schedule of Benefit Expenses by Type
- Schedule of Retired Members by Benefit
- Schedule of Average Benefit Payments

Please let us know if you have any questions on this material.

Sincerely,

Segal

Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary

I. Summary of Actuarial Assumptions and Actuarial Cost Method

The actuarial assumptions, as set forth in the accompanying supporting schedules, were selected by the City of Worcester Retirement Board and actuary. Unless stated otherwise, the actuarial assumptions are based upon the actuarial valuation as of January 1, 2023, which was adopted by the WRS in July of 2023.

Mortality Rates

Pre-retirement:	RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2021
Healthy Retiree:	RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2021
Disabled Retiree:	RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021
	The mortality tables reasonably reflect the projected mortality experience of the Plan as of the measurement date based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior years' assumptions over the most recent five years. The mortality tables were then adjusted to future years using generational projection under Scale MP-2021 to reflect future mortality improvement.

Termination Rates before Retirement

Groups 1 and 2 - Rate (%)

Age	Mortality Male	Mortality Female	Disability	Withdrawal
20	0.05	0.02	0.01	12.00
25	0.06	0.02	0.03	8.78
30	0.06	0.02	0.04	5.55
35	0.07	0.03	0.07	3.93
40	0.08	0.04	0.13	2.31
45	0.13	0.07	0.18	1.89
50	0.22	0.12	0.24	1.46
55	0.36	0.19	0.30	0.00
60	0.61	0.27	0.35	0.00

Notes: Mortality rates do not reflect generational projection.
55% of the disability rates shown represent accidental disability.
20% of the accidental disabilities will die from the same cause as the disability.
55% of the death rates shown represent accidental death.

Group 4 - Rate (%)

Age	Mortality Male	Mortality Female	Disability	Withdrawal
20	0.05	0.02	0.13	2.10
25	0.06	0.02	0.25	1.88
30	0.06	0.02	0.38	1.65
35	0.07	0.03	0.38	1.11
40	0.08	0.04	0.38	0.56
45	0.13	0.07	1.25	0.28
50	0.22	0.12	1.56	0.00
55	0.36	0.19	1.50	0.00
60	0.61	0.27	1.06	0.00

Notes: Mortality rates do not reflect generational projection.
90% of the disability rates shown represent accidental disability.
60% of the accidental disabilities will die from the same cause as the disability.
90% of the death rates shown represent accidental death.

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior years’ assumptions over the past five years.

Retirement Rates

	Rate (%)		
Age	Groups 1 and 2	Age	Group 4
50	3.0	50	5.0
51-54	1.0	51-54	1.0
55	2.0	55	16.0
56	2.0	56	9.0
57	3.0	57	9.0
58	3.0	58	12.0
59	3.0	59	11.0
60	8.0	60	24.0
61	7.0	61	14.0
62	15.0	62	20.0
63	11.0	63	13.0
64	10.0	64	19.0
65	36.0	65	100.0
66	22.0		
67	22.0		
68	22.0		
69	25.0		
70	100.0		

The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior years' assumptions over the past five years.

Retirement Age for Inactive Vested Participants

55 for participants hired prior to April 2, 2012. For participants hired April 2, 2012 and later, 60 for Group 1, 55 for Group 2 and 50 for Group 4.

The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment.

Unknown Data for Participants

Same as those exhibited by participants with similar known characteristics. If not specified, participants are assumed to be male.

Family Composition

80% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their male spouses.

Benefit Election

All participants are assumed to elect option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.

Net Investment Return

6.80% (same rate used to discount the actuarial accrued liability)

The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the Plan's target asset allocation.

Salary Scale

4.00% per year with an allowance for wage inflation of 3.00%

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.

Cost-of-Living Adjustments (COLA)

3.00% increase on the first $15,000 of retirement allowance, increasing to $16,000 on July 1, 2024. For recipients of Section 100 and Special Legislation benefits, 3.00% per year.

401(a)(17) Salary Limit Projection

3.00% per year.

Interest on Employee Contributions

3.50%

Administrative Expenses

$700,000 for calendar year 2023, increasing by 3.00% per year.

The administrative expense assumption is based on information on expected expenses provided by the Retirement System.

2022 Salary

2022 salary equal to salaries provided in the data.

Payroll figures are for the prior year and reflect annualized salaries for participants hired during the year.

Calendar 2022 salaries were reduced by 3.0% for police and firefighters to reflect retroactive payments that were included in the salary data.

Total Service

Total creditable service reported in the data. If missing, total creditable service estimated from date of hire.

Net 3(8)(c) Liability

Estimated liability of $15.8 million based on the average annual net 3(8)(c) benefits in the prior two years and the average demographics of retired participants.

Actuarial Value of Assets

Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.

Actuarial Cost Method

Entry Age Normal Actuarial Cost Method. Entry Age is the age of the participant less Total Service as defined above. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal cost is determined using the plan of benefits applicable to each participant.

Amortization Method

Level payments on the special legislation liabilities; total appropriation increases 4.79% in fiscal 2025, 3.50% in fiscal 2026 through fiscal 2033 and decreases 23.97% in fiscal 2034.

Recent Changes

The investment return assumption was lowered from 8.50% to 8.25% as of January 1, 2006. As of January 1, 2011, it was lowered to 8.00%. As of January 1, 2013, it was lowered to 7.75%. As of January 1, 2015 it was lowered to 7.625%. As of January 1, 2016, it was lowered to 7.50%. As of January 1, 2017 it was lowered to 7.375%. As of January 1, 2018 it was lowered to 7.00%. As of January 1, 2019 it was lowered to 6.90%. As of January 1, 2022 it was lowered to 6.80%

The salary increase assumption was lowered as of January 1, 2003 from 5.50% to 5.00%. As of January 1, 2011, it was lowered to 4.75%. As of January 1, 2013, it was lowered to 4.5%. As of January 1, 2014, a select and ultimate assumption of 3.5% for 2014 and 2015 and 4.5% thereafter was used. As of January 1, 2015, a select and ultimate assumption of 3.5% for 2015 and 2016 and 4.5% thereafter was used. As of January 1, 2016, a select and ultimate assumption of 3.5% for 2016 and 2017 and 4.5% thereafter was used. As of January 1, 2018, a select and ultimate assumption of 3.5% for 2018 and 2019 and 4.5% thereafter was used. As of January 1, 2019, a select and ultimate assumption of 3.5% for 2019 and 4.0% thereafter was used.

An asset smoothing method was first applied with the January 1, 2000 valuation and modified as of January 1, 2004. As of December 31, 2004, the actuarial value of assets was set equal to market value. As of January 1, 2009, the actuarial value of assets was changed from market value of assets to a five-year smoothing method. As of January 1, 2010, the actuarial value of assets was changed from being within 20% of the market value of assets to being within 10% of the market value of assets.

The mortality assumption for healthy participants was changed from the 1994 Group Annuity Mortality Table to the RP-2000 Combined Healthy Mortality Table projected 12 years using Scale AA as of January 1, 2012. As of January 1, 2013, the pre-retirement mortality assumption was changed to the RP-2000 Employee Mortality Table projected 20 years using Scale AA. As of January 1, 2014, the pre-retirement mortality assumption was changed to the RP-2000 Employee Mortality Table projected generationally using Scale AA. As of January 1, 2016, the pre-retirement mortality assumption was changed to the RP-2000 Employee Mortality Table projected generationally using Scale BB2D from 2009. As of January 1, 2018, the pre-retirement mortality assumption was changed to the RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017. As of January 1, 2022, the generational mortality improvement scale was updated to Scale MP-2021.

The mortality assumption for healthy retirees was changed from the RP-2000 Combined Healthy Mortality Table projected 12 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA as of January 1, 2013. As of January 1, 2014, the mortality assumption for non-disabled retirees was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA. As of January 1, 2016, the mortality assumption for non-disabled retirees was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2009. As of January 1, 2018, the mortality assumption for non-disabled retirees was changed to the RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2017. As of January 1, 2022, the generational mortality improvement scale was updated to Scale MP-2021.

The mortality assumption for disabled participants was changed from the 1994 Group Annuity Mortality Table set forward 10 years to the 1994 Group Annuity Mortality Table set forward 7 years, as of January 1, 2010. As of January 1, 2011, the table was changed to the 1994 Group Annuity Mortality Table set forward 5 years. As of January 1, 2012, the assumption was changed to the RP-2000 Combined Healthy Mortality Table set forward 5 years projected 12 years using Scale AA. As of January 1, 2013, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected 5 years using Scale AA with a 3-year set forward for males. As of January 1, 2014, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA from 2010 with a 3-year set forward for males. As of January 1, 2015, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale AA with a 3-year set forward for males. As of January 1, 2016, the assumption was changed to the RP-2000 Healthy Annuitant Mortality Table projected generationally using Scale BB2D from 2015. As of January 1, 2018, the assumption was changed to the RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017. As of January 1, 2022, the generational mortality improvement scale was updated to Scale MP-2021.

The estimated liability for future 3(8)(c) payments was decreased from $20.1 million based on estimated net annual benefits of $2.4 million to $15.7 million based on estimated net annual benefits of $1.8 million as of January 1, 2011 and to an estimated liability of $15.3 million based on net annual benefits of $1.7 million as of January 1, 2012. Beginning January 1, 2013, the estimated liability for future net 3(8)(c) payments was based on the average net 3(8)(c) benefits of prior two years and the average demographics of retired participants as follows:

January 1, 2013	$15.0 million
January 1, 2014	15.3 million
January 1, 2015	17.0 million
January 1, 2016	16.4 million
January 1, 2017	18.7 million
January 1, 2018	23.2 million
January 1, 2019	21.1 million
January 1, 2020	22.9 million
January 1, 2021	25.1 million
January 1, 2022	25.1 million*
January 1, 2023	15.8 million

**The January 1, 2022 estimated liability was set equal to the January 1, 2021 estimated liability.*

As of January 1, 2012, the annual rates of retirement and disability were changed.

The administrative expense assumption was changed from $625,000 to $600,000 as of January 1, 2012 and to $575,000 as of January 1, 2013. Administrative expenses are assumed to increase each year which is reflected in the funding schedule. As of January 1, 2014, the administrative expense assumption was reset to $575,000. As of January 1, 2015, the administrative expense assumption was changed from $575,000 to $600,000. As of January 1, 2016, January 1, 2017, January 1, 2018, and January 1, 2019 the administrative expense assumption was reset to $600,000. As of January 1, 2020 the administrative expense assumption was increased to $675,000. As of January 1, 2021 the administrative expense assumption was reset to $675,000. As of January 1, 2022 the administrative expense assumption was increased to $715,000. As of January 1, 2023 the administrative expense assumption was reduced to $700,000.

As of January 1, 2014, the assumed retirement age for inactive vested participants was changed from age 65 to age 55 for Group 1 and 2 members hired prior to April 2, 2012. For inactive vested participants hired April 2, 2012 or later, the assumed retirement age was lowered from age 65 to age 60 for Group 1 members, from age 65 to age 55 for Group 2 members and from age 55 to age 50 for Group 4 members.

II. Schedule of Active Member Valuation Data

Valuation date	Number of Employers	Active Members	Projected annual payroll ($)	Annual average pay ($)	% Increase in average pay
1/1/2014	2	3,293	$168,856,039	$51,277	0.64%
1/1/2015	2	3,262	173,759,691	53,268	3.88%
1/1/2016	2	3,275	175,910,160	53,713	0.84%
1/1/2017	2	3,342	182,832,183	54,707	1.85%
1/1/2018	2	3,455	192,957,155	55,849	2.09%
1/1/2019	2	3,393	195,816,954	57,712	3.34%
1/1/2020	2	3,506	204,289,852	58,269	0.97%
1/1/2021	2	3,411	206,797,756	60,627	4.05%
1/1/2022	2	3,377	207,413,215	61,419	1.31%
1/1/2023	2	3,630	226,093,258	62,285	1.41%

III. Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

		Added to Rolls		Removed from Rolls		Rolls - end of year			
Year ended	Valuation Date	Number	Annual allowances[1]	Number	Annual allowances	Number	Annual allowances[1]	% Increase in annual allowances	Average annual allowances
2013	01/01/14	112	3,510,330	133	2,262,416	2,733	69,107,130	3.55%	25,286
2014	01/01/15	128	4,240,131	145	2,393,537	2,716	72,007,429	4.20%	26,512
2015	01/01/16	135	4,994,889	130	2,298,965	2,721	75,746,634	5.19%	27,838
2016	01/01/17	144	4,986,404	138	2,931,552	2,727	78,900,779	4.16%	28,933
2017	01/01/18	116	3,773,403	136	3,061,604	2,707	80,676,665	2.25%	29,803
2018	01/01/19	146	5,323,886	136	3,242,379	2,717	83,946,045	4.05%	30,897
2019	01/01/20	148	5,388,605	127	3,020,329	2,738	87,364,386	4.07%	31,908
2020	01/01/21	128	5,303,175	142	3,503,867	2,724	90,138,703	3.18%	33,091
2021	01/01/22	167	6,077,088	138	3,520,878	2,753	93,722,201	3.98%	34,044
2022	01/01/23	149	5,517,294	141	3,828,086	2,761	96,605,610	3.08%	34,989

[1] Annual allowances are shown for retirees in pay status at the end of the year

IV. Solvency Test

	Actuarial Accrued Liability				Portion of Actuarial Accrued Liability Covered by Assets		
Valuation Date	(1) Active/Inactive member contributions	(2) Retirees and beneficiaries	(3) Active/Inactive members (Employer financed)	Actuarial value of assets	(1)	(2)	(3)
01/01/2014	178,648,060	649,780,235	342,197,340	770,334,007	100%	91%	0%
01/01/2015	183,475,605	687,917,537	357,161,637	820,708,236	100%	93%	0%
01/01/2016	186,699,458	738,049,932	362,150,206	849,286,321	100%	90%	0%
01/01/2017	188,910,537	777,664,492	379,691,076	884,576,848	100%	89%	0%
01/01/2018	196,740,865	835,591,903	430,038,244	928,286,125	100%	88%	0%
01/01/2019	201,754,782	872,943,297	431,638,679	952,294,056	100%	86%	0%
01/01/2020	206,620,971	915,307,098	432,846,339	993,870,483	100%	86%	0%
01/01/2021	213,482,360	946,089,443	433,836,319	1,069,701,047	100%	91%	0%
01/01/2022	214,597,406	996,565,467	440,960,296	1,204,658,632	100%	99%	0%
01/01/2023	219,081,882	1,026,745,517	454,162,636	1,251,062,070	100%	100%	1%

V. Analysis of Financial Experience

	Year Ended December 31,				
	2022	**2021**	**2020**	**2019**	**2018**
1. Unfunded actuarial accrued liability as of January 1	$447,464,537	$523,707,075	$560,903,925	$554,042,702	$534,084,887
2. Normal cost as of January 1	36,407,910	35,196,663	34,878,842	33,265,206	33,831,538
3. Employer, employee and other contributions during year	(84,525,421)	(79,036,993)	(75,464,319)	(71,619,317)	(67,434,617)
4. Interest					
(a) For whole year on (1)+(2)	32,903,326	38,564,358	41,109,011	40,524,246	39,754,150
(b) For half year on (3)	(2,603,086)	(2,469,435)	(2,357,809)	(2,237,676)	(2,137,100)
(c) Total interest	$30,300,240	$36,094,923	$38,751,202	$38,286,570	$37,617,050
5. Expected unfunded actuarial liability	429,647,266	515,961,668	559,069,650	553,975,161	538,098,858
6. Actual unfunded actuarial accrued liability	448,927,965	423,148,816	523,707,075	560,903,925	554,042,702
7. (Gain) or loss for the year: (6)-(5)	$19,280,699	($92,812,852)	($35,362,575)	$6,928,764	$15,943,844
8. Investment (gain) or loss	$19,153,472	($78,739,604)	($24,402,530)	$5,452,605	$22,932,790
9. (Gains) or losses from sources other than investments	(6,691,308)	(14,073,248)	(10,960,045)	1,476,159	(8,597,452)
10. Plan changes	6,818,535	21,678,106	-	-	-
11. Assumption changes	-	2,637,615	-	-	1,608,506

	2017	**2016**	**2015**	**2014**	**2013**
1. Unfunded actuarial accrued liability as of January 1	$461,689,257	$437,613,275	$407,846,543	$400,291,628	$410,487,870
2. Normal cost as of January 1	29,444,823	27,755,573	26,909,138	25,552,553	24,481,163
3. Employer, employee and other contributions during year	(64,158,570)	(61,283,246)	(59,217,609)	(56,715,269)	(53,519,634)
4. Interest					
(a) For whole year on (1)+(2)	36,221,138	34,902,664	33,150,121	33,002,924	33,710,099
(b) For half year on (3)	(2,140,833)	(2,079,106)	(2,042,077)	(1,987,425)	(1,875,443)
(c) Total interest	$34,080,305	$32,823,558	$31,108,044	$31,015,499	$31,834,656
5. Expected unfunded actuarial liability	461,055,815	436,909,160	406,646,116	400,144,411	413,284,055
6. Actual unfunded actuarial accrued liability	534,084,887	461,689,257	437,613,275	407,846,543	400,291,628
7. (Gain) or loss for the year: (6)-(5)	$73,029,072	$24,780,097	$30,967,159	$7,702,132	($12,992,427)
8. Investment (gain) or loss	$1,260,000	$8,461,822	$16,027,779	($7,612,571)	($25,231,411)
9. (Gains) or losses from sources other than investments	(1,270,240)	(2,801,045)	(1,886,071)	(1,121,486)	(7,994,158)
10. Plan changes	-	-	-	-	-
11. Assumption changes	73,039,312	19,119,320	16,825,451	16,436,189	20,233,142

(concluded)

VI. Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Plan Assets	Actuarial Accrued Liability	Unfunded Actuarial Accrued Liability	Funded Ratio (%)	Covered Employee Payroll	UAAL as a Percent of Covered Payroll (%)
	(a)	(b)	(b - a)	(a/b)	(c)	(b - a)/c
01/01/2014	770,334,007	1,170,625,635	400,291,628	65.81%	168,856,039	237.06%
01/01/2015	820,708,236	1,228,554,779	407,846,543	66.80%	173,759,691	234.72%
01/01/2016	849,286,321	1,286,899,596	437,613,275	65.99%	175,910,160	248.77%
01/01/2017	884,576,848	1,346,266,105	461,689,257	65.71%	182,832,183	252.52%
01/01/2018	928,286,125	1,462,371,012	534,084,887	63.48%	192,957,155	276.79%
01/01/2019	952,294,056	1,506,336,758	554,042,702	63.22%	195,816,954	282.94%
01/01/2020	993,870,483	1,554,774,408	560,903,925	63.92%	204,289,852	274.56%
01/01/2021	1,069,701,047	1,593,408,122	523,707,075	67.13%	206,797,756	253.25%
01/01/2022	1,204,658,632	1,652,123,169	447,464,537	72.92%	207,413,215	215.74%
01/01/2023	1,251,062,070	1,699,990,035	448,927,965	73.59%	226,093,258	198.56%

Also refer to the "Schedule of WRS's Contributions – Last 10 Fiscal Years" in the Required Supplementary Information section of this report.

VII. Summary of Plan Provisions

In addition to this summary of plan provisions, also refer to the "Financial Section" of this report for further information related to plan provisions.

The following summarizes the major provisions of Chapter 32 of the Massachusetts General Laws.

Plan Year

January 1 – December 31

Retirement Benefits

Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

For members with 30 years of creditable service or greater:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit "spiking" of a member's salary to increase the retirement benefit.

For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member's final three-year average salary. Any member who is a veteran also receives an additional yearly retirement allowance of $15 per year of creditable service, not exceeding $300. The veteran allowance is paid in addition to the 80 percent maximum.

Employee Contributions

Employees hired before January 1, 1975 contribute 5 percent of their salary; employees hired after January 1, 1975 and before December 31, 1983 contribute 7 percent; employees hired after January 1, 1984 and before June 30, 1996 contribute 8 percent; employees hired after July 1, 1996 contribute 9 percent.

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of $30,000.

Employees hired after 1983 who voluntarily withdraw their contributions with less than 10 years of credited service receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

Retirement Benefits (Superannuation)

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System).

Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service.

Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.

Ordinary Disability Benefits

A member who is unable to perform his job due to a non-occupational disability will receive a retirement allowance if he has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.

Accidental Disability Benefit

For a job-connected disability the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.

Death Benefits

In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of his or her death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. The allowance provided for under this option shall not be less than $250 per month, and there are additional amounts for surviving children.

If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death, and will be eligible for pay increases that would have been awarded to the officer if they were still living.

Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of $12,000 per year if the member dies for a reason unrelated to cause of disability.

"Heart and Lung Law" and Cancer Presumption

Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman or permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.

Options

Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death contributions not expended for annuity payments will be refunded to his beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have their benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.

Post-Retirement Benefits

The Board has adopted the provisions of Section 51 Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first $12,000 of a retirement allowance. As of July 1, 2012, this increased to an annual COLA in excess of the CPI, but not to exceed 3% of the first $13,000 of a retirement allowance. The $13,000 COLA base increased to $14,000 on July 1, 2022, and will increase to $15,000 on July 1, 2023, and to $16,000 on July 1, 2024. Pursuant to Chapter 269 of the Acts of 2022, the Board approved a one-time increase in the COLA from 3% to 5% effective July 1, 2022. Cost-of-living increases granted prior to July 1, 1998 are reimbursed by the Commonwealth and are not reflected in this report.

Changes in Plan Provisions

Pursuant to Chapter 269 of the Acts of 2022, the Board approved a one-time increase in the COLA from 3% to 5% effective July 1, 2022.

Statistical Section

STATISTICAL SECTION

This part of the WRS' Annual Comprehensive Financial Report presents information as a context for understanding what the information in the financial statements, note disclosures, and required supplementary information says about the WRS' overall financial health.

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These schedules contain trend information to help the reader understand how the WRS' financial performance and well-being have changed over time.

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This schedule presents trend data about retired members by type of benefit.

Schedules of Average Benefit Payments 79

These schedules present trend data about average benefit payments.

Schedule of Participating Employers 80

This schedule shows each participating employer's number of covered employees and percentage of total covered employees.

Schedule of Additions to Fiduciary Net Position by Source

Fiscal Year	Member Contributions	Employer Contributions	Employer Contributions as % of Covered Payroll	Investment Income(a)	Other(b)	Total
2013	16,208,897	38,148,683	22.97	93,539,100	2,485,176	150,381,856
2014	16,320,772	41,200,578	24.40	34,950,210	1,845,922	94,317,482
2015	17,409,182	42,703,837	24.58	(10,490,024)	1,808,517	51,431,512
2016	17,797,519	44,411,990	25.25	58,737,894	1,854,736	122,802,139
2017	19,327,093	46,188,470	25.26	134,646,815	1,766,916	201,929,294
2018	19,969,060	49,098,344	25.45	(30,549,012)	1,669,769	40,188,161
2019	20,740,274	52,206,269	26.50	147,174,441	1,599,809	221,720,793
2020	20,534,325	55,510,926	27.88	117,030,633	1,564,632	194,640,516
2021	20,012,226	59,024,767	29.52	221,467,014	3,080,028	303,584,035
2022	21,764,386	62,761,035	28.74	(110,667,214)	3,435,610	(22,706,183)

Schedule of Deductions from Fiduciary Net Position by Type

Fiscal Year	Benefits	Administrative Expenses	Withdrawals(a)	Total
2013	68,152,214	562,729	4,143,967	72,858,910
2014	70,761,551	587,157	4,325,882	75,674,590
2015	74,243,486	572,743	4,418,386	79,234,615
2016	77,848,021	565,669	4,873,808	83,287,498
2017	80,516,026	583,404	5,730,504	86,829,934
2018	82,386,639	587,936	5,191,880	88,166,455
2019	85,849,444	658,260	6,086,868	92,594,572
2020	88,861,178	556,041	4,767,990	94,185,209
2021	92,267,786	568,333	6,285,630	99,121,749
2022	95,994,461	575,104	7,213,397	103,782,962

Schedule of Total Change in Net Position

Fiscal Year	Total Change in Net Position
2013	77,522,946
2014	18,642,892
2015	(27,803,103)
2016	39,514,641
2017	115,099,360
2018	(47,978,294)
2019	129,126,221
2020	100,445,307
2021	204,462,286
2022	(126,489,145)

Schedule of Benefit Expenses by Type

Year ended December 31	Regular[1]	Disability[1]	Beneficiary[1]	COLA	Annuities	Total
2013	$30,940,561	$11,481,993	$6,275,471	$10,277,781	$9,176,408	$68,152,214
2014	33,659,810	11,596,064	5,066,472	10,496,771	9,942,434	70,761,551
2015	35,487,721	11,841,135	5,267,784	10,923,579	10,723,267	74,243,486
2016	37,977,162	12,615,968	4,670,120	11,157,039	11,427,732	77,848,021
2017	39,441,834	12,819,524	4,759,082	11,344,869	12,150,716	80,516,025
2018	38,589,392	11,751,978	7,791,730	11,487,304	12,766,235	82,386,639
2019	40,492,219	12,480,594	7,400,621	11,686,375	13,789,635	85,849,444
2020	42,075,498	12,876,090	7,682,010	11,838,734	14,388,846	88,861,178
2021	44,337,621	12,884,512	7,644,855	11,982,100	15,418,698	92,267,786
2022	47,044,457	13,527,008	7,728,544	10,996,362	16,698,090	95,994,461

Schedule of Refund Expenses by Type

Year ended December 31	Voluntary Refunds (Resignation)	Involuntary Refunds (Termination)	Deaths	Overpayment Contributions	Total
2013	$ 543,990	$ 485,490	$ 58,589	$ 970	$ 1,089,039
2014	639,481	287,034	23,279	-	949,794
2015	540,978	341,054	62,642	10,211	954,885
2016	690,021	213,630	126,575	-	1,030,226
2017	1,021,405	270,294	66,422	-	1,358,121
2018	851,230	157,197	134,627	1,979	1,145,033
2019	491,247	118,850	381,838	-	991,935
2020	807,351	31,681	72,505	-	911,538
2021	1,429,706	213,074	86,597	-	1,729,377
2022	1,643,706	108,303	316,205	-	2,068,213

Schedule of Retired Members by Benefit

	12/31/2022	12/31/2021	12/31/2020	12/31/2019	12/31/2018	12/31/2017	12/31/2016	12/31/2015	12/31/2014	12/31/2013
Superannuation										
Group 1	1,548	1,531	1,497	1,494	1,475	1,458	1,472	1,453	1,464	1,474
Group 2&4	435	429	422	410	401	392	387	375	347	327
Total	1,983	1,960	1,919	1,904	1,876	1,850	1,859	1,828	1,811	1,801
Ordinary Disability										
Group 1	25	27	28	28	28	29	31	33	35	34
Group 2&4	9	8	7	8	8	7	7	7	8	8
Total	34	35	35	36	36	36	38	40	43	42
Accidental Disability										
Group 1	111	112	113	115	114	117	117	119	117	117
Group 2&4	238	243	244	249	248	258	268	271	273	278
Total	349	355	357	364	362	375	385	390	390	395
Beneficiaries										
Group 1	221	228	230	237	241	246	249	263	273	289
Group 2&4	174	175	183	197	202	200	196	200	199	206
Total	395	403	413	434	443	446	445	463	472	495
Total Retired Members										
Group 1	1,905	1,898	1,868	1,874	1,858	1,850	1,869	1,868	1,889	1,914
Group 2&4	856	855	856	864	859	857	858	853	827	819
Total	2,761	2,753	2,724	2,738	2,717	2,707	2,727	2,721	2,716	2,733

Source: Actuarial valuation as of January 1, 2023

Schedule of Average Benefit Payments

Years of Credited Service	2013 (a)			2014 (a)			2015 (a)			2016 (a)			2017 (a)		
	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (a)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (a)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (a)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (a)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (b)
0	749	4,320	1	772	4,320	1	795	4,320	1	819	4,320	1	843	4,320	1
1 - 5	1,680	22,209	30	1,709	22,437	31	1,806	23,334	27	1,835	24,384	28	1,961	25,053	29
6 - 10	1,085	22,628	153	1,143	24,924	145	1,200	26,274	141	1,232	27,024	138	1,206	27,932	129
11 - 15	1,099	25,410	330	1,146	27,712	326	1,191	28,923	316	1,240	29,534	307	1,273	30,020	298
16 - 20	1,415	28,159	409	1,476	29,785	401	1,504	30,804	401	1,539	31,881	402	1,585	32,734	394
21 - 25	1,917	34,576	362	1,969	36,071	364	2,025	36,637	361	2,100	38,099	364	2,143	39,312	360
26 - 30	2,736	41,002	314	2,816	43,438	319	2,910	45,028	319	2,949	46,123	336	2,963	46,123	338
31 - 35	3,618	50,365	401	3,738	55,330	405	3,928	58,294	434	4,065	60,356	441	4,195	62,366	448
36 - 40	3,670	49,364	197	3,832	57,901	208	3,946	59,520	212	4,107	62,086	214	4,225	63,736	213
41 - 45	3,158	45,860	38	3,393	50,488	41	3,600	53,861	42	3,767	56,267	47	3,748	55,660	48
46 - 50	2,446	43,069	2	2,808	43,069	2	2,895	43,609	3	2,928	43,609	3	2,977	46,752	2
51 - 55	3,399	51,857	1	3,432	51,857	1	3,464	51,857	1	3,497	51,857	1	3,529	51,857	1

Years of Credited Service	2018 (a)			2019 (a)			2020 (a)			2021 (a)			2022 (a)		
	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (b)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (b)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (b)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (b)	Average Monthly Benefit ($)	Average Final Average Salary ($)	Number of Retired Members (b)
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 - 5	2,075	25,790	27	2,242	25,674	29	2,493	29,019	29	2,521	28,870	28	2,654	29,683	27
6 - 10	1,279	30,277	125	1,343	31,625	120	1,367	32,383	118	1,400	33,018	114	1,421	34,397	112
11 - 15	1,293	30,596	294	1,319	31,873	299	1,358	32,599	290	1,396	33,744	280	1,427	35,277	278
16 - 20	1,637	33,499	382	1,677	34,458	380	1,723	35,429	374	1,759	36,251	369	1,851	38,073	367
21 - 25	2,202	41,030	372	2,296	42,637	369	2,326	43,424	374	2,377	44,321	398	2,398	45,099	412
26 - 30	3,048	48,081	337	3,084	48,831	339	3,173	50,507	334	3,242	51,667	344	3,320	53,962	350
31 - 35	4,285	63,792	466	4,363	64,878	488	4,444	66,089	503	4,510	67,198	525	4,657	69,423	528
36 - 40	4,329	65,001	214	4,403	65,919	217	4,547	68,094	226	4,572	68,739	228	4,619	69,620	229
41 - 45	3,856	57,482	54	4,020	60,443	59	4,247	63,947	58	4,372	65,664	59	4,436	66,178	58
46 - 50	3,010	46,752	2	3,067	47,094	3	3,205	49,420	5	3,231	50,258	5	3,266	50,258	5
51 - 55	3,562	51,857	1	3,594	51,857	1	0	0	0	0	0	0	0	0	0

(a) Since the data in this table is organized by creditable service, it does not include "Beneficiaries"

Schedule of Participating Employers

Fiscal Year	Employer Name	Number of Covered Employees	Percentage of Total Covered Employees
2013	City of Worcester	3,121	94.8%
2013	Worcester Housing Authority	172	5.2%
2022	City of Worcester	3,414	94.0%
2022	Worcester Housing Authority	216	6.0%

Source: The WRS administrative staff