MIDDLESEX COUNTY

RETIREMENT SYSTEM AUDIT REPORT

JAN. 1, 2019 - DEC. 31, 2023



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COMMONWEALTH OF MASSACHUSETTS | PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION COMMISSION

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Auditor DIANA DIZOGLIO | KATHLEEN M. FALLON | KATE FITZPATRICK | JAMES J. GUIDO | RICHARD MACKINNON, JR. | JENNIFER F. SULLIVAN, ESQ.

December 3, 2025

The Public Employee Retirement Administration Commission (PERAC) has completed a review of the audits of the Middlesex County Retirement System conducted by the firm of Powers & Sullivan, LLC, Certified Public Accountants. Powers & Sullivan conducted these audits in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits in Government Auditing Standards, issued by the Comptroller General of the United States. The audits covered the period from January 1, 2019 to December 31, 2023.

We conducted an inspection of the work papers prepared by Powers & Sullivan. We determined that the audits were conducted in a competent professional manner and the work papers demonstrated that audit tests and procedures were performed in sufficient detail to allow us to accept the final audit reports as issued.

We identified specific differences between these financial audits designed to provide an opinion on financial statements and our compliance audits performed in accordance with the accounting and management standards established by PERAC in regulation 840 CMR 25.00 and in compliance with the provisions specified in PERAC Memo #18/2019.

Accordingly, we supplemented the field work conducted in the audits by Powers & Sullivan with certain limited procedures designed to provide additional assurance that the accounting and management standards established by PERAC were adhered to and complied with. The specific objectives of our review were to determine: 1) that the Board is exercising appropriate fiduciary oversight, 2) that cash balances are accurately stated, 3) that retirement contributions are accurately deducted, 4) that retirement allowances were correctly calculated, and 5) that required member documentation is maintained.

To achieve these objectives, we inspected certain records of the Middlesex County Retirement Board in the above areas. Specifically, we reviewed the minutes of the Board meetings for compliance with fiduciary oversight and verified cash balances. We tested the payroll records of a sample of active members to confirm that the correct percentage of regular compensation is being deducted, including the additional two percent over \$30,000. We tested a sample of members who retired during our audit period to verify that their retirement allowance was calculated in accordance with the statute. We also reviewed a sample of member files for accuracy and completeness.





Middlesex County Audit Report December 3, 2025 Page 2

In our opinion, the financial records are being maintained and the management functions are being performed in conformity with the standards established by PERAC with the exception of those related to our supplemental work which are detailed in the finding presented in this report.

It should be noted that the financial statements included in this audit report were based on the work performed by Powers & Sullivan, and the tests conducted for the periods referenced in their opinion. These audits were not performed by employees or representatives of PERAC. It should also be noted that the opinions expressed in these audit reports were based on the laws and regulations in effect at the time.

The financial statements and footnotes presented in this report were limited to the express results as of and for the years ended December 31, 2023, December 31, 2022, December 31, 2020, and December 31, 2019.

In closing, I wish to acknowledge the work of Powers & Sullivan, who conducted these examinations, and the PERAC examiners who conducted limited procedures to supplement the field work and express my appreciation to the Middlesex County Retirement Board and staff for their courtesy and cooperation.

Sincerely,

Bill Kufe

William T. Keefe Executive Director

EXPLANATION OF FINDING AND RECOMMENDATION

Regular Compensation:

We tested retirement deductions from payrolls of 34 employing units in the Middlesex County System. We found instances of pay types that should have been regular compensation which were not subject to deductions and instances of pay types that are not regular compensation that were subject to deductions.

Pay types that were incorrectly not considered regular compensation included night shift differentials, on-call pay when the work was required and scheduled, and a police department stipend covering photography and fingerprinting. Pay types that were incorrectly considered regular compensation included a uniform stipend and intermittent summer school pay.

Additionally, our review of retiree calculations found two retirees with errors related to regular compensation. One superannuation retiree had retirement deductions taken on health care reimbursements. Although this error was discovered by the Board and the deductions were returned to the member, the salary used in the allowance calculation was not lowered to exclude this pay. One accidental disability retiree had retroactive pay included in the regular compensation total used for the allowance calculation which was outside of the final year of payroll. Pursuant to 840 CMR 15.03 3(e) this pay should have been allocated to the effective dates it covered rather than the date of receipt.

Recommendation: The Board should work with the payroll departments to determine which pays are subject to retirement and begin taking retirement deductions. Deductions taken on pays that are not considered regular compensation should be refunded to the members.

The retirees cited should be recalculated. When calculating the amount owed to the Board, interest should be applied at the Board's correction of errors rate.

Board Response:

The Board conducts multiple training sessions annually for the payroll specialists of the System's 74 governmental units, which include substantive reviews and updates of ever-evolving regular compensation determinations. In the cases cited by PERAC, refunds and recalculations are being processed and will be completed by the time of PERAC's scheduled follow-up review.

FINAL DETERMINATION:

PERAC Audit staff will follow up in six (6) months to ensure appropriate actions have been taken regarding all findings.

SUPPLEMENTARY INFORMATION

SCHEDULE OF ALLOCATION OF INVESTMENTS OWNED

(percentages by category)

AS OF DECEMBER 31, 2023				
		PERCENTAGE		
	MARKET VALUE	OF TOTAL ASSETS		
Cash	\$81,767,823	3.9%		
Pooled Alternative Investment Funds	495,358	0.0%		
PRIT Core Fund	<u>1,990,183,151</u>	<u>96.0</u> %		
Grand Total	<u>\$2,072,446,332</u>	<u>100.0</u> %		

For the year ending December 31, 2023, the rate of return for the investments of the Middlesex County Retirement System was 11.19%. For the ten-year period ending December 31, 2023, the rate of return for the investments of the Middlesex County Retirement System averaged 7.62%. For the 39-year period ending December 31, 2023, since PERAC began evaluating the returns of the retirement systems, the rate of return on the investments of the Middlesex County Retirement System was 8.35%.

The composite rate of return for all retirement systems for the year ending December 31, 2023 was 11.64%. For the ten-year period ending December 31, 2023, the composite rate of return for the investments of all retirement systems averaged 7.81%. For the 39-year period ending December 31, 2023, since PERAC began evaluating the returns of the retirement systems, the composite rate of return on the investments of all retirement systems averaged 9.05%.

SUPPLEMENTARY INFORMATION (Continued)

ADMINISTRATION OF THE SYSTEM

Ex-officio Member:

The System is administered by a five-person Board of Retirement consisting of the Chairperson, who shall be selected by the other four board members, a second member appointed by the Advisory Council, a third and fourth member who shall be elected by the members in or retired from the service of such system, and a fifth member appointed by the other four board members.

Thomas F. Gibson, Esq., Chairperson Term Expires: 12/31/2026 Appointed Member: Brian P. Curtin Term Expires: 12/31/2027 Elected Member: Joseph W. Kearns Term Expires: 12/31/2025 Elected Member: John Brown, Jr. Term Expires: 12/31/2026

Fifth Member: Robert W. Healy Term Expires: 12/16/2025

The Board members are required to meet at least once a month. The Board must keep a record of all of its proceedings. The Board must annually submit to the appropriate authority an estimate of the expenses of administration and cost of operation of the system. The board must annually file a financial statement of condition for the system with the Executive Director of PERAC.

The investment of the system's funds is the responsibility of the Board. All retirement allowances must be approved by the Retirement Board. The PERAC Actuary performs verification prior to payment, unless the system has obtained a waiver for superannuation calculations allowing them to bypass this requirement. All expenses incurred by the System must be approved by a majority vote of the Board. Payments shall be made only upon vouchers signed by two persons designated by the Board.

Retirement board members and employees are bonded by an authorized agent representing a company licensed to do business in Massachusetts. Fidelity insurance is the only required policy coverage under Ch. 32 §21 and §23 as well as 840 CMR 17.01. The policy is designed to cover specific intentional acts such as theft, fraud or embezzlement and also specify who commits such acts, most commonly employees of the system. This coverage reimburses the system for the losses it suffers as a result of its employees' actions. It does not insure the employees for their illegal acts. Statutorily required coverage is provided by the current fidelity insurance policy to a limit of \$1,000,000 with a \$10,000 deductible issued through Travelers Casualty and Surety Insurance Company of America. The system also has Fiduciary coverage to a limit of \$100,000,000 under a blanket policy issued through the Massachusetts Association of Contributory Retirement Systems.

BOARD REGULATIONS

The Middlesex County Retirement Board has adopted Supplemental Regulations which are available on the PERAC website at https://www.mass.gov/middlesex-county-retirement-board-regulations.

SUPPLEMENTARY INFORMATION (Continued)

MEMBERSHIP EXHIBIT

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Retirement in Past Years										
Superannuation	295	289	268	294	327	315	374	398	329	356
Ordinary Disability	1	0	1	2	1	2	0	0	1	3
Accidental Disability	12	6	8	6	5	15	14	8	10	12
Total Retirements	308	295	277	302	333	332	388	406	340	371
Total Retirees, Beneficiaries										
and Survivors	5,267	5,288	5,394	5,497	5,677	5,949	6,156	6,388	6,503	6,719
Total Active Members	10,224	10,306	9,997	9,283	9,142	9,257	9,285	9,285 9,403		9,536
Pension Payments										
Superannuation	\$75,978,373	\$86,762,912	\$90,372,428	\$94,423,315	\$99,461,542	\$105,946,729	\$110,204,578	\$117,639,143	\$125,887,591	\$135,608,881
Survivor/Beneficiary Payments	4,154,980	2,020,209	5,023,927	4,946,105	5,119,154	5,570,318	5,801,485	6,239,961	6,668,627	7,123,741
Ordinary Disability	1,377,095	1,381,443	1,072,875	1,110,977	1,130,516	1,060,806	1,005,333	902,490	794,035	838,378
Accidental Disability	13,934,194	14,790,305	12,858,584	13,247,123	13,409,632	14,126,886	14,480,046	14,737,549	15,040,982	15,654,157
Other	10,116,822	10,251,686	14,857,779	13,941,224	16,220,421	14,862,219	18,288,311	14,225,013	14,764,395	19,741,147
Total Payments for Year	\$ <u>105,561,463</u>	\$ <u>115,206,556</u>	\$ <u>124,185,592</u>	\$ <u>127,668,745</u>	\$ <u>135,341,266</u>	\$ <u>141,566,957</u>	\$ <u>149,779,752</u>	\$ <u>153,744,156</u>	\$ <u>163,155,631</u>	\$ <u>178,966,303</u>
<u> </u>										



MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2023

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2023

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Financial Section

Middlesex County Retirement System

Financial Section

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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Opinion

We have audited the accompanying financial statements of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2023, and the related notes to the financial statements, which collectively comprise the MCRS's 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 financial position of the MCRS as of December 31, 2023, and the changes in its financial 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 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 Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the MCRS 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's for the Financial Statements

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

Auditor's 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 auditor's 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 generally accepted 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 judgement made by a reasonable user based on the financial statements.

In performing an audit in accordance with generally accepted auditing standards, we:

- Exercise professional judgement 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 auditing 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 MCRS'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 judgement, there are conditions or events, considered in the aggregate, that
 raise substantial doubt about the MCRS'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 Management's Discussion and Analysis; the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information is the responsibility of management and, although not a part of the financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated August 14, 2024 on our consideration of the MCRS's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, 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 MCRS'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 MCRS's internal control over financial reporting and compliance.

Restriction on Use

This report is intended solely for the information and use of MCRS, the Public Employee Retirement Administration Commission and all member units and is not intended to be and should not be used by anyone other than these specified parties.

August 14, 2024

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Management's Discussion and Analysis

As management of the Middlesex County Retirement System (MCRS), we offer readers of these financial statements this narrative overview and analysis of the financial activities for the year ended December 31, 2023. The MCRS complies with financial reporting requirements issued by the Governmental Accounting Standards Board (GASB).

The GASB is the authoritative standard setting body that provides guidance on how to prepare financial statements in conformity with generally accepted accounting principles (GAAP). Users of these financial statements rely on the GASB to establish consistent reporting standards for all governments in the United States. This consistent application is the only way users can assess the financial condition of a public retirement system compared to others.

Financial Highlights

- The MCRS's assets exceeded its liabilities at the close of the most recent year by \$2.1 billion (net
 position).
- The MCRS's net position increased by \$200.3 million for the year ended December 31, 2023.
- Total investment income was \$206.0 million; investment expenses were \$9.7 million; and net investment income was \$196.3 million.
- Total contributions were \$241.1 million, primarily consisting of \$167.1 million from employers, \$57.3 million from members, \$8.7 million in transfers from other systems and \$8.0 million in other contributions.
- Retirement benefits, refunds, and transfers of member deductions to other systems amounted to \$233.7 million.
- Depreciation, administrative and building expenses were \$3.4 million.
- The total pension liability was \$3.8 billion as of December 31, 2023, while the net pension liability was \$1.7 billion.
- The Plan fiduciary net position as a percentage of the total pension liability was 55.21%.

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the MCRS's fiduciary financial statements. These fiduciary financial statements comprise of four components: 1) management's discussion and analysis, 2) fiduciary financial statements, 3) notes to the financial statements and 4) required supplementary information.

Fiduciary Financial Statements

The *statement of fiduciary net position* presents information on all assets and deferred outflows less deferred inflows and liabilities with the difference reported as *net position*. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position is improving or deteriorating.

The statement of changes in fiduciary net position presents information showing how the MCRS's net position changed during the most recent year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, additions and deductions are reported in this statement for some items that will only result in cash flows in future periods.

Notes to the financial statements

The notes provide additional information that is essential to a full understanding of the data provided in the fiduciary financial statements.

Middlesex County Retirement System

6 Management's Discussion and Analysis

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context.

Financial Analysis

As noted earlier, net position may serve over time as a useful indicator of the MCRS's financial position. The MCRS's assets exceeded liabilities by \$2.1 billion at the close of 2023.

The assets accumulated are held to provide pension benefits for qualified retirees along with active and inactive employees of the member units. At year-end, the MCRS's net position included investments of \$2.0 billion, cash of \$81.8 million and current accounts receivable of \$7.7 million. The system also had capital assets, net of accumulated depreciation, of \$4.0 million at year-end primarily consisting of land, an office building, and building improvements.

In 2023, the MCRS's contributions were \$241.1 million while deductions were \$237.1 million which resulted in a current surplus of \$4.0 million. In 2022, the MCRS's contributions were \$229.4 million while deductions were \$215.2 million which resulted in a prior year surplus of \$14.2 million. Therefore, for these two years the MCRS was able to sustain operations independent of investment income.

The primary change in net position over the prior year relates to each year's investment performance. The System experienced a net investment income of \$196.3 million in 2023, compared to a loss of \$240.2 million in 2022. The annual money weighted rate of return was 10.95% and -11.54% in 2023, and 2022, respectively. The MCRS's investment policy is designed to achieve a long-term rate of return of 7.15% and fluctuation in annual investment returns is expected.

The following tables present summarized financial information for the past two years:

		2023		2022
Assets:	-			
Cash 9	\$	81,767,823	\$	31,868,459
Investments		1,990,678,509		1,842,477,278
Receivables		7,709,459		5,531,048
Capital assets, net of accumulated depreciation		4,026,260		4,044,658
Total assets	Ī	2,084,182,051		1,883,921,443
Liabilities:				
Accounts payable		122,943		127,569
Other liabilities		26,556		26,556
Total liabilities	-	149,499		154,125
Net Position Restricted for Pensions	\$ [2,084,032,552	\$	1,883,767,318

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Middlesex County Retirement System

Management's Discussion and Analysis

	2023	2022
Additions:		
Contributions:		
Member contributions\$	57,300,892	\$ 54,257,364
Employer contributions	167,210,111	156,421,867
Other contributions	16,584,815	18,734,375
Total contributions	241,095,818	229,413,606
Net investment income (loss):		
Total investment income (loss)	205,958,860	(230,563,506)
Less, investment expenses	(9,666,276)	(9,685,400)
Net investment income (loss)	196,292,584	(240,248,906)
Total additions	437,388,402	(10,835,300)
Deductions:		
Administration	3,122,473	3,024,829
Building operations and maintenance	117,205	196,641
Retirement benefits, refunds and transfers	233,709,115	211,772,537
Depreciation	174,375	174,374
Total deductions	237,123,168	215,168,381
Net increase (decrease) in fiduciary net position	200,265,234	(226,003,681)
Fiduciary net position at beginning of year	1,883,767,318	2,109,770,999
Fiduciary net position at end of year\$	2,084,032,552	\$ 1,883,767,318

Requests for Information

This financial report is designed to provide a general overview of the MCRS's finances for all those with an interest in the MCRS's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the MCRS's Chief Administrative Officer, 25 Linnell Circle, Billerica, Massachusetts 01865.

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STATEMENT OF FIDUCIARY NET POSITION

DECEMBER 31, 2023

Assets		
Cash and cash equivalents	\$	81,767,823
Investments:		
Investments in Pension Reserve Investment Trust		1,990,183,151
Pooled alternative investments		495,358
Total investments		1,990,678,509
Receivables, net of allowance for uncollectibles:		
Member deductions		4,374,986
Employer pension appropriation		1,584,664
Reimbursements from other systems		863,243
Member make-up payments and redeposits		335,089
Transfers from other systems		572,916
Other accounts receivable		38,561
Total receivables		7,769,459
Capital assets, net of accumulated depreciation		4,026,260
Total Assets		2,084,242,051
I to be that a		
Liabilities		100.040
Accounts payable		122,943
Other liabilities		26,556
Total Liabilities.		149,499
	-	. 10,100
Net Position Restricted for Pensions	\$.	2,084,092,552

See notes to financial statements.

Middlesex County Retirement System

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STATEMENT OF CHANGES IN FIDUCIARY NET POSITION

YEAR ENDED DECEMBER 31, 2023

Additions:	
Contributions:	* 407.400.044
Employer pension appropriation	
Member contributions	57,300,892
Transfers from other systems	8,708,163
3(8)(c) contributions from other systems	6,125,792
Workers' compensation settlements	73,500
Retirement benefits - state COLA reimbursements	560,618
Members' makeup payments and redeposits	949,776
Interest not refunded	240,466
Total contributions	241,155,818
Net investment income (loss):	
Investment income (loss)	205,958,860
Less: investment expense	(9,666,276)
Net investment income (loss)	196,292,584
Total additions	437,448,402
Deductions:	
Administration	3,122,473
Building operations and maintenance	117,205
Retirement benefits and refunds.	211,786,865
Transfers to other systems	10,301,479
3(8)(c) transfer to other systems	11,620,771
Depreciation	174,375
Total deductions	237,123,168
Net increase (decrease) in fiduciary net position	200,325,234
Fiduciary net position at beginning of year	1,883,767,318
Fiduciary net position at end of year	\$ 2,084,092,552

See notes to financial statements.

Middlesex County Retirement System

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NOTE 1 - PLAN DESCRIPTION

The Middlesex County Retirement System (MCRS) is a multiple-employer, cost-sharing, contributory defined benefit pension plan covering all employees of the governmental member units deemed eligible by the Middlesex County Retirement Board (the Board), with the exception of school department employees who serve in a teaching capacity. The pensions of such school employees are administered by the Commonwealth of Massachusetts' Teachers Retirement System. Membership in the System is mandatory immediately upon the commencement of employment for all permanent employees working a minimum of 20 hours per week and who are paid annual compensation of no less than \$5,000. As of January 1, 2024, the MCRS had 71 participating employers.

The MCRS is a Massachusetts Contributory Retirement System and is governed by Chapter 32 of the Massachusetts General Laws. Membership in the Plan is mandatory immediately upon the commencement of employment for all permanent, full-time employees.

Massachusetts contributory retirement system benefits are, with certain exceptions, uniform from system to system. The MCRS provides for retirement allowance benefits up to a maximum of 80% of a member's highest three-year average annual rate of regular compensation for those hired prior to April 2, 2012, and the highest five-year average for members hired after that date. Benefit payments are based upon a member's age, length of creditable service, level of compensation, and group classification.

Members become vested after ten years of creditable service. A superannuation retirement allowance may be received upon the completion of 20 years of service or upon reaching the age of 55 with 10 years of service for those hired prior to April 2, 2012. For those hired on or after April 2, 2012, a superannuation allowance may be received upon reaching the age of 60 with 10 years of service. Normal retirement for most employees occurs at age 65 for those hired prior to April 2, 2012, and at age 67 for those hired after April 2, 2012 (except for certain hazardous duty and public safety positions, whose normal retirement is at age 55).

A retirement allowance consists of two parts: an annuity and a pension. A member's accumulated total deductions and the interest they generate constitute the annuity. The differential between the total retirement benefit and the annuity is the pension.

Active members contribute between 5% and 11% of their gross regular compensation. The percentage rate is keyed to the date upon which an employee's membership commences. These deductions are deposited in the Annuity Savings Fund and earn interest at a rate determined by the Public Employee Retirement Administration Commission's (PERAC) actuary. When a member's retirement becomes effective, his/her deductions and related interest are transferred to the Annuity Reserve Fund. Any cost-of-living adjustments granted between 1981 and 1997 and any increase in other benefits imposed by the Commonwealth of Massachusetts' state law during those years are borne by the Commonwealth and are deposited into the Pension Fund. Cost-of-living adjustments granted after 1997 must be approved by the MCRS and all costs are borne by the MCRS.

The pension portion of any retirement benefit is paid from the Pension Fund. The governmental unit employing the member must annually appropriate and contribute the amount of current-year pension assessment.

Administrative expenses are paid from investment income.

Members who become permanently and totally disabled for further duty may be eligible to receive a disability retirement allowance. The amount of benefits to be received in such cases is dependent on several factors, including whether or not the disability is work related, the member's age, years of creditable service, level of compensation, veterans' status and group classification.

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Survivor benefits are extended to eligible beneficiaries of members whose death occurs prior to or following retirement

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements of the Middlesex County Retirement System have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The Governmental Accounting Standards Board (GASB) is the recognized standard-setting body for establishing governmental accounting and financial reporting principles.

MCRS is a special-purpose government engaged only in fiduciary activities. Accordingly, the financial statements are reported using the flow of economic resources measurement focus and use the accrual basis of accounting. Under this method, additions are recorded when earned and deductions are recorded when the liabilities are incurred.

Cash and Investments

Cash and cash equivalents are 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 carried at fair value. The fair values were determined by the closing price for those securities traded on national stock exchanges and at the average bid-and-asked quotation for those securities traded in the over-the-counter market. The fair value of private equities are based on management's valuation of estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values. Real estate assets are reported at fair value utilizing an income approach to valuation along with independent appraisals and estimates by management.

Fair Value Measurements

The MCRS reports required types of financial instruments in accordance with the fair value standards. These standards require an entity to maximize the use of observable inputs (such as quoted prices in active markets) and minimize the use of unobservable inputs (such as appraisals or valuation techniques) to determine fair value. Fair value standards also require the government to classify these financial instruments into a three-level hierarchy, based on the priority of inputs to the valuation technique or in accordance with net asset value practical expedient rules, which allow for either Level 2 or Level 3 depending on lock up and notice periods associated with the underlying funds.

Instruments measured and reported at fair value are classified and disclosed in one of the following categories:

Level 1 – Quoted prices are available in active markets for identical instruments as of the reporting date. Instruments, which are generally included in this category, include actively traded equity and debt securities, U.S. government obligations, and mutual funds with quoted market prices in active markets.

Level 2 – Pricing inputs are other than quoted in active markets, which are either directly or indirectly observable as of the reporting date, and fair value is determined through the use of models or other valuation methodologies. Certain fixed income securities, primarily corporate bonds, are classified as Level 2 because fair values are estimated using pricing models, matrix pricing, or discounted cash flows.

Level 3 – Pricing inputs are unobservable for the instrument and include situations where there is little, if any, market activity for the instrument. The inputs into the determination of fair value require significant management judgment or estimation.

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In some instances the inputs used to measure fair value may fall into different levels of the fair value hierarchy and is based on the lowest level of input that is significant to the fair value measurement.

Market price is affected by a number of factors, including the type of instrument and the characteristics specific to the instrument. Instruments with readily available active quoted prices generally will have a higher degree of market price observability and a lesser degree of judgment used in measuring fair value. It is reasonably possible that change in values of these instruments will occur in the near term and that such changes could materially affect amounts reported in these financial statements. For more information on the fair value of the MCRS's financial instruments, see Note 5 – Cash and Investments.

Accounts Receivable

Accounts receivable consist of member deductions, pension fund appropriations, and other miscellaneous reimbursements. These receivables are considered 100% collectible and therefore do not report an allowance for uncollectibles.

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of fiduciary net position will sometimes report a separate section for deferred outflows of resources. This separate financial statement element, *deferred outflows of resources*, represents a consumption of fiduciary net position that applies to a future period(s) and so will not be recognized as an outflow of resources (deduction) until then. The MCRS did not have any items that qualify for reporting in this category.

In addition to liabilities, the statement of fiduciary net position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, *deferred inflows of resources*, represents an acquisition of net position that applies to a future period(s) and so will not be recognized as an inflow of resources (addition) until that time. The MCRS did not have any items that qualify for reporting in this category.

NOTE 3 - PLAN ADMINISTRATION

The MCRS is administered by a five-person Board of Retirement consisting of a first member, who shall serve as Chairman/Treasurer, who shall be appointed by the other four members, a second member elected by the Advisory Council consisting of representatives from the member units, a third and fourth member who shall be elected by the members in or retired from the service of such system, and a fifth member who shall be chosen by the other four members.

Chairman	Thomas F. Gibson	Term Expires:	12/31/2026
Advisory Council Member	Brian P. Curtin	Term Expires:	12/31/2024
Elected Member	John Brown	Term Expires:	12/31/2026
Elected Member	Joseph W. Kearns	Term Expires:	12/31/2025
Appointed Member	Robert W. Healy, Jr.	Term Expires:	12/16/2025

Board members are required to meet at least once a month. The Board must keep a record of all of its proceedings. The Board must annually submit to the appropriate authority an estimate of the expenses of administration and cost of operation of the MCRS. The Board must annually file a financial statement of condition

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for the MCRS with the Executive Director of PERAC.

The investment of the MCRS's funds is the responsibility of the Board. All retirement allowances must be approved by the Retirement Board. The PERAC Actuary performs verification prior to payment, unless the MCRS has obtained a waiver for superannuation calculations allowing them to bypass this requirement. All expenses incurred by the MCRS must be approved by a majority vote of the Board. Payments shall be made only upon vouchers signed by three persons designated by the Board.

The following retirement board members and employees are bonded by an authorized agent representing a company licensed to do business in Massachusetts as follows:

Treasurer-Custodian: \$10,000,000 Fiduciary
Ex-Officio Member: RLI Insurance Company
Appointed Members: \$1,000,000 Fidelity

Staff Employees: National Union Fire Insurance

NOTE 4 - OFFICE BUILDING

The MCRS owns an office building that was purchased as an investment and for the administrative offices of the System. The building is a two story, 1986-built office building consisting of 62,307 square feet of net rentable area. The property is situated on a 4.23-acre site in Billerica, Middlesex County, Massachusetts.

NOTE 5 - CASH AND INVESTMENTS

Custodial Credit Risk - Deposits

At December 31, 2023, the carrying amount of the MCRS's deposits totaled \$81,767,823, and the bank balance totaled \$84,993,362, all of which was covered by Federal Depository Insurance.

Investments

The MCRS's investments were as follows:

	December 31, 2023
Investment Type	
PRIT Pooled Funds\$	1,990,183,151
Pooled Alternative Investments	495,358
-	
Total Investments\$	1,990,678,509

Approximately 99.8% of the Retirement MCRS's investments are in Pension Reserve Investment Trust (PRIT). This investment pool was established by the Treasurer of the Commonwealth of Massachusetts, who serves as Trustee. PRIT is administered by the Pension Reserves Investment Management Board. The fair values of the positions in each investment Pool are the same as the value of each Pool's shares. The Administration does not have the ability to control any of the investment decisions relative to its funds in PRIT. The effective weighted duration rate for PRIT investments ranged from 1.98 to 14.64 years.

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Approximately 0.01% of the MCRS's funds are invested in pooled alternative investments and pooled real estate funds. The market values of assets in those funds are based on the quoted values obtained from each pool.

Approximately 0.01% of the MCRS's funds are invested in money market mutual funds. The market values of assets in those funds are valued using prices quoted in active markets for those securities.

The Administration's annual money-weighted rate of return on pension plan investments was 10.95%. The money-weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested, measured monthly.

Fair Value of Investments

The retiree pension defined benefit plan holds significant amounts of investments that are measured at fair value on a recurring basis. Because investing is a key part of the plan's activities, the plan shows greater disaggregation in its disclosures. The plan chooses a tabular format for disclosing the levels within the fair value hierarchy.

The MCRS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles.

The MCRS had the following recurring fair value measurements as of December 31, 2023:

			Fair Value Measurements Using				Jsing
Investment Type	12/31/2023		Quoted Prices in Active Markets for Identical Assets (Level 1)		Significant Other Observable Inputs (Level 2)	•	Significant Unobservable Inputs (Level 3)
Investments by fair value level:							
Pooled Alternative Investments \$	495,358	\$ _		\$	-	\$	495,358
Investments measured at the net asset value (NAV):							
PRIT Investments.	1,990,183,151						
Total Investments\$	1,990,678,509						

Money market mutual funds in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Pooled alternative investments and pooled real estate funds classified in level 3 are valued using either a discounted cash flow or market comparable company's technique.

PRIT Investments are valued using the net asset value (NAV) method.

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NOTE 6 - CAPITAL ASSETS

All purchases and building costs in excess of \$25,000 are capitalized at the date of acquisition. Capital assets are depreciated on a straight-line basis. The estimated useful lives of capital assets are as follows:

	Estimated Useful Life
Capital Asset Type	(in years)
Building	40
Building improvements	40
Vehicles	5
Software and equipment	5

Capital asset activity for the year ended December 31, 2023, was as follows:

	Beginning			Ending
_	Balance	Increases	Decreases	Balance
Capital assets not being depreciated:				
Land\$	672,657 \$	- \$	- \$	672,657
Construction in progress	9,375	155,977		165,352
Total capital assets not being depreciated.	682,032	155,977		838,009
Capital assets being depreciated:				
Buildings	5,417,136	=	=	5,417,136
Building improvements	1,200,242	-	-	1,200,242
Software and equipment	27,619			27,619
Total capital assets being depreciated	6,644,997			6,644,997
Less accumulated depreciation for:				
Buildings	(2,712,922)	(135,428)	-	(2,848,350)
Building improvements	(551,037)	(29,740)	-	(580,777)
Software and equipment	(18,412)	(9,207)	 .	(27,619)
Total accumulated depreciation	(3,282,371)	(174,375)		(3,456,746)
Total capital assets being depreciated, net	3,362,626	(174,375)		3,188,251
Total capital assets, net\$	4,044,658 \$	(18,398)	\$	4,026,260

NOTE 7 - MEMBERSHIP

The following table represents the MCRS's membership at January 1, 2023:

Active members	9,603 4,227
Inactive participants with a vested right to a deferred or immediate benefit Retired participants or beneficiaries currently receiving benefits	470
Total	20,907

NOTE 8 – ACTUARIAL VALUATION

Components of the net pension liability as of December 31, 2023, were as follows:

Total pension liability\$	3,775,150,350
The MCRS's fiduciary net position	2,084,092,552
The net pension liability\$	1,691,057,798
The MCRS's fiduciary net position as a percentage of the total pension liability	55.21%

The total pension liability was determined by an actuarial valuation as of January 1, 2024, using the following actuarial assumptions, applied to all periods included in the measurement that was rolled back to December 31, 2023:

Valuation date	January 1, 2024.
Actuarial cost method	Entry Age Normal Cost Method.
Amortization method	Prior year's total contribution increased by 6.50% for fiscal 2023, through fiscal 2028, and thereafter the remaining unfunded liability will be amortized on a 4.00% annual increasing basis;
Remaining amortization period	14 years from July 1, 2022.
Asset valuation method	The difference between the expected return and the actual investment return on a fair value basis is recognized over a five year period. Asset value is adjusted as necessary to be within 20% of the fair value.
Investment rate of return/Discount rate	7.15%.
Inflation rate	3.25%.
Projected salary increases	Varies by length of service with ultimate rates of 4.00%

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for Group 1, 4.25% for Group 2 and 4.50% for Group 4

Cost of living adjustments	5.00% of the first \$16,000 for fiscal 2023 and 3.00% of the first \$16,000 thereafter.
Mortality Rates: Pre-Retirement	The RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2021.
Healthy Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2021.
Disabled Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021.

Investment policy: The MCRS's policy in regard to the allocation of invested assets is established by PRIT. Plan assets are managed on a total return basis with a long-term objective of achieving a fully funded status for the benefits provided through the pension plan.

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 MCRS's target asset allocation as of December 31, 2023, are summarized in the following table:

Asset Class	Long-Term Expected Asset Allocation	Long-Term Expected Real Rate of Return
Domestic equity	22.00%	6.29%
International developed markets equity	9.50%	6.39%
International emerging markets equity	4.50%	7.63%
Core fixed income	15.00%	1.72%
High-yield fixed income	9.00%	3.43%
Real estate	10.00%	3.24%
Timber	4.00%	3.72%
Hedge funds, GTAA, risk parity	10.00%	2.87%
Private equity	16.00%	9.43%
	100.00%	

Discount rate: The discount rate used to measure the total pension liability was 7.15% at December 31, 2023, and December 31, 2022. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rate. Based on those assumptions, the MCRS'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, calculated using the discount rate of 7.15%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.15%) or 1-percentage-point higher (8.15%) than the current rate:

			Current		
	1% Decrease		Discount		1% Increase
	(6.15%)		(7.15%)		(8.15%)
Middlesex County Retirement System's net		_		_	
pension liability as of December 31, 2023\$	2,117,083,698	\$	1,691,057,798	\$	1,332,542,696

Contributions: Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The pension fund appropriations are allocated amongst employers based on the actuarial valuation.

NOTE 9 - IMPLEMENTATION OF GASB PRONOUNCEMENTS

There were no GASB pronouncements required to be implemented in 2023 that impacted the MCRS's financial statements.

None of the issued GASB statements that are required to be implemented in future years are anticipated to impact the MCRS's financial statements.

NOTE 10 - SUBSEQUENT EVENTS

Management has evaluated subsequent events through August 14, 2024 which is the date the financial statements were available to be issued.

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Middlesex County Retirement System

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Required Supplementary Information

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

Total pension liability: Service cost	\$ December 31, 2014 52,132,389 172,094,226	\$ December 31, 2015 54,217,685 179,703,272	\$ December 31, 2016 56,386,392 187,359,946	\$ December 31, 2017 60,585,598 200,298,121
Changes in benefit terms Differences between expected and actual experience Changes in assumptions Benefit payments	- - - (125,082,678)	- - - (134,295,504)	7,976,453 96,500,754 (143,428,636)	(9,059,393) 97,195,824 (150,780,931)
Net change in total pension liability	99,143,937	99,625,453	204,794,909	198,239,219
Total pension liability - beginning	2,195,732,452	2,294,876,389	2,394,501,842	2,599,296,751
Total pension liability - ending (a)	\$ 2,294,876,389	\$ 2,394,501,842	\$ 2,599,296,751	\$ 2,797,535,970
Plan fiduciary net position: Employer pension appropriation. Member contributions. Other contributions. Net investment income (loss). Administrative expenses. Building operations and maintenance. Retirement benefits and refunds. Other retirement deductions. Depreciation.	\$ 93,368,685 39,048,869 6,405,881 74,904,315 (2,996,390) (381,899) (125,082,678) (5,556,930) (162,594)	\$ 99,792,641 40,340,741 8,668,378 7,732,128 (2,824,803) (302,771) (134,295,504) (8,025,993) (162,594)	\$ 107,032,211 42,015,296 12,337,414 74,917,546 (3,062,521) (235,667) (143,428,636) (11,475,752) (162,594)	\$ 115,377,205 44,177,815 10,405,773 189,343,574 (2,619,464) (306,177) (150,780,931) (9,358,262) (308,508)
Net increase (decrease) in fiduciary net position	79,547,259	10,922,223	77,937,297	195,931,025
Fiduciary net position - beginning of year	1,014,013,415	1,093,560,674	1,104,482,897	1,182,420,194
Fiduciary net position - end of year (b)	\$ 1,093,560,674	\$ 1,104,482,897	\$ 1,182,420,194	\$ 1,378,351,219
Net pension liability - ending (a)-(b)	\$ 1,201,315,715	\$ 1,290,018,945	\$ 1,416,876,557	\$ 1,419,184,751
Plan fiduciary net position as a percentage of the total pension liability	47.65%	46.13%	45.49%	49.27%
Covered payroll.	\$ 415,752,810	\$ 432,382,921	\$ 439,644,322	\$ 451,777,105
Net pension liability as a percentage of covered payroll.	288.95%	298.35%	322.28%	314.13%

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See notes to required supplementary information.

Middlesex County Retirement System

Required Supplementary Information

December 31, 2018	December 31, 2019	December 31, 2020	December 31, 2021	December 31, 2022	December 31, 2023
\$ 64,615,910 208,614,148 - -	\$ 66,816,001 216,905,943 29,156,339 46,671,873	\$ 73,591,385 229,825,239 - -	\$ 76,097,081 238,805,957 - 5,225,766	\$ 78,883,633 245,416,378 - -	\$ 81,569,522 254,059,307 18,729,653 58,204,892
- (161,259,804)	65,013,900 (168,486,003)	- (181,769,445)	27,166,375 (184,028,124)	(193,970,504)	(218,241,042)
111,970,254	256,078,053	121,647,179	163,267,055	130,329,507	194,322,332
2,797,535,970	2,909,506,224	3,165,584,277	3,287,231,456	3,450,498,511	3,580,828,018
\$ 2,909,506,224	\$ 3,165,584,277	\$ 3,287,231,456	\$ 3,450,498,511	\$ 3,580,828,018	\$ 3,775,150,350
\$ 120,614,676 45,984,957 9,581,643 (31,074,711) (2,645,568) (309,357) (161,259,804) (8,884,478) (318,812)	\$ 129,685,755 48,445,698 10,842,796 208,322,511 (2,754,384) (279,208) (168,486,003) (9,969,856) (318,812)	\$ 138,290,237 50,973,950 7,222,913 185,429,727 (2,781,367) (208,858) (181,769,445) (6,225,703) (321,386)	\$ 147,849,683 51,747,946 14,897,125 340,243,524 (2,878,819) (204,804) (184,026,124) (13,673,574) (320,288)	\$ 156,366,867 54,257,364 18,789,375 (240,248,906) (3,024,829) (196,641) (193,970,504) (17,802,033) (174,374)	\$ 167,196,611 57,300,892 16,658,315 196,292,584 (3,122,473) (117,205) (218,241,042) (15,468,073) (174,375)
(28,311,454)	215,488,497	190,610,068	353,632,669	(226,003,681)	200,325,234
1,378,351,219	1,350,039,765	1,565,528,262	1,756,138,330	2,109,770,999	1,883,767,318
\$ 1,350,039,765	\$ 1,565,528,262	\$ 1,756,138,330	\$ 2,109,770,999	\$ 1,883,767,318	\$ 2,084,092,552
\$ 1,559,466,459	\$ 1,600,056,015	\$ 1,531,093,126	\$ 1,340,727,512	\$ 1,697,060,700	\$ 1,691,057,798
46.40%	49.45%	53.42%	61.14%	52.61%	55.21%
\$ 471,115,185	\$ 492,109,775	\$ 513,201,283	\$ 519,239,589	\$ 541,233,353	\$ 567,243,261
331.02%	325.14%	298.34%	258.21%	313.55%	298.12%

SCHEDULE OF CONTRIBUTIONS

<u>Y</u> ear	Actuarially determined contribution	Contributions in relation to the actuarially determined contribution	Contribution deficiency (excess)	Covered payroll	Contributions as a percentage of covered payroll
December 31, 2023 \$	163,724,213 \$	(167,184,938) \$	(3,460,725) \$	567,243,261	29.47%
December 31, 2022	153,677,331	(156,335,119)	(2,657,788)	541,233,353	28.88%
December 31, 2021	144,255,207	(147,852,245)	(3,597,038)	519,239,589	28.47%
December 31, 2020	135,472,822	(138,290,237)	(2,817,415)	513,201,283	26.95%
December 31, 2019	127,151,838	(129,685,754)	(2,533,916)	492,109,775	26.35%
December 31, 2018	119,298,291	(120,614,676)	(1,316,385)	471,115,185	25.60%
December 31, 2017	112,017,087	(115,426,815)	(3,409,728)	451,777,105	25.55%
December 31, 2016	105,246,797	(107,067,707)	(1,820,910)	439,644,322	24.35%
December 31, 2015	98,792,642	(99,820,481)	(1,027,839)	432,382,921	23.09%
December 31, 2014	92,826,743	(93,400,946)	(574,203)	415,752,810	22.47%

See notes to required supplementary information.

SCHEDULE OF INVESTMENT RETURNS

Annual money-weighted rate of return.

V	rate of return,
<u>Year</u>	net of investment expense
December 31, 2023	10.95%
December 31, 2022	-11.54%
December 31, 2021	19.86%
December 31, 2020	12.26%
December 31, 2019	16.21%
December 31, 2018	-2.52%
December 31, 2017	17.25%
December 31, 2016	7.35%
December 31, 2015	0.61%
December 31, 2014	7.54%

See notes to required supplementary information.

NOTE A - CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

The Schedule of Changes in the Net Pension Liability and Related Ratios includes the detailed changes in the system's total pension liability, changes in the system's net position, and the ending net pension liability. It also demonstrates the plan's net position as a percentage of the total pension liability and the net pension liability as a percentage of covered payroll.

NOTE B - CONTRIBUTIONS

Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The total appropriations are payable on July 1 and January 1. Employers may choose to pay the entire appropriation in July at a discounted rate. Accordingly, actual employer contributions may be less than the "total appropriation". The pension fund appropriations are allocated amongst employers based on the actuarial valuation results. In addition, an employer may contribute more than the amount required.

NOTE C - MONEY WEIGHTED RATE OF RETURN

The money weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense. A money weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested. Inputs to the money weighted rate of return calculation are determined monthly.

NOTE D - CHANGES IN ASSUMPTIONS AND PLAN PROVISIONS

The following changes were reflected in the January 1, 2024, actuarial valuation.

Changes in Assumptions

None.

Changes in Plan Provisions

• Effective December 31, 2023, 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.

Middlesex County Retirement System

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Required Supplementary Information

Audit of Specific Elements, Accounts and Items of Financial Statements

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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Report on the Audit of the Schedule of Employer Allocations and Schedule of Pension Amounts by Employer

Opinion

We have audited the accompanying schedule of employer allocations of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2023, and the related notes. We have also audited the total for all entities of the rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total contributions and total pension expense included in the accompanying schedule pension amounts by employer of the MCRS Pension Plan as of and for the year ended December 31, 2023, and the related notes.

In our opinion, the accompanying schedule of employer allocations and schedule of pension amounts by employer present fairly, in all material respects, the employer allocations and net pension liability, total deferred outflows of resources, total deferred inflows of resources, total contributions and total pension expense for the total of all participating entities for the MCRS as of and for the year ended December 31, 2023, 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). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Schedules section of our report. We are required to be independent of the MCRS 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 opinions.

Responsibilities of Management for the Schedules

Management is responsible for the preparation and fair presentation of the schedules 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 the schedules that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibilities for the Audit of the Schedules

Our objectives are to obtain reasonable assurance about whether the schedule of employer allocations and the specified row totals included in the schedule of pension amounts by employer as a whole are free from material

misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. 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 will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than 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 judgement made by a reasonable user based on the schedules.

In performing an audit in accordance with GAAS, we:

- Exercise professional judgement and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the schedules, 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 schedules.
- 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 purposes of expressing an opinion on the
 effectiveness of the MCRS'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
 schedules.

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.

Other Matter

We have audited, in accordance with GAAS, the financial statements of the MCRS as of and for the year ended December 31, 2023, and our report thereon, dated August 14, 2024 expressed an unmodified opinion on those financial statements.

Restriction on Use

This report is intended solely for the information and use of the MCRS management, the MCRS employers and their auditors and is not intended to be and should not be used by anyone other than these specified parties.

August 14, 2024

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SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2023

Employer	Share of Net Pension Liability/(Asset)	Percent of Total Net Pension Liability
Middlesex County Retirement Board\$	-	0.000000%
Middlesex County	-	0.000000%
Middlesex Hospital	-	0.000000%
Town of Acton	56,665,288	3.350878%
Town of Ashby	1,505,590	0.089032%
Town of Ashland	38,782,403	2.293381%
Town of Ayer	22,587,224	1.335686%
Town of Bedford	59,004,049	3.489180%
Town of Billerica	163,804,814	9.686530%
Town of Boxborough	13,520,255	0.799515%
Town of Burlington	144,914,077	8.569434%
Town of Carlisle	16,210,292	0.958589%
Town of Chelmsford	120,898,338	7.149273%
Town of Dracut	75,090,691	4.440457%
Town of Dunstable	4,028,150	0.238203%
Town of Groton	23,696,683	1.401293%
Town of Holliston	28,063,006	1.659494%
Town of Hopkinton	27,101,615	1.602643%
Town of Hudson.	71,536,588	4.230286%
Town of Lincoln	32,130,102	1.900000%
Town of Littleton	25,893,317	1.531191%
Town of North Reading.	54,465,235	3.220779%
Town of Pepperell	16,995,063	1.004996%
Town of Sherborn	12,722,930	0.752365%
Town of Shirley	10,524,633	0.622370%
Town of Stow	14,559,897	0.860993%
Town of Sudbury	65,695,729	3.884890%
Town of Tewksbury	116,966,080	6.916741%
Town of Townsend	6,882,768	0.407010%
Town of Tyngsborough	26,555,868	1.570370%
Town of Wayland	62,127,083	3.673859%
Town of Westford	62,660,156	3.705382%
Town of Weston	73,443,424	4.343046%
Town of Wilmington	93,203,360	5.511542%
Acton-Boxborough Regional School District	32,314,927	1.910930%
Acton Water Supply	4,514,809	0.266981%
Bedford Housing Authority	376,352	0.022255%
Billerica Housing Authority	1,894,567	0.112034% 0.165098%
Chelmsford Housing Authority	2,791,904 732.694	0.165098%
Dracut Housing Authority	1,875,107	0.043328%
Dracut Water Supply	3,819,086	0.110864%
Diaduc vvacor duppry	3,013,000	0.22307070

(Continued)

Middlesex County Retirement System

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Employer Allocations

SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2023

	Share of Net Pension	Percent of Total Net
Employer	Liability/(Asset)	Pension Liability
East Chelmsford Water District	340,247	0.020120%
East Middlesex Mosquito Control	792,329	0.046854%
Greater Lowell Regional Vocational Technical School District	20,075,975	1.187184%
Groton-Dunstable Regional School District	15,368,239	0.908794%
Hudson Housing Authority	906,627	0.053613%
Lincoln-Sudbury Regional School District	10,386,487	0.614201%
Nashoba Valley Technical High School District	3,683,043	0.217795%
North Chelmsford Water District	1,742,783	0.103059%
North Middlesex Regional School District	14,594,252	0.863025%
Shawsheen Valley Regional Vocational School	9,594,986	0.567396%
South Middlesex Regional Vocational Technical School	7,400,154	0.437605%
Sudbury Water District	1,250,917	0.073972%
Tewksbury Housing Authority	2,151,337	0.127218%
Wayland Housing Authority	416,032	0.024602%
Hopkinton Housing Authority	621,215	0.036735%
Sudbury Housing Authority	554,364	0.032782%
Wilmington Housing Authority	137,041	0.008104%
Acton Housing Authority	1,015,010	0.060022%
Burlington Housing Authority	53,090	0.003139%
Ayer Housing Authority	688,618	0.040721%
Holliston Housing Authority	33,626	0.001988%
Littleton Housing Authority	686,302	0.040584%
Westford Housing Authority	789,669	0.046697%
Shirley Water District	395,361	0.023380%
Tyngsborough Housing Authority	573,626	0.033921%
Pepperell Housing Authority	243,694	0.014411%
Groton Housing Authority	· -	0.000000%
Tyngsborough Water District	710,027	0.041987%
North Reading Housing Authority	39,272	0.002322%
West Groton Water	86,060	0.005089%
Ayer-Shirley Regional School District	5,094,198	0.301243%
Northern Middlesex Regional Emergency Communications Center	79,063	0.004675%
Total\$	1,691,057,798	100.000%

(Concluded)

See notes to schedule of employer allocations and schedule of pension amounts by employer.

FOR THE YEAR ENDED DECEMBER 31, 2023

		Middlesex County Retirement Board		Middlesex County		Middlesex Hospital		Town of Acton
Net Pension Liability Beginning net pension liability/(asset)	\$	-	\$	-	\$	-	\$	56,442,883
Ending net pension liability/(asset)	\$	_	\$	_	\$	_	\$	56,665,288
Deferred Outflows of Resources	*		•		•		•	,,
Differences between expected and actual experience	\$	-	\$	-	\$	-	\$	1,630,344
Net difference between projected and actual investment earnings on pension plan investments		-		-		-		2,905,028
Changes of assumptions		-		-		-		364,130
Changes in proportion and differences between employer contributions and proportionate share of contributions.		-		_				265,094
Total Deferred Outflows of Resources				-				5,164,596
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$.		\$	_	\$		\$.	845,122
Pension Expense Proportionate share of plan pension expense	\$	453,368	\$	_	\$	-	\$	6,457,923
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions Total Employer Pension Expense		453,368			\$			(390,605) 6,067,318
Contributions Statutory required contribution	\$	453,368	\$	-	\$	-	\$	5,309,325
Contribution in relation to statutory required contribution		(453,368)						(5,345,128)
Contribution deficiency/(excess)	\$		\$		\$		\$	(35,803)
Contributions as a percentage of covered payroll		36.14%		N/A		N/A		33.31%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2025	\$	_	\$	_	\$	_	\$	568,594
June 30, 2026		_		_		-		1.066.423
June 30, 2027		_		_		-		2,680,565
June 30, 2028		_		_		_		3,892
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense			\$		\$		 \$	4,319,474
	Ψ.		Ψ		Ψ		Ψ.	4,515,414
Discount Rate Sensitivity 1% decrease (6.15%).	\$	-	\$	-	\$	-	\$	70,940,898
Current discount rate (7.15%)	\$	-	\$	-	\$	-	\$	56,665,288
1% increase (8.15%)	\$	-	\$	-	\$	-	\$	44,651,882
Covered Payroll	\$	1,254,426	\$	-	\$	-	\$	16,048,362
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Town of Ashby		Town of Ashland	-	Town of Ayer		Town of Bedford
Net Pension Liability								
Beginning net pension liability/(asset)	\$	2,195,503	\$	39,177,494	\$	21,132,333	\$	58,143,653
Ending net pension liability/(asset)	\$	1,505,590	\$	38,782,403	\$	22,587,224	\$	59,004,049
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	43,318	\$	1,115,827	\$	649,868	\$	1,697,633
Net difference between projected and actual investment earnings on pension plan investments		77,186		1,988,236		1,157,967		3,024,928
Changes of assumptions		9,675		249,211		145,143		379,153
Changes in proportion and differences between employer contributions and proportionate share of contributions		277,462		1,435,197		1,929,219		1,722,091
Total Deferred Outflows of Resources	\$.	407,641	\$	4,788,471	\$	3,882,197	\$	6,823,805
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions	\$	453,904	\$	1,089,890	\$	147,650	\$	471,465
	•							
Pension Expense Proportionate share of plan pension expense	\$	171,586	\$	4,419,888	\$	2,574,181	\$	6,724,472
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(66,071)		51,362		396,210		(134,403)
Total Employer Pension Expense	\$.	105,515	\$	4,471,250	\$.	2,970,391	\$	6,590,069
Contributions	_		_		_		_	
Statutory required contribution	\$	254,095	\$	3,905,242	\$	2,096,798	\$	5,458,202
Contribution in relation to statutory required contribution		(254,095)		(3,905,242)	-	(2,396,798)		(5,458,202)
Contribution deficiency/(excess)	\$.		\$		\$	(300,000)	\$	
Contributions as a percentage of covered payroll		23.91%		23.44%		28.66%		24.58%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2025	\$	(6,976)	\$	576,988	\$	834,754	\$	1,220,413
June 30, 2026		3,331		938,500		1,023,701		1,793,961
June 30, 2027		59,415		2,229,005		1,576,751		3,242,869
June 30, 2028	-	(102,033)		(45,912)	-	299,341		95,097
Future Pension Expense	\$.	(46,263)	\$	3,698,581	\$.	3,734,547	\$	6,352,340
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	1,884,891	\$	48,552,801	\$	28,277,593	\$	73,868,859
Current discount rate (7.15%)	\$	1,505,590	\$	38,782,403	\$	22,587,224	\$	59,004,049
1% increase (8.15%)	\$	1,186,395	\$	30,560,285	\$	17,798,588	\$	46,494,812
Covered Payroll	\$	1,062,577	\$	16,662,527	\$	8,362,919	\$	22,210,006
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Town of Billerica		Town of Boxborough		Town of Burlington	-	Town of Carlisle
Net Pension Liability								
Beginning net pension liability/(asset)	\$	163,486,989	\$	12,627,142	\$	143,508,193	\$	13,493,696
Ending net pension liability/(asset)	\$	163,804,814	\$	13,520,255	\$	144,914,077	\$	16,210,292
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	4,712,905	\$	388,998	\$	4,169,391	\$	466,394
Net difference between projected and actual investment earnings on pension plan investments		8,397,692		693,136		7,429,231		831,044
Changes of assumptions		1,052,592		86,880		931,202		104,166
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,117,069		617,690		1,120,488		3,087,879
Total Deferred Outflows of Resources					¢	13.650,312	٠.	4,489,483
Total Deletted Outflows of Nesources	Φ.	10,200,200	. Ψ	1,700,704	Φ	10,000,012	Φ:	4,403,403
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate								
share of contributions.	\$.	5,232,516	\$	318,711	\$	4,024,026	\$.	56,178
Pension Expense								
Proportionate share of plan pension expense	\$	18,668,227	\$	1,540,852	\$	16,515,318	\$	1,847,425
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(838,094)		184,987		62,668		793,155
				4 707 000	_			
Total Employer Pension Expense	\$,	17,830,133	. \$	1,725,839	\$	16,577,986	\$.	2,640,580
Contributions								
Statutory required contribution	\$	15,421,709	\$	1,245,470	\$	13,403,482	\$	1,402,244
Contribution in relation to statutory required contribution		(15,421,709)		(1,245,470)		(13,403,482)		(1,402,244)
Contribution deficiency/(excess)	\$	-	\$		\$		\$.	
Contributions as a percentage of covered payroll		36.73%		36.45%		32.85%		21.25%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2025		1,546,788	\$	247,133	\$	1,447,961	\$	1,098,479
June 30, 2026. June 30, 2027.		2,762,979 5,790,872		346,899 728,640		2,593,636 5,478,102		1,263,193 1,621,009
June 30, 2028.		(52,897)		145,321		106,587		450,624
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense		10,047,742			•	9,626,286		4,433,305
Future Ferision Expense	Φ.	10,047,742	. ⊅	1,467,983	Ф	9,020,200	Φ.	4,433,305
Discount Rate Sensitivity 1% decrease (6.15%)	\$	205,071,939	\$	16,926,395	\$	181,422,084	\$	20,294,129
Current discount rate (7.15%)	\$	163,804,814	\$	13,520,255	\$	144,914,077	\$	16,210,292
1% increase (8.15%)	\$	129,077,143	\$	10,653,874	\$	114,191,363	\$	12,773,606
Covered Payroll	\$	41,992,311	\$	3,417,136	\$	40,805,162	\$	6,599,149
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Town of Chelmsford		Town of Dracut	-	Town of Dunstable		Town of Groton
Net Pension Liability								
Beginning net pension liability/(asset)	\$	117,848,343	\$	75,091,196	\$	3,248,740	\$	25,150,097
Ending net pension liability/(asset)	\$	120,898,338	\$	75,090,691	\$	4,028,150	\$	23,696,683
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	3,478,423	\$	2,160,470	\$	115,896	\$	681,788
Net difference between projected and actual investment earnings on pension plan investments		6,198,029		3,849,633		206,509		1,214,845
Changes of assumptions		776,879		482,524		25,884		152,272
Changes in proportion and differences between employer contributions and proportionate share of contributions		3,317,307		1,608,071	_	785,225		570,324
Total Deferred Outflows of Resources	\$	13,770,638	\$	8,100,698	\$	1,133,514	\$	2,619,229
Deferred inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$	4 646 139	\$	2 117 715	\$	191 314	•	1,797,534
	Ψ,	1,010,100	Ψ	2,111,710	Ψ.	101,011	Ψ,	1,107,001
Pension Expense Proportionate share of plan pension expense	\$	13,778,333	\$	8,557,808	\$	459,073	\$	2,700,624
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(188,726)		359,430	_	177,378		(224,135)
Total Employer Pension Expense	\$,	13,589,607	\$	8,917,238	\$.	636,451	\$	2,476,489
Contributions Statutory required contribution	dr.	11 222 552	Ф	7,203,532	6	365,094	•	2,494,280
Statutory required contribution	Φ	11,333,332	Ф	1,203,552	Ф	300,094	Φ	2,494,260
Contribution in relation to statutory required contribution		(11,335,407)		(7,203,874)	-	(365,094)		(2,494,280)
Contribution deficiency/(excess)	\$.	(1,855)	\$	(342)	\$.	-	\$	
Contributions as a percentage of covered payroll		34.19%		37.14%		25.25%		27.51%
<u>Deferred Outflows/(inflows) Recognized in</u> <u>Future Pension Expense</u>								
June 30, 2025	\$	1,641,814	\$	1,350,684	\$	192,460	\$	(102,397) 86,494
June 30, 2027		2,519,896 4,507,226		1,906,879 2,748,971		217,318 398,438		1,060,975
June 30, 2028		455,563		(23,551)		133,984		(223,377)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	9,124,499	\$	5,982,983	\$	942,200	\$	821,695
B. 18.10 3111	•				•			
Discount Rate Sensitivity 1% decrease (6.15%)	\$	151,356,092	\$	94,008,187	\$	5,042,956	\$	29,666,556
Current discount rate (7.15%)	\$	120,898,338	\$	75,090,691	\$	4,028,150	\$	23,696,683
1% increase (8.15%)	\$	95,267,115	\$	59,170,983	\$	3,174,156	\$	18,672,834
Covered Payroll	\$	33,151,794	\$	19,399,126	\$	1,445,859	\$	9,066,226
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Town of Holliston		Town of Hopkinton		Town of Hudson		Town of Lincoln
Net Pension Liability								
Beginning net pension liability/(asset)	\$	27,235,114	\$	29,030,303	\$	75,932,435	\$	32,224,079
Ending net pension liability/(asset)	\$	28,063,006	\$	27,101,615	\$	71,536,588	\$	32,130,102
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	807,414	\$	779,753	\$	2,058,213	\$	924,430
Net difference between projected and actual investment earnings on pension plan investments		1,438,691		1,389,404		3,667,427		1,647,196
Changes of assumptions		180,330		174,152		459,686		206,464
Changes in proportion and differences between employer contributions and proportionate share of contributions		3,022,225		4,448,679		823,827		1,074,257
Total Deferred Outflows of Resources	\$	5,448,660	\$	6,791,988	\$	7,009,153	\$	3,852,347
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate		4.550.047	_	0.040.000		0.000.007		07.044
share of contributions.	\$.	1,553,247	\$	2,642,203	\$	2,698,837	\$	87,841
Pension Expense Proportionate share of plan pension expense	œ	3.198.236	đ	3.088.670	•	8.152.758		3.661.748
Proportionate share of plan pension expense	Φ	3, 180,230	Φ	3,000,070	Ф	0,132,730	Ф	3,001,740
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(61,275)		406,670		(601,450)		312,115
Total Employer Pension Expense	\$	3,136,961	\$	3,495,340	\$	7,551,308	\$	3,973,863
Contributions	_		_		_	=	_	
Statutory required contribution	\$	2,720,260	\$	3,104,074	\$	7,441,621	\$	3,050,494
Contribution in relation to statutory required contribution		(2,720,260)		(3,104,074)		(7,441,621)		(3,050,494)
Contribution deficiency/(excess)	\$.		\$		\$	<u> </u>	\$	
Contributions as a percentage of covered payroll		20.35%		14.98%		31.84%		24.92%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2025	\$	601,804	\$	791,792	\$	899,437	\$	947,357
June 30, 2026		905,108	•	1,125,440	•	1,498,658	•	1,225,832
June 30, 2027		2,243,473		2,485,437		2,605,674		1,624,563
June 30, 2028		145,028		(252,884)		(693,453)		(33,246)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	3,895,413	\$	4,149,785	\$	4,310,316	\$	3,764,506
	,				,		,	
Discount Rate Sensitivity 1% decrease (6.15%)	\$	35,132,881	\$	33,929,288	\$	89,558,704	\$	40,224,595
Current discount rate (7.15%)	\$	28,063,006	\$	27,101,615	\$	71,536,588	\$	32,130,102
1% increase (8.15%)	\$	22,113,469	\$	21,355,899	\$	56,370,372	\$	25,318,314
Covered Payroll	\$	13,368,469	\$	20,722,283	\$	23,371,212	\$	12,243,307
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	_	Town of Littleton		Town of North Reading	_	Town of Pepperell	_	Town of Sherborn
Net Pension Liability								
Beginning net pension liability/(asset)	\$	30,512,028	\$	55,154,781	\$	19,372,966	\$	11,793,029
Ending net pension liability/(asset)	\$	25,893,317	\$	54,465,235	\$	16,995,063	\$	12,722,930
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	744,989	\$	1,567,045	\$	488,973	\$	366,057
Net difference between projected and actual investment earnings on pension plan investments		1,327,459		2,792,239		871,277		652,259
Changes of assumptions		166,388		349,988		109,208		81,756
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	3,397,992		191,293	_	6,490	_	1,242,276
Total Deferred Outflows of Resources	\$_	5,636,828	\$	4,900,565	\$_	1,475,948	\$_	2,342,348
Deferred inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$ _	1,203,102	\$	1,274,724	\$ _	1,503,977	\$_	
Pension Expense	•	2.950.963	•	6 207 200	•	1 026 865	•	1 440 005
Proportionate share of plan pension expense	Þ	2,930,963	Þ	6,207,200	Ф	1,936,865	Þ	1,449,985
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	1,056,599		(559,494)	_	(402,632)	_	123,225
Total Employer Pension Expense	\$ _	4,007,562	\$	5,647,706	\$ _	1,534,233	\$ _	1,573,210
Contributions Statutory required contribution	\$	3,110,711	\$	5.210.793	\$	1.941.379	s	1,236,905
•				(5,210,793)	•	(1.941,379)	*	(1,236,905)
Contribution in relation to statutory required contribution							_	(1,230,303)
Contribution deficiency/(excess)	\$ =	(2,056,320)	\$		\$ =	-	\$ =	
Contributions as a percentage of covered payroll		30.86%		33.74%		30.45%		24.88%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2025	\$	1,270,864	\$	602,836	\$	(102,224)	\$	571,348
June 30, 2026		1,541,802 1,919,298		1,050,654 2,115,666		34,197 408,758		676,157 929,104
June 30, 2028		(298,238)		(143,315)		(368,760)		165,739
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense		4,433,726	6	3,625,841	\$	(28,029)		2.342.348
rutule relision Expense	Φ =	4,433,720	Φ	3,023,041	Φ =	(20,023)	Φ =	2,042,040
Discount Rate Sensitivity 1% decrease (6.15%)	c	32,416,585	•	68,186,588	Œ	21,276,606	¢	15,928,201
, ,								
Current discount rate (7.15%)		25,893,317		. ,	\$		\$	12,722,930
1% increase (8.15%)	\$	20,403,768	\$	42,918,256	\$	13,392,001	\$	10,025,587
Covered Payroll	\$	16,743,124	\$	15,445,769	\$	6,374,629	\$	4,971,947
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Town of Shirley	Town of Stow		Town of Sudbury		Town of Tewksbury
Net Pension Liability							
Beginning net pension liability/(asset)	\$	10,265,353	\$ 14,182,336	\$	66,845,536	\$	115,583,007
Ending net pension liability/(asset)	\$	10,524,633	\$ 14,559,897	\$	65,695,729	\$	116,966,080
Deferred Outflows of Resources							
Differences between expected and actual experience	\$	302,809	\$ 418,910	\$	1,890,163	\$	3,365,286
Net difference between projected and actual investment earnings on pension plan investments		539,561	746,434		3,367,987		5,996,436
Changes of assumptions		67,630	93,560		422,153		751,61 1
Changes in proportion and differences between employer contributions and proportionate share of contributions		510,738	788,818		137,566		3,962,833
Total Deferred Outflows of Resources	\$.	1,420,738	\$ 2,047,722	\$	5,817,869	\$	14,076,166
Deferred inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.						\$	5,889,381
Pension Expense Proportionate share of plan pension expense	\$	1,199,454	\$ 1,659,337	\$	7,487,097	\$	13,330,188
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		80,903	265,242		(819,033)		(81,774)
Total Employer Pension Expense	\$	1,280,357	\$ 1,924,579	\$	6,668,064	\$	13,248,414
Contributions Statutory required contribution	\$	1,016,240	\$ 1,334,265	\$	6.370.873	s	10,932,548
				•	,	٠	
Contribution in relation to statutory required contribution		(1,016,240)	(1,334,265)		(6,370,873)		(10,932,548)
Contribution deficiency/(excess)	\$.		\$ 	\$	<u> </u>	\$	
Contributions as a percentage of covered payroll		42.68%	29.46%		31.49%		41.27%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u>							
June 30, 2025	\$	250,334	\$ 510,139	\$	528,742	\$	1,791,109
June 30, 2026		330,607	634,056		1,052,079		2,633,999
June 30, 2027		400,267	661,713		2,391,686		3,608,386
June 30, 2028		44,433	50,524		(212,675)		153,291
Future Pension Expense	\$	1,025,641	\$ 1,856,432	\$	3,759,832	\$	8,186,785
Discount Rate Sensitivity							
1% decrease (6.15%)	\$	13,176,090	\$ 18,227,952	\$	82,246,365	\$	146,433,186
Current discount rate (7.15%)	\$	10,524,633	\$ 14,559,897	\$	65,695,729	\$	116,966,080
1% increase (8.15%)	\$	8,293,343	\$ 11,473,105	\$	51,767,813	\$	92,168,521
Covered Payroll	\$	2,381,326	\$ 4,529,512	\$	20,232,436	\$	26,490,728
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	-	Town of Townsend		Town of Tyngsborough		Town of Wayland		Town of Westford
Net Pension Liability								
Beginning net pension liability/(asset)	\$	7,565,089	\$	27,541,050	\$	60,047,515	\$	65,161,824
Ending net pension liability/(asset)	\$	6,882,768	\$	26,555,868	\$	62,127,083	\$	62,660,156
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	198,027	\$	764,051	\$	1,787,487	\$	1,802,825
Net difference between projected and actual investment earnings on pension plan investments		352,855		1,361,425		3,185,035		3,212,364
Changes of assumptions		44,228		170,645		399,222		402,647
Changes in proportion and differences between employer contributions and proportionate share of contributions		990,752		578,237		2,399,328		4,615,398
Total Deferred Outflows of Resources	\$	1,585,862	\$	2,874,358	\$	7,771,072	\$	10,033,234
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate								
share of contributions	\$.	1,199,170	. \$	488,332	\$	1,349,683	\$	2,983,703
Pension Expense Proportionate share of plan pension expense	\$	784.405	\$	3.026.474	\$	7.080.392	\$	7.141.145
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionale share of contributions		(309,478)		295,579		(274,065)		166,235
Total Employer Pension Expense	\$	474 927	· \$	3,322,053	s	6,806,327	·	7,307,380
	٠.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	*		•		*,	.,,
Contributions								
Statutory required contribution	\$	891,023	\$	2,802,097	\$	5,907,067	\$	6,522,668
Contribution in relation to statutory required contribution		(891,023)		(2,805,247)		(5,907,067)		(6,522,668)
Contribution deficiency/(excess)	\$.		\$	(3,150)	\$		\$	
Contributions as a percentage of covered payroll		20.04%		27.03%		26.38%		22.26%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2025	\$	(78,837)	\$	530,211	\$	1,001,978	\$	1,367,012
June 30, 2026		(25,693)		744,033		1,548,026		1,971,655
June 30, 2027		569,363		1,244,906		3,529,184		4,075,969
June 30, 2028		(78,141)		(133,124)		342,201		(365,105)
Future Pension Expense	\$.	386,692	\$	2,386,026	\$	6,421,389	\$	7,049,531
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	8,616,734	\$	33,246,052	\$	77,778,675	\$	78,446,044
Current discount rate (7.15%)	\$	6,882,768	\$	26,555,868	\$	62,127,083	\$	62,660,156
1% increase (8.15%)	\$	5,423,577	\$	20,925,854	\$	48,955,743	\$	49,375,801
Covered Payroll	\$	4,446,532	\$	10,378,946	\$	22,389,383	\$	29,308,551
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Town of Weston		Town of Wilmington		Acton- Boxborough Regional School District		Acton Water Supply
Net Pension Liability								
Beginning net pension liability/(asset)	\$	73,861,876	\$	93,568,182	\$	32,804,832	\$	4,310,937
Ending net pension liability/(asset)	\$	73,443,424	\$	93,203,360	\$	32,314,927	\$	4,514,809
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	2,113,075	\$	2,681,598	\$	929,748	\$	129,898
Net difference between projected and actual investment earnings on pension plan investments		3,765,184		4,778,206		1,656,672		231,458
Changes of assumptions		471,939		598,914		207,652		29,012
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,349,910		665,797		920,375		136,588
Total Deferred Outflows of Resources	\$:	7,700,108	\$	8,724,515	\$	3,714,447	\$	526,956
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$	981,494	. \$	1,104,940	\$	643,260	\$	17,150
Pension Expense Proportionate share of plan pension expense	. \$	8,370,074	\$	10,622,040	\$	3,682,812	\$	514,535
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		29,525		(17,874)		161,850		(2,470)
Total Employer Pension Expense	\$.	8,399,599	\$	10,604,166	\$	3,844,662	\$	512,065
Contributions Statutory required contribution	\$	6,912,365	\$	8,908,246	\$	3.367.439	\$	330.838
Contribution in relation to statutory required contribution		(7,912,365)		(8,908,630)	•	(3,367,439)		(330,838)
Contribution deficiency/(excess)		(1,000,000)	\$	(384)	\$	-	\$	=
Contributions as a percentage of covered payroll		34.06%	•	33.10%		20.06%	٠	28.64%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2025	\$	1,431,781	\$	1,509,572	\$	563,206	\$	101,114
June 30, 2026		2,058,064 3,153,3 1 3		2,279,855		803,430 1,748,882		156,229 237,841
June 30, 2027 June 30, 2028		75,456		3,931,149 (101,001)		(44,331)		14,622
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$		· \$	7,619,575	\$	3,071,187	\$	509,806
·	•							
Discount Rate Sensitivity 1% decrease (6.15%)	. \$	91,945,926	\$	116,683,956	\$	40,455,983	\$	5,652,219
Current discount rate (7.15%)	\$	73,443,424	\$	93,203,360	\$	32,314,927	\$	4,514,809
1% increase (8.15%)	\$	57,872,947	\$	73,443,650	\$	25,463,955	\$	3,557,641
Covered Payroll	\$	23,232,459	\$	26,917,809	\$	16,789,694	\$	1,155,228
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	-	Bedford Housing Authority	Billerica Housing Authority	Chelmsford Housing Authority	Chelmsford Water District
Net Pension Liability Beginning net pension liability/(asset)	\$	357,375	\$ 1,270,401	\$ 2.873,470	\$ 819.895
Ending net pension liability/(asset).		376,352	1,894,567	\$ 	\$ 732,694
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	10,828	\$ 54,509	\$ 80,327	\$ 21,081
Net difference between projected and actual investment earnings on pension plan investments		19,294	97,128	143,131	37,563
Changes of assumptions		2,418	12,174	17,940	4,708
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	27,723	394,204	500,744	1,108,302
Total Deferred Outflows of Resources	\$ _	60,263	\$ 558,015	\$ 742,142	\$ 1,171,654
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate					
share of contributions	\$ _	9,901	\$ 176,375	\$ 36,934	\$ 520,106
Pension Expense Proportionate share of plan pension expense	\$	42,894	\$ 215,919	\$ 318,183	\$ 83,503
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	980	37,690	128,366	45,541
Total Employer Pension Expense	\$ _	43,874	\$ 253,609	\$ 446,549	\$ 129,044
<u>Contributions</u> Statutory required contribution	\$	32,681	\$ 113,735	\$ 297,353	\$ 52,448
Contribution in relation to statutory required contribution	_	(32,681)	(113,735)	(357,353)	(52,448)
Contribution deficiency/(excess)	\$ _		\$ 	\$ (60,000)	\$
Contributions as a percentage of covered payroll		24.81%	28.70%	10.00%	3.92%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense					
June 30, 2025.	\$	9,146	\$ 44,197	\$ 186,001	\$ 117,197
June 30, 2026		13,021 25,601	59,188 180,727	222,892 293,887	169,789 383,968
June 30, 2028.		2,594	97,528	2,428	(19,406)
Total Deferred Outflows/(Inflows) Recognized in	-				
Future Pension Expense	\$ =	50,362	\$ 381,640	\$ 705,208	\$ 651,548
Discount Rate Sensitivity 1% decrease (6.15%)	\$	471,166	\$ 2,371,863	\$ 3,495,265	\$ 917,281
Current discount rate (7.15%)	\$	376,352	\$ 1,894,567	\$ 2,791,904	\$ 732,694
1% increase (8.15%)	\$	296,563	\$ 1,492,907	\$ 2,200,002	\$ 577,358
Covered Payroll	\$	131,725	\$ 396,320	\$ 3,573,684	\$ 1,336,985
See notes to schedule of employer allocations and schedule of pension amounts by employer.					(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Dracut Housing Authority		Dracut Water Supply		East Chelmsford Water District		East Middlesex Mosquito Control
Net Pension Liability Beginning net pension liability/(asset)	\$	1,967,855	\$	3,773,011	\$	358,607	\$	843,725
Ending net pension liability/(asset)	\$	1,875,107	\$	3,819,086	\$	340,247	\$	792,329
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	53,950	\$	109,881	\$	9,789	\$	22,796
Net difference between projected and actual investment earnings on pension plan investments		96,130		195,791		17,443		40,620
Changes of assumptions		12,049		24,541		2,186		5,091
Changes in proportion and differences between employer contributions and proportionate share of contributions.		832		127,956		71,406	_	125,772
Total Deferred Outflows of Resources	\$.	162,961	\$	458,169	\$	100,824	\$	194,279
Deferred inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$	308,700	\$	203,938	\$	69,319	\$	97,228
Pension Expense	٠		•				٠	
Proportionate share of plan pension expense	\$	213,700	\$	435,247	\$	38,778	\$	90,299
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(110.302)		(17,135)		(7,846)		4.508
Total Employer Pension Expense						30,932	ς.	94,807
	Ψ,	100,000	٠ *		Ψ,	00,002	٠.	0 1,001
Contributions Statutory required contribution	\$	164,851	\$	316,875	\$	34,525	\$	65,087
Contribution in relation to statutory required contribution		(167,722)		(316,875)		(34,525)		(65,087)
Contribution deficiency/(excess)	\$	(2,871)	. \$		\$		\$.	
Contributions as a percentage of covered payroll		37.50%		41.99%		14.77%		18.85%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2026. June 30, 2027. June 30, 2027.	\$	(87,679) (72,743) 34,304 (19,621)		56,365 91,832 108,882 (2,848)	\$	(3,315) 1,289 36,548 (3,017)	\$	13,696 27,993 66,995 (11,633)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	(145,739)	\$	254,231	\$	31,505	\$	97,051
<u>Discount Rate Sensitivity</u> 1% decrease (6.15%)	\$	2,347,500	\$	4,781,223	\$	425,965	\$	991,939
Current discount rate (7.15%)	\$	1,875,107	\$	3,819,086	\$	340,247	\$	792,329
1% increase (8.15%)	\$	1,477,572	\$	3,009,415	\$	268,112	\$	624,350
Covered Payroll	\$	447,219	\$	754,572	\$	233,823	\$	345,200
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Greater Lowell Regional Vocation Technical School District	Groton- Dunstable Regional School District	-	Hudson Housing Authority	Lincoln- Sudbury Regional School District
Net Pension Liability Beginning net pension liability/(asset)	\$	20,251,238	\$ 14,947,853	\$	807,927	\$ 10,259,862
Ending net pension liability/(asset)	\$	20,075,975	\$ 15,368,239	\$	906,627	\$ 10,386,487
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	577,615	\$ 442,167	\$	26,085	\$ 298,834
Net difference between projected and actual investment earnings on pension plan investments		1,029,224	787,875		46,480	532,478
Changes of assumptions		129,006	98,755		5,826	66,742
Changes in proportion and differences between employer contributions and proportionate share of contributions		579,466	648,413		110,520	275,362
Total Deferred Outflows of Resources			\$ 	\$	188,911	\$
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions				-	2,748	225,273
Pension Expense Proportionate share of plan pension expense			1,751,461	\$	103,325	\$ 1,183,710
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		19,507	274,307		(58,111)	(17,804)
Total Employer Pension Expense.	\$.	2,307,492	\$ 2,025,768	\$.	45,214	\$ 1,165,906
Contributions Statutory required contribution	\$	1,780,273	\$ 1,373,329	\$	72,524	\$ 913,596
Contribution in relation to statutory required contribution		(1,780,273)	(1,373,329)		(72,524)	(913,596)
Contribution deficiency/(excess)	\$.	-	\$ 	\$.	-	\$
Contributions as a percentage of covered payroll		33.87%	30.60%		14.82%	29.22%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2025. June 30, 2026.	\$	202,439 383,985	\$ 457,520 614,350	\$	45,773 56,145	\$ 218,350 314,957
June 30, 2027 June 30, 2028 Total Deferred Outflows/(Inflows) Recognized in		520,196 (66,790)	827,502 50,240	-	69,751 14,494	411,984 2,852
Future Pension Expense	\$.	1,039,830	\$ 1,949,612	\$.	186,163	\$ 948,143
Discount Rate Sensitivity 1% decrease (6.15%)	\$	25,133,688	\$ 19,239,939	\$	1,135,032	\$ 13,003,141
Current discount rate (7.15%)	\$	20,075,975	\$ 15,368,239	\$	906,627	\$ 10,386,487
1% increase (8.15%)	\$	15,819,740	\$ 12,110,074	\$	714,416	\$ 8,184,485
Covered Payroll.	\$	5,256,908	\$ 4,488,209	\$	489,311	\$ 3,127,054
See notes to schedule of employer allocations and schedule of pension amounts by employer						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	Nashoba Valley Technical High School District		North Chelmsford Water District	-	North Middlesex Regional School District]	Shawsheen Valley Regional Vocational Fechnical School
Net Pension Liability Beginning net pension liability/(asset)\$	3,773,754	\$	1,229,309	\$	14,660,062	\$	9,786,464
Ending net pension liability/(asset)\$	3,683,043	\$	1,742,783	\$	14,594,252	\$	9,594,986
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience\$	105,967	\$	50,142	\$	419,898	\$	276,062
Net difference between projected and actual investment earnings on pension plan investments	188,817		89,346		748,196		491,901
Changes of assumptions	23,667		11,199		93,781		61,656
Changes in proportion and differences between employer contributions and proportionate share of contributions.	104,385		523,229		202,593		216,512
			·			-	
Total Deferred Outflows of Resources\$	422,836	\$	673,916	\$	1,464,468	\$ =	1,046,131
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions\$	349,869	\$	113,259	\$	42,245	\$_	461,694
Pension Expense Proportionate share of plan pension expense\$	419,741	\$	198,618	\$	1,663,254	\$	1,093,506
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	(52,247)		81,193		68,563	_	(28,804)
Total Employer Pension Expense\$	367,494	\$	279,811	\$	1,731,817	\$ =	1,064,702
0.47.5							
Contributions Statutory required contribution\$	377.582	\$	95.159	\$	1,410,189	\$	904,644
Contribution in relation to statutory required contribution			(95,159)		(1,410,189)	*	(904.644)
Contribution deficiency/(excess)\$		\$, , , , ,	\$	- (*)	- ¢	(,,
		Ψ.		. Ф		Φ=	
Contributions as a percentage of covered payroll	36.17%		14.16%		24.05%		27.11%
Deferred Outflows/(Inflows) Recognized in							
Future Pension Expense June 30, 2025\$	6.191	ď	113.738	ır.	289,565	œ	121,433
June 30, 2026.	23.189	Φ	141.438	Φ	421,508	Φ	204,065
June 30, 2027.	56.124		228.521		725.473		299,383
June 30, 2028.	(12,537)		76,960		(14,323)		(40,444)
Total Deferred Outflows/(Inflows) Recognized in	(12,001)		, 0,300		(17,020)	-	(40,447)
Future Pension Expense\$	72,967	\$	560,657	\$	1,422,223	\$ _	584,437
Discount Rate Sensitivity 1% decrease (6.15%)\$	4,610,907	\$	2,181,840	\$	18,270,962	\$	12,012,238
Current discount rate (7.15%)\$	3,683,043	\$	1,742,783	\$	14,594,252	\$	9,594,986
1% increase (8.15%)\$	2,902,214	\$	1,373,302	\$	11,500,177	\$	7,560,787
Covered Payroll\$	1,043,817	\$	672,107	\$	5,863,270	\$	3,336,441
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	Ţ	South Middlesex Regional Vocational echnical School	ol	Sudbury Water District	-	Tewksbury Housing Authority	-	Wayland Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	¢	7,705,068	\$	2,303,019	\$	1,805,120	\$	671,550
beginning het pension liability/(asset)	Φ	7,700,000	Φ	2,303,019	Φ	1,000,120	Ф	071,550
Ending net pension liability/(asset)	\$	7,400,154	\$	1,250,917	\$	2,151,337	\$	416,032
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	212,913	\$	35,991	\$	61,897	\$	11,970
Net difference between projected and actual investment earnings on pension plan investments		379,380		64,130		110,291		21,328
Changes of assumptions		47,553		8,038		13,824		2,673
Changes in proportion and differences between employer contributions and proportionate share of contributions.		118,456		269,691		219,536		106,725
					-		•	
Total Deferred Outflows of Resources	\$	758,302	\$	377,850	\$	405,548	\$	142,696
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions	\$	353,657	\$	1,072,756	\$.	44,241	\$.	248,149
Pension Expense Proportionate share of plan pension expense	\$	843,368	\$	142,560	\$	245,179	\$	47,412
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(101,522)		(203,674)		44,637		(59,803)
Total Employer Pension Expense	\$	741,846	\$	(61,114)	\$.	289,816	\$	(12,391)
Contributions Statutory required contribution	Ф	704.878	\$	156.230	\$	160.199	\$	56.113
			Ψ		φ	,	Ψ	,
Contribution in relation to statutory required contribution				(156,230)	-	(160,199)		(56,113)
Contribution deficiency/(excess)	\$.		\$		\$.	-	\$.	-
Contributions as a percentage of covered payroll		26.92%		14.91%		29.85%		17.11%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2025	\$	73,823	\$	(254,110)	\$	75,164	\$	(41,428)
June 30, 2026		145,474		(225,699)		96,147		(33,617)
June 30, 2027		243,252		(33,627)		137,935		12,220
June 30, 2028.		(57,904)		(181,470)	-	52,061		(42,628)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	404,645	\$	(694,906)	\$.	361,307	\$.	(105,453)
Discount Rate Sensitivity 1% decrease (6.15%)	\$	9,264,465	\$	1,566,059	\$	2,693,320	\$	520,842
Current discount rate (7.15%)	\$	7,400,154	\$	1,250,917	\$	2,151,337	\$	416,032
1% increase (8.15%)	\$	5,831,274	\$	985,715	\$	1,695,240	\$	327,831
Covered Payroll	\$	2,618,631	\$	1,048,146	\$	536,594	\$	327,989
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

Net Pension Liability	-	Hopkinton Housing Authority		Sudbury Housing Authority		Wilmington Housing Authority		Acton Housing Authority
Beginning net pension liability/(asset)	\$	591,913	\$	534,374	\$	233,342	\$	1,015,501
Ending net pension liability/(asset)	\$	621,215	\$	554,364	\$	137,041	\$	1,015,010
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	17,873	\$	15,950	\$	3,943	\$	29,203
Net difference between projected and actual investment earnings on pension plan investments		31,847		28,420		7,026		52,036
Changes of assumptions		3,992		3,562		881		6,522
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	34,342		34,520		9,813		47,109
Total Deferred Outflows of Resources	\$ _	88,054	\$	82,452	\$	21,663	\$	134,870
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate	•	25.745		20 502		447.040	•	20.044
share of contributions	\$ =	25,745	\$	20,003	ъ,	117,646	۶.	26,941
Pension Expense Proportionate share of plan pension expense	\$	70,797	\$	63,180	\$	15,619	\$	115,678
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	4,391		3,253		(38,079)		7,115
Total Employer Pension Expense	\$ _	75,188	\$	66,433	\$	(22,460)	\$.	122,793
Contributions Statutory required contribution	\$	55,738	\$	52,795	\$	24,139	\$	87,654
Contribution in relation to statutory required contribution	_	(55,738)		(52,795)		(24,139)		(87,654)
Contribution deficiency/(excess)	\$_		\$		\$	<u>-</u>	\$	
Contributions as a percentage of covered payroll		54.65%		54.49%		12.83%		16.95%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2025. June 30, 2026.	\$	13,740	\$	13,586 18,681	\$	(37,753)	\$	18,881 31,025
June 30, 2027		19,602 24,687		20,296		(37,413) (5,735)		60,372
June 30, 2028	_	4,280		3,326		(15,082)		(2,349)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	62,309	\$	55,889	\$	(95,983)	\$	107,929
	-							
Discount Rate Sensitivity 1% decrease (6.15%)	\$	777,717	\$	694,024	\$	171,566	\$	1,270,720
Current discount rate (7.15%)	\$	621,215	\$	554,364	\$	137,041	\$	1,015,010
1% increase (8.15%)	\$	489,513	\$	436,835	\$	107,987	\$	799,821
Covered Payroll	\$	101,991	\$	96,896	\$	188,084	\$	516,982
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

Na Parada di Allifa	_	Burlington Housing Authority	Ayer Housing Authority	-	Holliston Housing Authority		Littleton Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	\$	198,080	\$ 753,718	\$	159,405	\$	660.639
Ending net pension liability/(asset)		53,090	\$ 688,618		33,626	\$	686,302
Deferred Outflows of Resources							
Differences between expected and actual experience	\$	1,527	\$ 19,8 1 3	\$	967	\$	19,746
Net difference between projected and actual investment earnings on pension plan investments		2,722	35,303		1,724		35,184
Changes of assumptions.		341	4,425		216		4,410
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	113,832	316	_	25,912		62,874
Total Deferred Outflows of Resources	\$ =	118,422	\$ 59,857	\$ _	28,819	\$	122,214
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate							
share of contributions	\$ =	212,465	\$ 134,975	\$ _	97,996	\$.	101,568
Pension Expense Proportionate share of plan pension expense	\$	6,049	\$ 78,480	\$	3,831	\$	78,215
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(15,474)	(39,140)		(18,537)		14,051
Total Employer Pension Expense	\$ =	(9,425)	\$ 39,340	\$ _	(14,706)	\$.	92,266
Contributions Statutory required contribution	\$	18,072	\$ 73,004	\$	19,430	\$	57,173
Contribution in relation to statutory required contribution	_	(18,072)	(73,004)	_	(19,430)		(57,173)
Contribution deficiency/(excess)	\$ =		\$ 	\$ _	-	\$.	
Contributions as a percentage of covered payroll		7.95%	39.13%		18.73%		N/A
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense							
June 30, 2025	\$	(45,915)	\$ (35,282)	\$	(20,387)	\$	5,934
June 30, 2026		(41,785)	(29,808)		(20,339)		11,485
June 30, 2027		17,030 (23,373)	452 (10,480)		(9,167) (19,284)		581 2,646
Total Deferred Outflows/(Inflows) Recognized in	-	(20,0,0)	(10(100)	-	(10,201)		
Future Pension Expense	\$ =	(94,043)	\$ (75,118)	\$ _	(69,177)	\$.	20,646
Discount Rate Sensitivity 1% decrease (6.15%)	\$	66,465	\$ 862,101	\$	42,097	\$	859,201
Current discount rate (7.15%)	\$	53,090	\$ 688,618	\$	33,626	\$	686,302
1% increase (8.15%)	\$	41,835	\$ 542,627	\$	26,497	\$	540,802
Covered Payroll	\$	227,257	\$ 186,559	\$	103,737	\$	-
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	-	Westford Housing Authority		Shirley Water District		Tyngsborough Housing Authority		Pepperell Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	æ	456,630	\$	558,390	\$	577,242	•	248.169
Beginning net pension liability/(asset)	Ф	400,030	Ф	336,390	Ф	577,242	Þ	246, 169
Ending net pension liability/(asset)	\$	789,669	\$	395,361	\$	573,626	\$	243,694
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	22,720	\$	11,375	\$	16,504	\$	7,011
Net difference between projected and actual investment earnings on pension plan investments		40,484		20,269		29,408		12,493
Changes of assumptions		5,074		2,541		3,686		1,566
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	275,242		80,121		22,221		1,671
Total Deferred Outflows of Resources	\$ _	343,520	\$	114,306	\$	71,819	\$	22,741
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate								
share of contributions	\$ =	77,045	\$	160,446	\$	34,355	\$.	11,017
Pension Expense Proportionate share of plan pension expense	\$	89,995	\$	45,058	\$	65,374	\$	27,773
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	33,973		(18,515)		(1,730)		6,642
Total Employer Pension Expense	\$ _	123,968	\$	26,543	\$	63,644	\$.	34,415
Contributions Statutory required contribution	\$	46,868	\$	38,447		57,544	\$	28,680
Contribution in relation to statutory required contribution	_	(46,868)		(38,447)		(57,544)		(28,680)
Contribution deficiency/(excess)	\$_		\$		\$		\$	
Contributions as a percentage of covered payroll		10.68%		15.00%		41.72%		26.27%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2025	\$	47,465	\$	(20,657)	\$	9,847	\$	860
June 30, 2026		55,394		(12,100)		13,031 14,911		2,378
June 30, 2027		110,027 53,589		15,819 (29,202)		(325)		8,303 183
Total Deferred Outflows/(Inflows) Recognized in	-			(20,202)		(020)		100
Future Pension Expense	\$ _	266,475	\$	(46,140)	\$	37,464	\$.	11,724
Discount Rate Sensitivity 1% decrease (6.15%).	\$	988,609	\$	494,964	\$	718,139	\$	305,087
Current discount rate (7.15%)	\$	789,669	\$	395,361	\$	573,626	\$	243,694
1% increase (8.15%).		622,254	\$	311,542		452,014		192.029
Covered Payroll		439,035	\$	256,361		137,933		109,186
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

	_	Groton Housing Authority		Tyngsborough Water District		North Reading Housing Authority		West Groton Water
Net Pension Liability Beginning net pension liability/(asset)	\$	_	\$	597,899	\$	65,307	\$	76,91 1
Ending net pension liability/(asset)		_	\$	710.027	\$	39.272		86.060
	Ť		Ť			,		
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	-	\$	20,429	\$	1,130	\$	2,476
Net difference between projected and actual investment earnings on pension plan investments		-		36,401		2,013		4,412
Changes of assumptions		-		4,563		252		553
Changes in proportion and differences between								
employer contributions and proportionate								
share of contributions	-	573		131,986		29,034		66,845
Total Deferred Outflows of Resources	\$ _	573	\$	193,379	\$	32,429	\$	74,286
Deferred Inflows of Resources								
Changes in proportion and differences between								
employer contributions and proportionate share of contributions	œ		¢	9,918	¢	80,264	ė	25.770
Share of Contributions	Ψ =		Ψ.	3,310	φ.	00,204	φ.	25,770
Pension Expense Proportionate share of plan pension expense	\$	-	\$	80,918	\$	4,477	\$	9,807
Net amortization of deferred amounts from changes								
in proportion and differences between employer								
contributions and proportionate share of contributions	_	2,839		32,278		(17,174)		7,031
Total Employer Pension Expense	\$ =	2,839	\$	113,196	\$	(12,697)	\$	16,838
Contributions	Φ.		Φ.	E0 400	Φ.	0.074		0.245
Statutory required contribution	\$	-	\$	53,128	\$	8,671		2,315
Contribution in relation to statutory required contribution	-			(53,128)		(8,671)		(2,315)
Contribution deficiency/(excess)	\$ =		\$		\$	<u>-</u>	\$	
Contributions as a percentage of covered payroll		N/A		27.71%		27.17%		1.01%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2025	Ф	573	m	12.045	e	(25.300)	e	9.081
June 30, 2026.		5/3	Ф	42,945 52,788	Ф	(25,308) (26,225)	Þ	12,933
June 30, 2027		-		70,875		7,390		26,080
June 30, 2028	_			16,853		(3,692)		422
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	æ	573	æ	183.461	œ.	(47,835)	e	48,516
Total Crision Expense	Ψ =		Ψ	100,401	Ψ.	(-11,000)	Ψ.	40,010
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	-	\$	888,903	\$	49,166	\$	107,741
Current discount rate (7.15%)	\$	-	\$	710,027	\$	39,272	\$	86,060
1% increase (8.15%)	\$	-	\$	559,497	\$	30,946	\$	67,815
Covered Payroll	\$	-	\$	191,704	\$	31,913	\$	228,442
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2023

		Ayer-Shirley Regional School District		Northern Middlesex Regional Emergency Communications Center		Totals
Net Pension Liability Beginning net pension liability/(asset)	\$	4,746,593	\$	582,488	\$	1,697,060,700
Ending net pension liability/(asset)	\$	5,094,198	\$	79,063	\$	1,691,057,798
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	146,568	\$	2,275	\$	48,654,218
Net difference between projected and actual investment earnings on pension plan investments		261,161		4,053		86,694,535
Changes of assumptions		32,735		508		10,866,550
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,431.054		198,024		57,413,811
Total Deferred Outflows of Resources			\$		\$	203,629,114
Deferred Inflows of Resources	Ψ.	1,011,010	Ψ		Ψ	200,020,114
Changes in proportion and differences between employer contributions and proportionate share of contributions	\$.	655,213	\$	318,781	\$	57,413,811
Pension Expense Proportionate share of plan pension expense	\$	580,567	\$	9,011	\$	193,176,927
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		29,539		7,939		-
Total Employer Pension Expense	\$	610,106	\$	16,950	\$	193,176,927
Contributions						
Statutory required contribution	\$	497,092	\$	62,893	\$	163,724,213
Contribution in relation to statutory required contribution		(497,092)		(62,893)		(167,184,938)
Contribution deficiency/(excess)	\$.		\$		\$	(3,460,725)
Contributions as a percentage of covered payroll		11.45%		5.79%		29.47%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense						
June 30, 2025. June 30, 2026. June 30, 2027. June 30, 2028.	\$	196,057 268,539 689,405 62,304	\$	9,227 12,505 (56,578) (79,075)	\$	27,533,230 41,753,292 77,631,844 (703,063)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$.	1,216,305	\$	(113,921)	\$	146,215,303
Discount Rate Sensitivity 1% decrease (6.15%)	\$	6,377,572	\$	98,981	\$	2,117,083,698
Current discount rate (7.15%)	\$	5,094,198	\$	79,063	\$	1,691,057,798
1% increase (8.15%)	\$	4,014,195	\$	62,301	\$	1,332,542,696
Covered Payroll	\$	4,341,290	\$	1,086,962	\$	567,243,261
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(concluded)

Middlesex County Retirement System

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NOTE A - Schedule of Employer Allocations

Governmental Accounting Standards Board (GASB) Statement #68 requires employers participating in a costsharing pension plan to recognize pension liabilities as employees provide services to the government and earn their pension benefits. Employers participating in cost-sharing plans are required to recognize their proportionate share of the plan's collective pension amounts for all benefits provided through the plan including the net pension liability, deferred outflows of resources, deferred inflows of resources, pension expense, and contributions.

GASB Statement #68 requires the allocation of the collective pension amounts be consistent with the manner in which contributions to the plan are determined. As permissible under GASB Statement #68, The Schedule of Employer Allocations is used to demonstrate the allocation of Middlesex County Retirement System's collective pension amounts.

Massachusetts General Law (MGL) Chapter 32 Section 22 Paragraph 7c dictates that Massachusetts cost sharing defined benefit pension plans allocate the annual required pension fund appropriation to employer units based on their proportionate share of the aggregate of the annual rates of regular compensation of all members in service of the system. The Public Employee Retirement Administration Commission (PERAC) approves each system's proportionate share of the annual required contribution. PERAC can accept alternative allocation methodologies and as such the MCRS has elected to use an actuarial based allocation methodology. Accordingly, each member unit's proportionate share of the total pension liability has been calculated based on each member unit's actual current employees, retirees and inactive participants. Each member's share of the MCRS's net position at year end is calculated by starting with the balance carried forward from the prior year. Each member unit is then credited with the actual required contribution received during the year along with any excess contributions received. Each member unit's share is reduced by the actual payment made to their specific retirees. Net investment income is allocated based on each member's money-weighted rate of return. All other shared expenses are allocated based on the proportionate share of the total pension liability. The difference between the total pension liability and the net position is reported as the net pension liability.

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County and Middlesex Hospital be transferred to the Commonwealth. The legislation required that County and Hospital retirees and beneficiaries remain with the County Retirement System. The Commonwealth provided a mechanism, in the legislation, that fully funded the actuarially determined liability of those retirees. At December 31, 2018, the remaining liabilities for Middlesex County and the Middlesex Hospital retirees and beneficiaries were actuarially determined and are separately identified in the MCRS's funding schedule. No assets have been allocated to cover the remaining liability and therefore the liability has been allocated to the remaining member units.

The current employees, retirees, beneficiaries and inactive participants of the MCRS have been identified and their total pension liability has been actuarially determined. For transparency purposes, the MCRS has historically paid a contribution as an employer to itself. However, with the implementation of GASB 67 & 68 the net pension liability is allocated to each member unit.

NOTE B - Schedule of Pension Amounts by Employer

The Schedule of Pension Amounts by Employer presents the net pension liability, the various categories of deferred outflows of resources and deferred inflows of resources, contributions and pension expense for all participating employers including differences between expected and actual economic experience; differences between projected and actual investment earnings, net; and changes of assumptions.

Middlesex County Retirement System

52 Audit of Specific Elements, Accounts and Items of Financial Statements

The following assumption changes were reflected in the January 1, 2024 actuarial valuation.

Changes in Assumptions

None.

Changes in Plan Provisions

• Effective December 31, 2023, pursuant to chapter 269 of the Acts of 2022, the Board approved a onetime increase in the COLA from 3% to 5% effective July 1, 2022.

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MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2022

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2022

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Financial Section

Middlesex County Retirement System

Financial Section

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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Opinion

We have audited the accompanying financial statements of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2022, and the related notes to the financial statements, which collectively comprise the MCRS's 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 financial position of the MCRS as of December 31, 2022, and the changes in its financial 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 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 Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the MCRS 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's for the Financial Statements

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

Auditor's 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 auditor's 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 generally accepted 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 judgement made by a reasonable user based on the financial statements.

In performing an audit in accordance with generally accepted auditing standards, we:

- Exercise professional judgement 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 auditing 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 MCRS'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 judgement, there are conditions or events, considered in the aggregate, that
 raise substantial doubt about the MCRS'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 Management's Discussion and Analysis; the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information is the responsibility of management and, although not a part of the financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated July 20, 2023, on our consideration of the MCRS's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, 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 MCRS'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 MCRS's internal control over financial reporting and compliance.

Restriction on Use

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This report is intended solely for the information and use of MCRS, the Public Employee Retirement Administration Commission and all member units and is not intended to be and should not be used by anyone other than these specified parties.

July 20, 2023

Management's Discussion and Analysis

As management of the Middlesex County Retirement System (MCRS), we offer readers of these financial statements this narrative overview and analysis of the financial activities for the year ended December 31, 2022. The MCRS complies with financial reporting requirements issued by the Governmental Accounting Standards Board (GASB).

The GASB is the authoritative standard setting body that provides guidance on how to prepare financial statements in conformity with generally accepted accounting principles (GAAP). Users of these financial statements rely on the GASB to establish consistent reporting standards for all governments in the United States. This consistent application is the only way users can assess the financial condition of a public retirement system compared to others.

Financial Highlights

- The MCRS's assets exceeded its liabilities at the close of the most recent year by \$1.9 billion (net
 position).
- The MCRS's net position decreased by \$226.0 million for the year ended December 31, 2022.
- Total investment loss was \$230.6 million; investment expenses were \$9.7 million; and net investment loss was \$240.2 million.
- Total contributions were \$229.4 million, primarily consisting of \$156.4 million from employers, \$54.3 million from members, \$9.0 million in transfers from other systems and \$9.8 million in other contributions.
- Retirement benefits, refunds, and transfers of member deductions to other systems amounted to \$211.8 million.
- Depreciation, administrative and building expenses were \$3.4 million.
- The total pension liability was \$3.6 billion as of December 31, 2022, while the net pension liability was \$1.7 billion.
- The Plan fiduciary net position as a percentage of the total pension liability was 52.61%.

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the MCRS's fiduciary financial statements. These fiduciary financial statements comprise of four components: 1) management's discussion and analysis, 2) fiduciary financial statements, 3) notes to the financial statements and 4) required supplementary information.

Fiduciary Financial Statements

The *statement of fiduciary net position* presents information on all assets and deferred outflows less deferred inflows and liabilities with the difference reported as *net position*. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position is improving or deteriorating.

The statement of changes in fiduciary net position presents information showing how the MCRS's net position changed during the most recent year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, additions and deductions are reported in this statement for some items that will only result in cash flows in future periods.

Notes to the financial statements

The notes provide additional information that is essential to a full understanding of the data provided in the fiduciary financial statements.

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Middlesex County Retirement System

Management's Discussion and Analysis

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context.

Financial Analysis

As noted earlier, net position may serve over time as a useful indicator of the MCRS's financial position. The MCRS's assets exceeded liabilities by \$1.9 billion at the close of 2022.

The assets accumulated are held to provide pension benefits for qualified retirees along with active and inactive employees of the member units. At year-end, the MCRS's net position included investments of \$1.8 billion, cash of \$31.9 million and current accounts receivable of \$5.5 million. The system also had capital assets, net of accumulated depreciation, of \$4.0 million at year-end primarily consisting of land, an office building, and building improvements.

In 2022, the MCRS's contributions were \$229.4 million while deductions were \$215.2 million which resulted in a current surplus of \$14.2 million. In 2021, the MCRS's contributions were \$214.5 million while deductions were \$201.1 million which resulted in a prior year surplus of \$13.4 million. Therefore, for these two years the MCRS was able to sustain operations independent of investment income.

The primary change in net position over the prior year relates to each year's investment performance. The System experienced a net investment loss of \$240.2 million in 2022, compared to a gain of \$340.2 million in 2021. The annual money weighted rate of return was -11.54% and 19.86% in 2022, and 2021, respectively. The MCRS's investment policy is designed to achieve a long-term rate of return of 7.15% and fluctuation in annual investment returns is expected.

The following tables present summarized financial information for the past two years:

	2022	2021
Assets:		
Cash\$	31,868,459	\$ 18,455,232
Investments	1,842,477,278	2,082,386,263
Receivables	5,531,048	4,949,242
Capital assets, net of accumulated depreciation	4,044,658	4,108,907
Total assets	1,883,921,443	2,109,899,644
Liabilities:		
Accounts payable	127,569	102,089
Other liabilities	26,556	26,556
Total liabilities	154,125	128,645
Net Position Restricted for Pensions \$	1,883,767,318	\$ 2,109,770,999

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Middlesex County Retirement System

Management's Discussion and Analysis

	2022	2021
Additions:		
Contributions:		
Member contributions\$	54,257,364	\$ 51,747,946
Employer contributions	156,421,867	147,955,483
Other contributions	18,734,375	14,791,325
Total contributions	229,413,606	214,494,754
Net investment income (loss):		
Total investment income (loss)	(230,563,506)	349,671,539
Less, investment expenses	(9,685,400)	(9,428,015)
2000, invocations expended	(0,000,100)	(0, 120,010)
Net investment income (loss)	(240,248,906)	340,243,524
, ,		
Total additions	(10,835,300)	554,738,278
Deductions:		
Administration	3,024,829	2,878,819
Building operations and maintenance	196,641	204,804
Retirement benefits, refunds and transfers	211,772,537	197,701,698
Depreciation	174,374	320,288
Total deductions	215,168,381	201,105,609
Net increase (decrease) in fiduciary net position	(226,003,681)	353,632,669
Net increase (decrease) in illudiary het position	(220,003,001)	333,632,669
Fiduciary net position at beginning of year	2,109,770,999	1,756,138,330
Fiduciary net position at end of year \$	1,883,767,318	\$ <u>2,109,770,999</u>

Requests for Information

This financial report is designed to provide a general overview of the MCRS's finances for all those with an interest in the MCRS's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the MCRS's Chief Administrative Officer, 25 Linnell Circle, Billerica, Massachusetts 01865.

STATEMENT OF FIDUCIARY NET POSITION

DECEMBER 31, 2022

Assets	
Cash and cash equivalents\$	31,868,459
Investments:	
Investments in Pension Reserve Investment Trust	1,840,310,810
Pooled alternative investments	2,165,484
Pooled real estate funds	984
Total investments	1,842,477,278_
Receivables, net of allowance for uncollectibles:	
Member deductions	4,780,456
Member contributions	42,035
Member make-up payments and redeposits	316,706
Transfers from other systems	325,759
Other accounts receivable	17,547_
Total receivables	5,482,503
Interest and dividends	48,545
Capital assets, net of accumulated depreciation	4,044,658
Total Assets	1,883,921,443
Liabilities	
Accounts payable	127,569
Other liabilities	26,556
Total Liabilities	154,125
Net Position Restricted for Pensions\$	1,883,767,318

See notes to financial statements.

STATEMENT OF CHANGES IN FIDUCIARY NET POSITION

YEAR ENDED DECEMBER 31, 2022

Additions: Contributions:		
Employer pension appropriation	¢	156,366,867
Member contributions	Ψ	54,257,364
Transfers from other systems		8,992,726
3(8)(c) contributions from other systems		8,142,165
Workers' compensation settlements		55,000
Retirement benefits - state COLA reimbursements		612,144
Members' makeup payments and redeposits		906,649
Interest not refunded.		80,691
interest not returided	_	00,091
Total contributions	_	229,413,606
Net investment income (loss):		
Investment income (loss)		(230,563,506)
Less: investment expense	_	(9,685,400)
Net investment income (loss)		(240,248,906)
Total additions	_	(10,835,300)
Deductions:		
Administration		3,024,829
Building operations and maintenance		196,641
Retirement benefits and refunds		194,383,539
Transfers to other systems		8,981,784
3(8)(c) transfer to other systems		8,407,214
Depreciation	_	174,374
Total deductions	_	215,168,381
Net increase (decrease) in fiduciary net position		(226,003,681)
Fiduciary net position at beginning of year	_	2,109,770,999
Fiduciary net position at end of year		1,883,767,318

See notes to financial statements.

Middlesex County Retirement System

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NOTE 1 - PLAN DESCRIPTION

The Middlesex County Retirement System (MCRS) is a multiple-employer, cost-sharing, contributory defined benefit pension plan covering all employees of the governmental member units deemed eligible by the Middlesex County Retirement Board (the Board), with the exception of school department employees who serve in a teaching capacity. The pensions of such school employees are administered by the Commonwealth of Massachusetts' Teachers Retirement System. Membership in the System is mandatory immediately upon the commencement of employment for all permanent employees working a minimum of 20 hours per week and who are paid annual compensation of no less than \$5,000. As of January 1, 2022, the MCRS had 71 participating employers.

The MCRS is a Massachusetts Contributory Retirement System and is governed by Chapter 32 of the Massachusetts General Laws. Membership in the Plan is mandatory immediately upon the commencement of employment for all permanent, full-time employees.

Massachusetts contributory retirement system benefits are, with certain exceptions, uniform from system to system. The MCRS provides for retirement allowance benefits up to a maximum of 80% of a member's highest three-year average annual rate of regular compensation for those hired prior to April 2, 2012, and the highest five-year average for members hired after that date. Benefit payments are based upon a member's age, length of creditable service, level of compensation, and group classification.

Members become vested after ten years of creditable service. A superannuation retirement allowance may be received upon the completion of 20 years of service or upon reaching the age of 55 with 10 years of service for those hired prior to April 2, 2012. For those hired on or after April 2, 2012, a superannuation allowance may be received upon reaching the age of 60 with 10 years of service. Normal retirement for most employees occurs at age 65 for those hired prior to April 2, 2012, and at age 67 for those hired after April 2, 2012 (except for certain hazardous duty and public safety positions, whose normal retirement is at age 55).

A retirement allowance consists of two parts: an annuity and a pension. A member's accumulated total deductions and the interest they generate constitute the annuity. The differential between the total retirement benefit and the annuity is the pension.

Active members contribute between 5% and 11% of their gross regular compensation. The percentage rate is keyed to the date upon which an employee's membership commences. These deductions are deposited in the Annuity Savings Fund and earn interest at a rate determined by the Public Employee Retirement Administration Commission's (PERAC) actuary. When a member's retirement becomes effective, his/her deductions and related interest are transferred to the Annuity Reserve Fund. Any cost-of-living adjustments granted between 1981 and 1997 and any increase in other benefits imposed by the Commonwealth of Massachusetts' state law during those years are borne by the Commonwealth and are deposited into the Pension Fund. Cost-of-living adjustments granted after 1997 must be approved by the MCRS and all costs are borne by the MCRS.

The pension portion of any retirement benefit is paid from the Pension Fund. The governmental unit employing the member must annually appropriate and contribute the amount of current-year pension assessment.

Administrative expenses are paid from investment income.

Members who become permanently and totally disabled for further duty may be eligible to receive a disability retirement allowance. The amount of benefits to be received in such cases is dependent on several factors, including whether or not the disability is work related, the member's age, years of creditable service, level of compensation, veterans' status and group classification.

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Survivor benefits are extended to eligible beneficiaries of members whose death occurs prior to or following retirement

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements of the Middlesex County Retirement System have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The Governmental Accounting Standards Board (GASB) is the recognized standard-setting body for establishing governmental accounting and financial reporting principles.

MCRS is a special-purpose government engaged only in fiduciary activities. Accordingly, the financial statements are reported using the flow of economic resources measurement focus and use the accrual basis of accounting. Under this method, additions are recorded when earned and deductions are recorded when the liabilities are incurred.

Cash and Investments

Cash and cash equivalents are 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 carried at fair value. The fair values were determined by the closing price for those securities traded on national stock exchanges and at the average bid-and-asked quotation for those securities traded in the over-the-counter market. The fair value of private equities are based on management's valuation of estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values. Real estate assets are reported at fair value utilizing an income approach to valuation along with independent appraisals and estimates by management.

Fair Value Measurements

The MCRS reports required types of financial instruments in accordance with the fair value standards. These standards require an entity to maximize the use of observable inputs (such as quoted prices in active markets) and minimize the use of unobservable inputs (such as appraisals or valuation techniques) to determine fair value. Fair value standards also require the government to classify these financial instruments into a three-level hierarchy, based on the priority of inputs to the valuation technique or in accordance with net asset value practical expedient rules, which allow for either Level 2 or Level 3 depending on lock up and notice periods associated with the underlying funds.

Instruments measured and reported at fair value are classified and disclosed in one of the following categories:

Level 1 – Quoted prices are available in active markets for identical instruments as of the reporting date. Instruments, which are generally included in this category, include actively traded equity and debt securities, U.S. government obligations, and mutual funds with quoted market prices in active markets.

Level 2 – Pricing inputs are other than quoted in active markets, which are either directly or indirectly observable as of the reporting date, and fair value is determined through the use of models or other valuation methodologies. Certain fixed income securities, primarily corporate bonds, are classified as Level 2 because fair values are estimated using pricing models, matrix pricing, or discounted cash flows.

Level 3 – Pricing inputs are unobservable for the instrument and include situations where there is little, if any, market activity for the instrument. The inputs into the determination of fair value require significant management judgment or estimation.

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In some instances the inputs used to measure fair value may fall into different levels of the fair value hierarchy and is based on the lowest level of input that is significant to the fair value measurement.

Market price is affected by a number of factors, including the type of instrument and the characteristics specific to the instrument. Instruments with readily available active quoted prices generally will have a higher degree of market price observability and a lesser degree of judgment used in measuring fair value. It is reasonably possible that change in values of these instruments will occur in the near term and that such changes could materially affect amounts reported in these financial statements. For more information on the fair value of the MCRS's financial instruments, see Note 5 – Cash and Investments.

Accounts Receivable

Accounts receivable consist of member deductions, pension fund appropriations, and other miscellaneous reimbursements. These receivables are considered 100% collectible and therefore do not report an allowance for uncollectibles.

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of fiduciary net position will sometimes report a separate section for deferred outflows of resources. This separate financial statement element, *deferred outflows of resources*, represents a consumption of fiduciary net position that applies to a future period(s) and so will not be recognized as an outflow of resources (deduction) until then. The MCRS did not have any items that qualify for reporting in this category.

In addition to liabilities, the statement of fiduciary net position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, *deferred inflows of resources*, represents an acquisition of net position that applies to a future period(s) and so will not be recognized as an inflow of resources (addition) until that time. The MCRS did not have any items that qualify for reporting in this category.

NOTE 3 – PLAN ADMINISTRATION

The MCRS is administered by a five-person Board of Retirement consisting of a first member, who shall serve as Chairman/Treasurer, who shall be appointed by the other four members, a second member elected by the Advisory Council consisting of representatives from the member units, a third and fourth member who shall be elected by the members in or retired from the service of such system, and a fifth member who shall be chosen by the other four members.

Chairman	Thomas F. Gibson	Term Expires:	12/31/2026
Advisory Council Member	Brian P. Curtin	Term Expires:	12/31/2024
Elected Member	John Brown	Term Expires:	12/31/2023
Elected Member	Joseph W. Kearns	Term Expires:	12/31/2025
Appointed Member	Robert W. Healy, Jr.	Term Expires:	12/16/2025

Board members are required to meet at least once a month. The Board must keep a record of all of its proceedings. The Board must annually submit to the appropriate authority an estimate of the expenses of administration and cost of operation of the MCRS. The Board must annually file a financial statement of condition

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for the MCRS with the Executive Director of PERAC.

The investment of the MCRS's funds is the responsibility of the Board. All retirement allowances must be approved by the Retirement Board. The PERAC Actuary performs verification prior to payment, unless the MCRS has obtained a waiver for superannuation calculations allowing them to bypass this requirement. All expenses incurred by the MCRS must be approved by a majority vote of the Board. Payments shall be made only upon vouchers signed by three persons designated by the Board.

The following retirement board members and employees are bonded by an authorized agent representing a company licensed to do business in Massachusetts as follows:

Treasurer-Custodian: \$10,000,000 Fiduciary
Ex-Officio Member: RLI Insurance Company
Appointed Members: \$1,000,000 Fidelity

Staff Employees: National Union Fire Insurance

NOTE 4 - OFFICE BUILDING

The MCRS owns an office building that was purchased as an investment and for the administrative offices of the System. The building is a two story, 1986-built office building consisting of 62,307 square feet of net rentable area. The property is situated on a 4.23-acre site in Billerica, Middlesex County, Massachusetts.

NOTE 5 - CASH AND INVESTMENTS

Custodial Credit Risk - Deposits

At December 31, 2022, the carrying amount of the MCRS's deposits totaled \$30,386,584, and the bank balance totaled \$33,114,129, all of which was covered by Federal Depository Insurance.

Investments

The MCRS's investments were as follows:

	December 31, 2022
Investment Type	-
PRIT Pooled Funds\$	1,840,310,810
Money Market Mutual Funds	1,481,875
Pooled Alternative Investments	2,165,484
Pooled Real Estate Funds	984
Total Investments\$	1,843,959,153

Approximately 99.8% of the Retirement MCRS's investments are in Pension Reserve Investment Trust (PRIT). This investment pool was established by the Treasurer of the Commonwealth of Massachusetts, who serves as Trustee. PRIT is administered by the Pension Reserves Investment Management Board. The fair values of the positions in each investment Pool are the same as the value of each Pool's shares. The Administration does not have the ability to control any of the investment decisions relative to its funds in PRIT. The effective weighted

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duration rate for PRIT investments ranged from 1.98 to 14.64 years.

Approximately 0.01% of the MCRS's funds are invested in pooled alternative investments and pooled real estate funds. The market values of assets in those funds are based on the quoted values obtained from each pool.

Approximately 0.01% of the MCRS's funds are invested in money market mutual funds. The market values of assets in those funds are valued using prices quoted in active markets for those securities.

The Administration's annual money-weighted rate of return on pension plan investments was -11.54%. The money-weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested, measured monthly.

Fair Value of Investments

The retiree pension defined benefit plan holds significant amounts of investments that are measured at fair value on a recurring basis. Because investing is a key part of the plan's activities, the plan shows greater disaggregation in its disclosures. The plan chooses a tabular format for disclosing the levels within the fair value hierarchy.

The MCRS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles.

The MCRS had the following recurring fair value measurements as of December 31, 2022:

		Fair Value Measurements Using		Using		
Investment Type	12/31/2022	 Quoted Prices in Active Markets for Identical Assets (Level 1)		Significant Other Observable Inputs (Level 2)	_	Significant Unobservable Inputs (Level 3)
Investments by fair value level:						
Money Market Mutual Funds\$ Pooled Alternative Investments Pooled Real Estate Funds	1,481,875 2,165,484 984	\$ 1,481,875 - -	\$	- - -	\$	- 2,165,484 984
Total Investments by fair value level	3,648,343	\$ 1,481,875	\$	-	\$	2,166,468
Investments measured at the net asset value (NAV):						
PRIT Investments	1,840,310,810					
Total Investments\$	1,843,959,153					

Money market mutual funds in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Pooled alternative investments and pooled real estate funds classified in level 3 are valued using either a discounted cash flow or market comparable company's technique.

PRIT Investments are valued using the net asset value (NAV) method.

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NOTE 6 - CAPITAL ASSETS

All purchases and building costs in excess of \$25,000 are capitalized at the date of acquisition. Capital assets are depreciated on a straight-line basis. The estimated useful lives of capital assets are as follows:

	Estimated Useful Life
Capital Asset Type	(in years)
Building	40
Building improvements	40
Vehicles	5
Software and equipment	5

Capital asset activity for the year ended December 31, 2022, was as follows:

	Beginning Balance	Increases	Decreases	Ending Balance
Capital assets not being depreciated:				
Land\$	672,657 \$	-	\$ - \$	672,657
Construction in progress	<u> </u>	9,375		9,375
Total capital assets not being depreciated.	672,657	9,375	<u>-</u>	682,032
Capital assets being depreciated:				
Buildings	5,417,136	_	-	5,417,136
Building improvements	1,099,492	100,750	_	1,200,242
Vehicles	30,913	_	(30,913)	-
Software and equipment	757,189		(729,570)	27,619
Total capital assets being depreciated	7,304,730	100,750	(760,483)	6,644,997
Less accumulated depreciation for:				
Buildings	(2,577,494)	(135,428)	-	(2,712,922)
Building improvements	(521,297)	(29,740)	_	(551,037)
Vehicles	(30,912)	-	30,912	-
Software and equipment	(738,777)	(9,206)	729,571	(18,412)
Total accumulated depreciation	(3,868,480)	(174,374)	760,483	(3,282,371)
Total capital assets being depreciated, net	3,436,250	(73,624)		3,362,626
Total capital assets, net\$	4,108,907 \$	(64,249)	\$\$	4,044,658

NOTE 7 - MEMBERSHIP

The following table represents the MCRS's membership at January 1, 2022:

Active members	9,432
Inactive members entitled to a return of their employee contributions	3,581
Inactive members with a vested right to a deferred or immediate benefit	403
Retirees and beneficiaries currently receiving benefits	6,284
·	
Total	19,700

NOTE 8 – ACTUARIAL VALUATION

Components of the net pension liability as of December 31, 2022, were as follows:

Total pension liability\$	3,580,828,018
The MCRS's fiduciary net position	1,883,767,318
The net pension liability\$	1,697,060,700
The MCRS's fiduciary net position as a percentage of the total pension liability	52.61%

The total pension liability was determined by an actuarial valuation as of January 1, 2022, using the following actuarial assumptions, applied to all periods included in the measurement that was updated to December 31, 2022:

Valuation date	January 1, 2022.
Actuarial cost method	Entry Age Normal Cost Method.
Amortization method	Prior year's total contribution increased by 6.50% for fiscal 2023, through fiscal 2028, and thereafter the remaining unfunded liability will be amortized on a 4.00% annual increasing basis; ERI liability amortized in level payments.
Remaining amortization period	17 years from July 1, 2020, for non-ERI liability, and 2 years from July 1, 2020 for 2010 ERI.
Asset valuation method	The difference between the expected return and the actual investment return on a fair value basis is recognized over a five year period. Asset value is adjusted as necessary to be within 20% of the fair value.
Investment rate of return/Discount rate	7.15%.
Inflation rate	3.25%.

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Projected salary increases	Varies by length of service with ultimate rates of 4.00% for Group 1, 4.25% for Group 2 and 4.50% for Group 4
Cost of living adjustments	3.00% of the first \$16,000 of retirement income.
Mortality Rates: Pre-Retirement	The RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2021.
Healthy Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2021.
Disabled Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021.

Investment policy: The MCRS's policy in regard to the allocation of invested assets is established by PRIT. Plan assets are managed on a total return basis with a long-term objective of achieving a fully funded status for the benefits provided through the pension plan.

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 MCRS's target asset allocation as of December 31, 2022, are summarized in the following table:

Asset Class	Long-Term Expected Asset Allocation	Long-Term Expected Real Rate of Return
Domestic equity	20.50%	6.59%
International developed markets equity	12.00%	6.87%
International emerging markets equity	4.50%	8.30%
Core fixed income	15.00%	1.53%
High-yield fixed income	8.00%	3.54%
Real estate	10.00%	3.44%
Timber	4.00%	4.01%
Hedge funds, GTAA, risk parity	10.00%	3.06%
Private equity	16.00%	9.49%
	100.00%	

Discount rate: The discount rate used to measure the total pension liability was 7.15% at December 31, 2022, and December 31, 2021. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rate. Based on those assumptions, the MCRS'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.

Middlesex County Retirement System

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Sensitivity of the net pension liability to changes in the discount rate: The following presents the net pension liability, calculated using the discount rate of 7.15%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.15%) or 1-percentage-point higher (8.15%) than the current rate:

		Current	
	1% Decrease	Discount	1% Increase
-	(6.15%)	(7.15%)	(8.15%)
Middlesex County Retirement System's net			
pension liability as of December 31, 2022\$	2,100,727,873 \$	1,697,060,700 \$	1,357,206,313

Contributions: Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The pension fund appropriations are allocated amongst employers based on the actuarial valuation.

NOTE 9 - IMPLEMENTATION OF GASB PRONOUNCEMENTS

There were no GASB pronouncements required to be implemented in 2022 that impacted the MCRS's financial statements.

None of the issued GASB statements that are required to be implemented in future years are anticipated to impact the MCRS's financial statements.

NOTE 10 - SUBSEQUENT EVENTS

Management has evaluated subsequent events through July 20, 2023, which is the date the financial statements were available to be issued.

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Middlesex County Retirement System

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Required Supplementary Information

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

Total pension liability: Service cost	\$ December 31, 2014 52,132,389 172,094,226	\$ December 31, 2015 54,217,685 179,703,272	\$ December 31, 2016 56,386,392 187,359,946	\$ December 31, 2017 60,585,598 200,298,121
Changes in benefit terms. Differences between expected and actual experience Changes in assumptions. Benefit payments.	- - - (125,082,678)	- - - (134,295,504)	7,976,453 96,500,754 (143,428,636)	(9,059,393) 97,195,824 (150,780,931)
Net change in total pension liability	99,143,937	99,625,453	204,794,909	198,239,219
Total pension liability - beginning	2,195,732,452	2,294,876,389	2,394,501,842	2,599,296,751
Total pension liability - ending (a)	\$ 2,294,876,389	\$ 2,394,501,842	\$ 2,599,296,751	\$ 2,797,535,970
Plan fiduciary net position: Employer pension appropriation. Member contributions. Other contributions. Net investment income (loss). Administrative expenses. Building operations and maintenance. Retirement benefits and refunds. Other retirement deductions. Depreciation.	\$ 93,368,685 39,048,869 6,405,881 74,904,315 (2,996,390) (381,899) (125,082,678) (5,556,930) (162,594)	\$ 99,792,641 40,340,741 8,668,378 7,732,128 (2,824,803) (302,771) (134,295,504) (8,025,993) (162,594)	\$ 107,032,211 42,015,296 12,337,414 74,917,546 (3,062,521) (235,667) (143,428,636) (11,475,752) (162,594)	\$ 115,377,205 44,177,815 10,405,773 189,343,574 (2,619,464) (306,177) (150,780,931) (9,358,262) (308,508)
Net increase (decrease) in fiduciary net position	79,547,259	10,922,223	77,937,297	195,931,025
Fiduciary net position - beginning of year	1,014,013,415	1,093,560,674	1,104,482,897	1,182,420,194
Fiduciary net position - end of year (b)	\$ 1,093,560,674	\$ 1,104,482,897	\$ 1,182,420,194	\$ 1,378,351,219
Net pension liability - ending (a)-(b)	\$ 1,201,315,715	\$ 1,290,018,945	\$ 1,416,876,557	\$ 1,419,184,751
Plan fiduciary net position as a percentage of the total pension liability	47.65%	46.13%	45.49%	49.27%
Covered payroll.	\$ 415,752,810	\$ 432,382,921	\$ 439,644,322	\$ 451,777,105
Net pension liability as a percentage of covered payroll.	288.95%	298.35%	322.28%	314.13%

Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

Middlesex County Retirement System

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Required Supplementary Information

December 31, 2018	December 31, 2019	December 31, 2020	December 31, 2021	December 31, 2022
\$ 64,615,910	\$ 66,816,001	\$ 73,591,385	\$ 76,097,081	\$ 78,883,633
208,614,148	216,905,943	229,825,239	238,805,957	245,416,378
-	29,156,339	-	-	-
-	46,671,873	-	5,225,766	-
-	65,013,900	-	27,166,375	-
(161,259,804)	(168,486,003)	(181,769,445)	(184,028,124)	(193,970,504)
111,970,254	256,078,053	121,647,179	163,267,055	130,329,507
2,797,535,970	2,909,506,224	3,165,584,277	3,287,231,456	3,450,498,511
\$ 2,909,506,224	\$ 3,165,584,277	\$ 3,287,231,456	\$ 3,450,498,511	\$ 3,580,828,018
\$ 120,614,676	\$ 129,685,755	\$ 138,290,237	\$ 147,849,683	\$ 156,366,867
45,984,957	48,445,698	50,973,950	51,747,946	54,257,364
9,581,643	10,842,796	7,222,913	14,897,125	18,789,375
(31,074,711)	208,322,511	185,429,727	340,243,524	(240,248,906)
(2,645,568)	(2,754,384)	(2,781,367)	(2,878,819)	(3,024,829)
(309,357)	(279,208)	(208,858)	(204,804)	(196,641)
(161,259,804)	(168,486,003)	(181,769,445)	(184,028,124)	(193,970,504)
(8,884,478)	(9,969,856)	(6,225,703)	(13,673,574)	(17,802,033)
(318,812)	(318,812)	(321,386)	(320,288)	(174,374)
(28,311,454)	215,488,497	190,610,068	353,632,669	(226,003,681)
1,378,351,219	1,350,039,765	1,565,528,262	1,756,138,330	2,109,770,999
\$ 1,350,039,765	\$ 1,565,528,262	\$ 1,756,138,330	\$ 2,109,770,999	\$ 1,883,767,318
\$ 1,559,466,459	\$ 1,600,056,015	\$ 1,531,093,126	\$ 1,340,727,512	\$ 1,697,060,700
46.40%	49.45%	53.42%	61.14%	52.61%
\$ 471,115,185	\$ 492,109,775	\$ 513,201,283	\$ 519,239,589	\$ 541,233,353
331.02%	325.14%	298.34%	258.21%	313.55%

SCHEDULE OF CONTRIBUTIONS

Year	Actuarially determined contribution	Contributions in relation to the actuarially determined contribution	Contribution deficiency (excess)	Covered payroll	Contributions as a percentage of covered payroll
December 31, 2022 \$	153,677,331 \$	(156,335,119) \$	(2,657,788) \$	541,233,353	28.88%
December 31, 2021	144,255,207	(147,852,245)	(3,597,038)	519,239,589	28.47%
December 31, 2020	135,472,822	(138,290,237)	(2,817,415)	513,201,283	26.95%
December 31, 2019	127,151,838	(129,685,754)	(2,533,916)	492,109,775	26.35%
December 31, 2018	119,298,291	(120,614,676)	(1,316,385)	471,115,185	25.60%
December 31, 2017	112,017,087	(115,426,815)	(3,409,728)	451,777,105	25.55%
December 31, 2016	105,246,797	(107,067,707)	(1,820,910)	439,644,322	24.35%
December 31, 2015	98,792,642	(99,820,481)	(1,027,839)	432,382,921	23.09%
December 31, 2014	92,826,743	(93,400,946)	(574,203)	415,752,810	22.47%

Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

SCHEDULE OF INVESTMENT RETURNS

Annual money-weighted rate of return.

	rate of return,
Year	net of investment expense
December 31, 2022	-11.54%
December 31, 2021	19.86%
December 31, 2020	12.26%
December 31, 2019	16.21%
December 31, 2018	-2.52%
December 31, 2017	17.25%
December 31, 2016	7.35%
December 31, 2015	0.61%
December 31, 2014	7.54%

Note: this schedule is intended to present information for 10 years. Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

NOTE A - CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

The Schedule of Changes in the Net Pension Liability and Related Ratios includes the detailed changes in the system's total pension liability, changes in the system's net position, and the ending net pension liability. It also demonstrates the plan's net position as a percentage of the total pension liability and the net pension liability as a percentage of covered payroll.

NOTE B - CONTRIBUTIONS

Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The total appropriations are payable on July 1 and January 1. Employers may choose to pay the entire appropriation in July at a discounted rate. Accordingly, actual employer contributions may be less than the "total appropriation". The pension fund appropriations are allocated amongst employers based on the actuarial valuation results. In addition, an employer may contribute more than the amount required.

NOTE C - MONEY WEIGHTED RATE OF RETURN

The money weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense. A money weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested. Inputs to the money weighted rate of return calculation are determined monthly.

NOTE D - CHANGES IN ASSUMPTIONS AND PLAN PROVISIONS

The following changes were reflected in the January 1, 2022 actuarial valuation.

Changes in Assumptions

- The net investment return assumption was lowered from 7.30% to 7.15%.
- The mortality projection scale was updated from MP-2017 to MP-2021.

Changes in Plan Provisions

None.

Audit of Specific Elements, Accounts and Items of Financial Statements

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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Report on the Audit of the Schedule of Employer Allocations and Schedule of Pension Amounts by Employer

Opinion

We have audited the accompanying schedule of employer allocations of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2022, and the related notes. We have also audited the total for all entities of the rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total contributions and total pension expense included in the accompanying schedule pension amounts by employer of the MCRS Pension Plan as of and for the year ended December 31, 2022, and the related notes.

In our opinion, the accompanying schedule of employer allocations and schedule of pension amounts by employer present fairly, in all material respects, the employer allocations and net pension liability, total deferred outflows of resources, total deferred inflows of resources, total contributions and total pension expense for the total of all participating entities for the MCRS as of and for the year ended December 31, 2022, 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). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Schedules section of our report. We are required to be independent of the MCRS 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 opinions.

Responsibilities of Management for the Schedules

Management is responsible for the preparation and fair presentation of the schedules 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 the schedules that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibilities for the Audit of the Schedules

Our objectives are to obtain reasonable assurance about whether the schedule of employer allocations and the specified row totals included in the schedule of pension amounts by employer as a whole are free from material

misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. 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 will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than 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 judgement made by a reasonable user based on the schedules.

In performing an audit in accordance with GAAS, we:

- Exercise professional judgement and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the schedules, 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 schedules.
- 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 purposes of expressing an opinion on the
 effectiveness of the MCRS'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
 schedules.

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.

Other Matter

We have audited, in accordance with GAAS, the financial statements of the MCRS as of and for the year ended December 31, 2022, and our report thereon, dated July 20, 2023, expressed an unmodified opinion on those financial statements.

Restriction on Use

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This report is intended solely for the information and use of the MCRS management, the MCRS employers and their auditors and is not intended to be and should not be used by anyone other than these specified parties.

July 20, 2023

SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2022

Employer	Share of Net Pension Liability/(Asset)	Percent of Total Net Pension Liability
Middlesex County Retirement Board	\$ -	0.000000%
Middlesex County	-	0.000000%
Middlesex Hospital	-	0.000000%
Town of Acton	56,442,883	3.325920%
Town of Ashby	2,195,503	0.129371%
Town of Ashland	39,177,494	2.308550%
Town of Ayer	21,132,333	1.245231%
Town of Bedford	58,143,653	3.426139%
Town of Billerica	163,486,989	9.633538%
Town of Boxborough	12,627,142	0.744060%
Town of Burlington	143,508,193	8.456279%
Town of Carlisle	13,493,696	0.795122%
Town of Chelmsford	117,848,343	6.944262%
Town of Dracut	75,091,196	4.424780%
Town of Dunstable	3,248,740	0.191433%
Town of Groton	25,150,097	1.481980%
Town of Holliston	27,235,114	1.604840%
Town of Hopkinton	29,030,303	1.710623%
Town of Hudson	75,932,435	4.474350%
Town of Lincoln	32,224,079	1.898817%
Town of Littleton	30,512,028	1.797934%
Town of North Reading	55,154,781	3.250018%
Town of Pepperell	19,372,966	1.141560%
Town of Sherborn	11,793,029	0.694909%
Town of Shirley	10,265,353	0.604890%
Town of Stow	14,182,336	0.835700%
Town of Sudbury	66,845,536	3.938901%
Town of Tewksbury	115,583,007	6.810776%
Town of Townsend	7,565,089	0.445776%
Town of Tyngsborough	27,541,050	1.622868%
Town of Wayland	60,047,515	3.538325%
Town of Westford	65,161,824	3.839687%
Town of Weston	73,861,876 93,568,182	4.352341% 5.513544%
Town of Wilmington Acton-Boxborough Regional School District	32,804,832	1.933038%
Acton Water Supply	4,310,937	0.254024%
Bedford Housing Authority.	357,375	0.021058%
Billerica Housing Authority	1,270,401	0.074859%
Chelmsford Housing Authority	2,873,470	0.169320%
Chelmsford Water District	819,895	0.048313%
Dracut Housing Authority	1,967,855	0.115957%
Dracut Water Supply	3,773,011	0.222326%

(Continued)

Middlesex County Retirement System

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Employer Allocations

SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2022

	Share of Net Pension	Percent of Total Net
Employer	Liability/(Asset)	Pension Liability
East Chelmsford Water District	358,607	0.021131%
East Middlesex Mosquito Control	843,725	0.049717%
Greater Lowell Regional Vocational Technical School District	20,251,238	1.193313%
Groton-Dunstable Regional School District	14,947,853	0.880808%
Hudson Housing Authority	807,927	0.047607%
Lincoln-Sudbury Regional School District	10,259,862	0.604567%
Nashoba Valley Technical High School District	3,773,754	0.222370%
North Chelmsford Water District	1,229,309	0.072438%
North Middlesex Regional School District	14,660,062	0.863850%
Shawsheen Valley Regional Vocational School	9,786,464	0.576671%
South Middlesex Regional Vocational Technical School	7,705,068	0.454024%
Sudbury Water District	2,303,019	0.135706%
Tewksbury Housing Authority	1,805,120	0.106367%
Wayland Housing Authority	671,550	0.039571%
Hopkinton Housing Authority	591,913	0.034879%
Sudbury Housing Authority	534,374	0.031488%
Wilmington Housing Authority	233,342	0.013750%
Acton Housing Authority	1,015,501	0.059839%
Burlington Housing Authority	198,080	0.011672%
Ayer Housing Authority	753,718	0.044413%
Holliston Housing Authority	159,405	0.009393%
Littleton Housing Authority	660,639	0.038928%
Westford Housing Authority	456,630	0.026907%
Shirley Water District	558,390	0.032903%
Tyngsborough Housing Authority	577,242	0.034014%
Pepperell Housing Authority	248,169	0.014623%
Groton Housing Authority	,	0.000000%
Tyngsborough Water District	597,899	0.035231%
North Reading Housing Authority	65,307	0.003848%
West Groton Water	76,911	0.004532%
Ayer-Shirley Regional School District	4,746,593	0.279695%
Northern Middlesex Regional Emergency Communications Center	582,488	0.034323%
Total\$	1,697,060,700	100.000%

(Concluded)

See notes to schedule of employer allocations and schedule of pension amounts by employer.

FOR THE YEAR ENDED DECEMBER 31, 2022

		Middlesex County Retirement Board	Middlesex County	Middlesex Hospital	-	Town of Acton
Net Pension Liability Beginning net pension liability/(asset)	\$	-	\$ -	\$ -	\$	44,317,853
Ending net pension liability/(asset)	\$	-	\$ -	\$ -	\$	56,442,883
<u>Deferred Cutflows of Resources</u> Differences between expected and actual experience	\$	-	\$ -	\$ -	\$	414,738
Net difference between projected and actual investment earnings on pension plan investments		-	-	-		4,537,806
Changes of assumptions		-	-	-		974,581
Changes in proportion and differences between employer contributions and proportionate share of contributions		<u>-</u>			_	207,080_
Total Deferred Outflows of Resources	\$	_	\$ 	\$ 	\$ _	6,134,205
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$.		\$ 	\$ 	\$_	1,314,946
Pension Expense Proportionate share of plan pension expense	\$	459,165	\$ -	\$ -	\$	5,874,434
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions						(403,636)
Total Employer Pension Expense	\$	459,165	\$ 	\$ 	\$ _	5,470,798
Contributions Statutory required contribution	\$	459,165	\$ -	\$ -	\$	5,133,300
Contribution in relation to statutory required contribution		(459,165)			-	(5,137,366)
Contribution deficiency/(excess)	\$		\$ 	\$ <u> </u>	\$ _	(4,066)
Contributions as a percentage of covered payroll		32.93%	N/A	N/A		33.00%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2024. June 30, 2025. June 30, 2026. June 30, 2027. Total Deferred Outflows/(Inflows) Recognized in		- - - -	\$ -	\$	\$	552,537 557,660 1,051,940 2,657,122
Future Pension Expense.	\$		\$ 	\$ 	\$ _	4,819,259
<u>Discount Rate Sensitivity</u> 1% decrease (6.15%)	\$	-	\$ -	\$ -	\$	69,868,529
Current discount rate (7.15%)	\$	-	\$ -	\$ -	\$	56,442,883
1% increase (8.15%)	\$	-	\$ -	\$ -	\$	45,139,600
Covered Payroll	\$	1,394,225	\$ -	\$ -	\$	15,565,493
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Ashby	Town of Ashland	Town of Ayer	Town of Bedford
Net Pension Liability					
Beginning net pension liability/(asset)	\$	1,370,949	\$ 29,025,102	\$ 16,034,552	\$ 44,033,584
Ending net pension liability/(asset)	\$	2,195,503	\$ 39,177,494	\$ 21,132,333	\$ 58,143,653
Deferred Outflows of Resources					
Differences between expected and actual experience	\$	16,132	\$ 287,872	\$ 155,278	\$ 427,234
Net difference between projected and actual investment earnings on pension plan investments		176,511	3,149,734	1,698,966	4,674,547
Changes of assumptions.		37,909	676,465	364,885	1,003,948
Changes in proportion and differences between employer contributions and proportionate share of contributions		371,518	2,019,412	926,380	1,658,100
Total Deferred Outflows of Resources	\$.	602,070	\$ 6,133,483	\$ 3,145,509	\$ 7,763,829
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	-			\$ 292,260	\$ 1,140,018
Pension Expense Proportionate share of plan pension expense	\$	228,502	\$ 4,077,493	\$ 2,199,400	\$ 6,051,441
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		70,148	226,168	155,921	(159,982)
Total Employer Pension Expense.	\$.	298,650	\$ 4,303,661	\$ 2,355,321	\$ 5,891,459
0.13.6					
Contributions Statutory required contribution	\$	253,936	\$ 3,793,010	\$ 2,058,373	\$ 5,288,347
Contribution in relation to statutory required contribution		(253,936)	(3,838,105)	(2,358,373)	(5,288,347)
Contribution deficiency/(excess)	\$.		\$ (45,095)	\$ (300,000)	\$
Contributions as a percentage of covered payroll		24.40%	23.82%	30.91%	25.93%
Deferred Outflows/(Inflows) Recognized in					
Future Pension Expense June 30, 2024	\$	73.090	\$ 754,846	\$ 450,870	\$ 745.810
June 30, 2025		106,446	627,183	509,871	1,107,515
June 30, 2026		122,489	990,852	685,956	1,672,098
June 30, 2027		193,045	2,286,799	1,206,552	3,098,388
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$.	495,070	\$ 4,659,680	\$ 2,853,249	\$ 6,623,811
Discount Rate Sensitivity					
1% decrease (6.15%)	\$	2,717,731	\$ 48,496,352	\$ 26,158,923	\$ 71,973,850
Current discount rate (7.15%)	\$	2,195,503	\$ 39,177,494	\$ 21,132,333	\$ 58,143,653
1% increase (8.15%)	\$	1,755,830	\$ 31,331,786	\$ 16,900,359	\$ 46,499,770
Covered Payroll	\$	1,040,863	\$ 16,112,007	\$ 7,630,394	\$ 20,395,777
See notes to schedule of employer allocations and schedule of pension amounts by employer.					(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Billerica	Town of Boxborough	Town of Burlington	_	Town of Carlisle
Net Pension Liability Beginning net pension liability/(asset)	\$	136,488,741	\$ 10,220,882	\$ 118,806,981	\$	8,806,565
Ending net pension liability/(asset)	\$	163,486,989	\$ 12,627,142	\$ 143,508,193	\$	13,493,696
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	1,201,286	\$ 92,783	\$ 1,054,484	\$	99,150
Net difference between projected and actual investment earnings on pension plan investments		13,143,783	1,015,178	11,537,558		1,084,846
Changes of assumptions		2,822,878	218,029	2,477,910		232,991
Changes in proportion and differences between employer contributions and proportionate share of contributions		1,947,082	185,836	1,690,322	-	1,677,908
Total Deferred Outflows of Resources	\$	19,115,029	\$ 1,511,826	\$ 16,760,274	\$	3,094,895
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions	\$.	6,976,688	\$ 456,577	\$ 5,365,368	\$ _	139,850
Pension Expense Proportionate share of plan pension expense	\$	17,015,293	\$ 1,314,203	\$ 14,935,963	\$	1,404,390
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(1,445,252)	34,085	(438,191)		484,217
Total Employer Pension Expense	\$.	15,570,041	\$ 1,348,288	\$ 14,497,772	\$ _	1,888,607
Contributions Statutory required contribution			1,218,757	\$ 12,543,435	\$	1,265,339
Contribution in relation to statutory required contribution		(14,484,999)	(1,218,757)	(12,543,435)	-	(1,265,339)
Contribution deficiency/(excess)	\$.	<u>-</u>	\$ 	\$ <u>-</u>	\$.	-
Contributions as a percentage of covered payroll		36.29%	33.08%	32.30%		19.74%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2024. June 30, 2025. June 30, 2026. June 30, 2027.	\$	1,958,008 1,584,707 2,793,370 5,802,256	\$ 251,180 86,155 178,035 539,879	\$ 2,363,597 1,309,424 2,439,008 5,282,877	\$	567,842 601,700 743,169 1,042,334
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$.		\$	\$	\$	2,955,045
Discount Rate Sensitivity 1% decrease (6.15%).	\$	202,374,420	\$ 15,630,666	\$ 177,643,417	\$	16,703,341
Current discount rate (7.15%)	\$	163,486,989	\$ 12,627,142	\$ 143,508,193	\$	13,493,696
1% increase (8.15%)	\$	130,746,987	\$ 10,098,423	\$ 114,769,157	\$	10,791,440
Covered Payroll	\$	39,914,881	\$ 3,684,081	\$ 38,832,472	\$	6,411,108
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Chelmsford		Town of Dracut	-	Town of Dunstable		Town of Groton
Net Pension Liability								
Beginning net pension liability/(asset)	\$	100,318,386	\$	62,185,294	\$	2,299,674	\$	19,238,916
Ending net pension liability/(asset)	\$	117,848,343	\$	75,091,196	\$	3,248,740	\$	25,150,097
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	865,938	\$	551,763	\$	23,871	\$	184,800
Net difference between projected and actual investment earnings on pension plan investments		9,474,595		6,037,070		261,187		2,021,980
Changes of assumptions.		2,034,850		1,296,576		56,095		434,259
Changes in proportion and differences between employer contributions and proportionate share of contributions		2,148,173		2,635,063	_	379,965		1,031,430
Total Deferred Outflows of Resources	\$.	14,523,556	\$	10,520,472	\$_	721,118	\$	3,672,469
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	•	& 104 952	¢	2,823,620	•	286,971		1,415,151
share of contributions	Φ.	6, 194,652	Þ	2,023,020	Ъ-	200,971	ъ.	1,415,151
Pension Expense Proportionate share of plan pension expense	\$	12,265,352	\$	7,815,297	\$	338,122	\$	2,617,557
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(1,247,255)		231,400	_	64,039		7,889
Total Employer Pension Expense	\$	11,018,097	\$	8,046,697	\$ _	402,161	\$	2,625,446
Contributions Statutory required contribution	\$	10,538,132	\$	6,554,393	\$	389,434	\$	2,538,910
Contribution in relation to statutory required contribution		(11,142,487)		(6,564,528)		(389,434)		(2,538,910)
Contribution deficiency/(excess)				(10,135)	\$	-		_
Contributions as a percentage of covered payroll		35.63%		36.40%	•	26.06%		29.53%
		50.5570		05.4070		20.0070		20.0070
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2024		1,331,980	\$	1,643,026	\$	97,584	\$	421,870
June 30, 2025		1,128,363		1,369,809		45,270		143,763
June 30, 2026		1,977,293 3,891,068		1,923,774 2,760,243		63,477 227,816		344,128 1,347,557
Total Deferred Outflows/(Inflows) Recognized in		0,001,000		2,130,240	-	EE7,010		1,0-11,007
Future Pension Expense	\$.	8,328,704	\$	7,696,852	\$ _	434,147	\$	2,257,318
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	145,880,050	\$	92,952,579	\$	4,021,494	\$	31,132,363
Current discount rate (7.15%)	\$	117,848,343	\$	75,091,196	\$	3,248,740	\$	25,150,097
1% increase (8.15%)	\$	94,247,964	\$	60,053,388	\$	2,598,145	\$	20,113,524
Covered Payroll	\$	31,275,996	\$	18,032,108	\$	1,494,204	\$	8,598,720
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Holliston		Town of Hopkinton	-	Town of Hudson	-	Town of Lincoln
Net Pension Liability								
Beginning net pension liability/(asset)	\$	18,170,200	\$	16,725,088	\$	59,893,267	\$	24,515,962
Ending net pension liability/(asset)	\$	27,235,114	\$	29,030,303	\$	75,932,435	\$	32,224,079
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	200,121	\$	213,312	\$	557,944	\$	236,779
Net difference between projected and actual investment earnings on pension plan investments		2,189,608		2,333,935		6,104,703		2,590,703
Changes of assumptions		470,260		501,257		1,311,101		556,403
Changes in proportion and differences between employer contributions and proportionate share of contributions		3,193,932		5,987,713	_	1,236,905		1,526,663
Total Deferred Outflows of Resources	\$	6,053,921	\$	9,036,217	\$	9,210,653	\$	4,910,548
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$	2,569,699	\$	2,566,478	\$	394,803	\$	128,696
	•				•		•	
Pension Expense Proportionate share of plan pension expense	\$	2,834,562	\$	3,021,398	\$	7,902,854	\$	3,353,800
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		5,102		1,132,408		110,029		407,326
Total Employer Pension Expense	\$.	2,839,664	\$	4,153,806	\$.	8,012,883	\$.	3,761,126
Contributions	_		_		_		_	
Statutory required contribution	\$	2,754,852	\$	3,087,462	\$	6,794,331	\$	2,754,456
Contribution in relation to statutory required contribution	-	(2,754,852)		(3,142,328)	-	(6,794,331)		(2,754,456)
Contribution deficiency/(excess)	\$.		\$	(54,866)	\$	-	\$.	
Contributions as a percentage of covered payroll		22.66%		16.26%		28.48%		23.20%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2024	\$	250,366	\$	1,147,496	\$	1,367,997	\$	886,128
June 30, 2025		441,345		1,075,166		1,661,806		980,269
June 30, 2026		736,878		1,424,169		2,295,732		1,258,575
June 30, 2027		2,055,633		2,822,908	-	3,490,315		1,656,880
Future Pension Expense	\$.	3,484,222	\$	6,469,739	\$.	8,815,850	\$.	4,781,852
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	33,713,327	\$	35,935,525	\$	93,993,917	\$	39,888,980
Current discount rate (7.15%)	\$	27,235,114	\$	29,030,303	\$	75,932,435	\$	32,224,079
1% increase (8.15%)	\$	21,780,994	\$	23,216,677	\$	60,726,160	\$	25,770,866
Covered Payroll	\$	12,158,151	\$	19,323,845	\$	23,852,808	\$	11,870,539
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Littleton		Town of North Reading	-	Town of Pepperell	-	Town of Sherborn
Net Pension Liability Beginning net pension liability/(asset)	\$	19,636,977	\$	44,566,036	\$	15,377,884	\$	8,564,819
Ending net pension liability/(asset)	\$	30,512,028	\$	55,154,781	\$	19,372,966	\$	11,793,029
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	224,199	\$	405,272	\$	142,351	\$	86,654
Net difference between projected and actual investment earnings on pension plan investments		2,453,061		4,434,252		1,557,519		948,118
Changes of assumptions		526,841		952,340		334,507		203,626
Changes in proportion and differences between employer contributions and proportionate share of contributions		4,795,271		292,029		12,980		751,329
Total Deferred Outflows of Resources	\$	7,999,372	\$	6,083,893	\$	2,047,357	\$ _	1,989,727
<u>Deferred inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions	¢	106 404	¢	1,331,593	e	104,629	•	240.975
	Φ.	100,404	Ф	1,331,383	Φ.	104,029	Φ.	240,915
Pension Expense Proportionate share of plan pension expense	\$	3,175,613	\$	5,740,368	\$	2,016,288	\$	1,227,390
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		1,693,128		(550,297)		(49,078)		(1,782)
Total Employer Pension Expense	\$,	4,868,741	\$	5,190,071	\$.	1,967,210	\$ _	1,225,608
Contributions								
Statutory required contribution	\$	2,900,040	\$	4,854,543	\$	1,811,124	\$	1,112,907
Contribution in relation to statutory required contribution		(2,900,040)		(4,854,543)		(1,811,897)	-	(1,112,907)
Contribution deficiency/(excess)	\$.	-	\$		\$.	(773)	\$.	-
Contributions as a percentage of covered payroll		18.63%		32.98%		31.69%		23.05%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2024	\$	1,868,762 1,644,423	\$	509,620 754,409	\$	292,199 305,096	5	154,987 389,386
June 30, 2026. June 30, 2027.		1,953,292 2,426,491		1,206,384 2,281,887		460,937 884,496		486,024 718,355
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$.	7,892,968	\$	4,752,300	\$	1,942,728	\$ _	1,748,752
Discount Rate Sensitivity 1% decrease (6.15%)	\$	37,769,697	\$	68,274,037	\$	23,981,069	\$	14,598,149
Current discount rate (7.15%)	\$	30,512,028	\$	55,154,781	\$	19,372,966	\$	11,793,029
1% increase (8.15%)	\$	24,401,671	\$	44,109,452	\$	15,493,324	\$	9,431,350
Covered Payroll	\$	15,569,164	\$	14,719,205	\$	5,718,227	\$	4,827,222
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Shirley		Town of Stow		Town of Sudbury		Town of Tewksbury
Net Pension Liability								
Beginning net pension liability/(asset)	\$	8,630,720	\$	11,352,166	\$	54,643,133	\$	99,361,547
Ending net pension liability/(asset)	\$	10,265,353	\$	14,182,336	\$	66,845,536	\$	115,583,007
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	75,429	\$	104,210	\$	491,174	\$	849,292
Net difference between projected and actual investment earnings on pension plan investments		825,299		1,140,210		5,374,148		9,292,470
Changes of assumptions		177,249		244,882		1,154,201		1,995,735
Changes in proportion and differences between employer contributions and proportionate share of contributions		479,297		843,765		220,897		4,834,589
Total Deferred Outflows of Resources	\$	1,557,274	\$	2,333,067	\$	7,240,420	\$	16,972,086
Deferred inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	¢	526 796	¢	263,882	•	2,033,590	•	7,852,508
STEE OF CONTINUE OF STEEL STEE	Ψ.	525,150	Ψ	200,002	Ψ.	2,000,000	Ψ,	7,002,000
Pension Expense Proportionate share of plan pension expense	\$	1,068,390	\$	1,476,061	\$	6,957,113	\$	12,029,582
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		30,692		231,096		(836,453)		(849,179)
Total Employer Pension Expense	\$	1,099,082	\$	1,707,157	\$	6,120,660	\$	11,180,403
Contributions Statutory required contribution	•	866,303	4	1,147,938	¢	5.993,875	8	9,788.110
							•	5,700,770
Contribution in relation to statutory required contribution		(866,303)		(1,151,354)		(5,993,875)		(9,792,941)
Contribution deficiency/(excess)	\$		\$	(3,416)	\$.	-	\$	(4,831)
Contributions as a percentage of covered payroll		42.63%		28.89%		30.57%		38.10%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2024		208,619	\$	452,542	\$	515,805	\$	1,703,873
June 30, 2025		200,965 278,752		452,474 572,794		756,668 1.287,686		1,607,898 2,435,719
June 30, 2027		342,142		591,375		2,646,671		3,372,088
Total Deferred Outflows/(Inflows) Recognized in			•					
Future Pension Expense	Φ.	1,030,478	Ф	2,069,185	Φ.	5,206,830	Þ	9,119,578
Discount Rate Sensitivity 1% decrease (6.15%)	\$	12,707,096	\$	17,555,783	\$	82,745,585	\$	143,075,875
Current discount rate (7.15%)	\$	10,265,353	\$	14,182,336	\$	66,845,536	\$	115,583,007
1% increase (8.15%)	\$	8,209,607	\$	11,342,173	\$	53,459,009	\$	92,436,285
Covered Payroll	\$	2,031,952	\$	3,984,650	\$	19,605,695	\$	25,701,352
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	-	Town of Townsend	Town of Tyngsborough	_	Town of Wayland		Town of Westford
Net Pension Liability							
Beginning net pension liability/(asset)	\$	4,774,763	\$ 21,175,029	\$	46,247,117	\$	44,844,218
Ending net pension liability/(asset)	\$	7,565,089	\$ 27,541,050	\$	60,047,515	\$	65,161,824
Deferred Outflows of Resources							
Differences between expected and actual experience	\$	55,588	\$ 202,369	\$	441,223	\$	478,803
Net difference between projected and actual investment earnings on pension plan investments		608,207	2,214,204		4,827,611		5,238,783
Changes of assumptions		130,624	475,543		1,036,821		1,125,128
Changes in proportion and differences between employer contributions and proportionate share of contributions		1,324,158	995,898	_	1,236,272		6,153,864
Total Deferred Outflows of Resources	\$	2,118,577	\$ 3,888,014	\$	7,541,927	\$	12,996,578
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions	\$	1,465,660	\$ 	\$	2,300,846	\$	2,660,667
	•			٠		٠	
Pension Expense Proportionate share of plan pension expense	\$	787,355	\$ 2,866,401	\$	6,249,592	\$	6,781,875
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(152,213)	503,300		(583,558)		1,006,258
Total Employer Pension Expense	\$.	635,142	\$ 3,369,701	\$ _	5,666,034	\$	7,788,133
Contributions							
Statutory required contribution	\$	991,340	\$ 2,617,413	\$	5,728,625	\$	6,263,082
Contribution in relation to statutory required contribution		(995,268)	(2,617,413)		(5,728,625)		(6,263,082)
Contribution deficiency/(excess)	\$.	(3,928)	\$ 	\$ _	-	\$	
Contributions as a percentage of covered payroll		26.39%	27.73%		25.94%		22.55%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u>							
June 30, 2024	\$	(104,111)	\$ 891,257	\$	390,481	\$	1,625,808
June 30, 2025		10,250	678,158		621,507		1,770,040
June 30, 2026		68,906	899,445		1,148,282		2,393,781
June 30, 2027		677,872	1,419,154	-	3,080,811		4,546,282
Future Pension Expense	\$.	652,917	\$ 3,888,014	\$.	5,241,081	\$	10,335,911
Discount Rate Sensitivity							
1% decrease (6.15%)	\$	9,364,540	\$ 34,092,034	\$	74,330,570	\$	80,661,381
Current discount rate (7.15%)	\$	7,565,089	\$ 27,541,050	\$	60,047,515	\$	65,161,824
1% increase (8.15%)	\$	6,050,100	\$ 22,025,663	\$	48,022,364	\$	52,112,478
Covered Payroll	\$	3,771,576	\$ 9,438,696	\$	22,086,979	\$	27,779,314
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

		Town of Weston	-	Town of Wilmington	Acton- Boxborough Regional School District		Acton Water Supply
Net Pension Liability							
Beginning net pension liability/(asset)	\$	59,360,735	\$	76,302,617	\$ 24,866,009	\$	3,246,366
Ending net pension liability/(asset)	\$	73,861,876	\$	93,568,182	\$ 32,804,832	\$	4,310,937
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	542,730	\$	687,530	\$ 241,047	\$	31,676
Net difference between projected and actual investment earnings on pension plan investments		5,938,237		7,522,555	2,637,394		346,584
Changes of assumptions		1,275,349		1,615,612	566,431		74,436
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,388,919		1,005,426	1,372,957		98.843
			•			•	
Total Deferred Outflows of Resources	\$	9,145,235	\$	10,831,123	\$ 4,817,829	\$	551,539
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$	1,520,935	. \$	1,151,190	\$ 779,514	\$	64,378
Pension Expense Proportionate share of plan pension expense	\$	7,687,354	\$	9,738,336	\$ 3,414,241	\$	448,671
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(182,103)		(197,170)	257,532		(26,785)
Total Employer Pension Expense	\$	7,505,251	\$	9,541,166	\$ 3,671,773	\$	421,886
Contributions Statutory required contribution	\$	6,288,908	\$	8,322,908	\$ 3,320,479	\$	288,240
Contribution in relation to statutory required contribution		(6,288,908)		(9,828,234)	(3,320,479)		(288,240)
Contribution deficiency/(excess)	\$.	-	\$	(1,505,326)	\$ 	\$	-
Contributions as a percentage of covered payroll		27.75%		37.39%	21.71%		22.24%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense							
June 30, 2024	\$	1,193,660	\$	1,653,373	\$ 756,856	\$	55,158
June 30, 2025		1,358,949 1,986,554		1,611,137 2,381,706	613,779 857,148		82,832 136,104
June 30, 2027		3,085,137		4,033,717	1,810,532		213,067
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$		\$	9,679,933	\$ 4,038,315	\$	487,161
Discount Rate Sensitivity 1% decrease (6.15%)	. \$	91,430,850	\$	115,824,548	\$ 40,607,873	\$	5,336,347
Current discount rate (7.15%)	\$	73,861,876	\$	93,568,182	\$ 32,804,832	\$	4,310,937
1% increase (8.15%)	\$	59,070,253	\$	74,830,162	\$ 26,235,317	\$	3,447,626
Covered Payroll	\$	22,665,622	\$	26,288,985	\$ 15,291,181	\$	1,296,052
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	-	Bedford Housing Authority		Billerica Housing Authority	-	Chelmsford Housing Authority		Chelmsford Water District
Net Pension Liability Beginning net pension liability/(asset)	\$	255,587	\$	1,042,229	\$	1.656,493	s	(1,005,744)
Ending net pension liability/(asset)		357,375		1,270,401	\$		\$	819,895
Deferred Outliers of December								
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	2,626	\$	9,335	\$	21,114	\$	6,025
Net difference between projected and actual investment earnings on pension plan investments		28,732		102,136		231,017		65,917
Changes of assumptions		6,171		21,936		49,615		14,157
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	22,292		26,222		648,512		1,477,736
Total Deferred Outflows of Resources	\$ _	59,821	\$	159,629	\$	950,258	\$	1,563,835
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate								
share of contributions	\$ _	17,243	\$	262,281	\$	74,288	\$	748,490
Pension Expense Proportionate share of plan pension expense	\$	37,194	\$	132,219	\$	299,064	\$	85,333
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(1,289)		(70,296)		158,795		202,343
Total Employer Pension Expense	\$ _	35,905	\$	61,923	\$.	457,859	\$	287,676
<u>Contributions</u> Statutory required contribution	\$	30,802	\$	136,975	\$	268,910	\$	74,907
Contribution in relation to statutory required contribution	_	(30,802)		(136,975)		(388,910)		(74,907)
Contribution deficiency/(excess)	\$ _		\$		\$.	(120,000)	\$	
Contributions as a percentage of covered payroll		24.49%		34.09%		12.08%		4.66%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2024.	\$	4,376	\$	(38,778)	\$	174,186	\$	78,741
June 30, 2025		6,213 9,919		(63,829) (54,124)		184,764 222,255		138,012 191,312
June 30, 2027		22,070		54,079		294,765		407,280
Total Deferred Outflows/(Inflows) Recognized in			_	(100.050)		.== .==	_	0.50.5
Future Pension Expense	\$ =	42,578	\$	(102,652)	\$.	875,970	\$	815,345
Discount Rate Sensitivity 1% decrease (6.15%)	\$	442,381	\$	1,572,582	\$	3,556,961	\$	1,014,917
Current discount rate (7.15%)	\$	357,375	\$	1,270,401	\$	2,873,470	\$	819,895
1% increase (8.15%)	\$	285,807	\$	1,015,990	\$	2,298,027	\$	655,702
Covered Payroll	\$	125,795	\$	401,772	\$	3,220,111	\$	1,605,725
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	_	Dracut Housing Authority		Dracut Water Supply		East Chelmsford Water District	_	East Middlesex Mosquito Control
Net Pension Liability	•	4 700 004	•	0.004.544	\$	400 400	•	405 500
Beginning net pension liability/(asset)	Ф	1,703,681	\$	3,204,541	Ъ	183,163	\$	465,506
Ending net pension liability/(asset)	\$	1,967,855	\$	3,773,011	\$	358,607	\$	843,725
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	14,460	\$	27,724	\$	2,635	\$	6,200
Net difference between projected and actual		450.000		000 007		00.004		07.000
investment earnings on pension plan investments		158,209		303,337		28,831		67,833
Changes of assumptions.		33,978		65,147		6,192		14,568
Changes in proportion and differences between								
employer contributions and proportionate								
share of contributions	-	9,574		191,934		96,220	-	171,407
Total Deferred Outflows of Resources	\$ _	216,221	\$	588,142	\$	133,878	\$ _	260,008
Deferred Inflows of Resources								
Changes in proportion and differences between								
employer contributions and proportionate								
share of contributions.	\$_	333,536	\$	278,749	\$	87,606	\$_	81,841
Pension Expense Proportionate share of plan pension expense	œ	204,809	\$	392,685	\$	37,323	\$	87,813
Proportionate share of plan pension expense	Ф	204,609	Ф	392,663	Ф	31,323	Þ	07,013
Net amortization of deferred amounts from changes								
in proportion and differences between employer								
contributions and proportionate share of contributions	_	(113,215)		(39,195)		880	_	32,399
Total Employer Pension Expense	æ	91,594	æ	353,490	•	38,203	•	120.212
	* =	,	•		•		* =	,_,_,
Contributions City to the second contribution of the second contribution o	ф	182,577	Φ.	270,657	\$	40,049	\$	62.459
Statutory required contribution	Ф	162,377	\$	270,657	Ф	40,049	Þ	62,458
Contribution in relation to statutory required contribution	_	(182,577)		(270,657)		(40,049)	_	(62,459
Contribution deficiency/(excess)	\$ _	-	\$		\$		\$ _	
Contributions as a percentage of covered payroll		42.48%		41.41%		17.88%		15.119
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense								
June 30, 2024	\$	(57,619)	\$	49,008	\$	1,198	\$	30,319
June 30, 2025		(66,626)		58,221		(14)		26,137
June 30, 2026		(50,969)		93,188		4,733		40,841
June 30, 2027	-	57,899		108,976		40,355	-	80,870
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	æ	(117,315)	æ	309,393	\$	46,272	c	178,167
Tatal Constant Expense	Ψ=	(117,010)	Ψ	000,000	Ψ	40,212	Ψ=	170,101
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	2,435,934	\$	4,670,469	\$	443,906	\$	1,044,416
Current discount rate (7.15%)	\$	1,967,855	\$	3,773,011	\$	358,607	\$	843,725
1% increase (8.15%)	\$	1,573,771	\$	3,017,426	\$	286,792	\$	674,760
Covered Payroll	\$	429,781	\$	653,666	\$	223,976	\$	413,420
	Ψ.	120,101	Ψ	000,000	Ψ	220,010	~	110,720
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	Greater Regi Voca Tech School	onal ation nical		Groton- Dunstable Regional School District	_	Hudson Housing Authority		Lincoln- Sudbury Regional School Distric
Net Pension Liability	m 47.00	20.705	•	44 400 000	•	500,000	•	0.007.040
Beginning net pension liability/(asset)	\$ 17,26	30,795	\$	11,406,839	\$	568,228	\$	8,307,816
Ending net pension liability/(asset)	\$ 20,2	51,238	\$	14,947,853	\$	807,927	\$	10,259,862
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$ 14	1 8,804	\$	109,835	\$	5,937	\$	75,388
Net difference between projected and actual investment earnings on pension plan investments	1,62	28,129		1,201,755		64,955		824,857
Changes of assumptions.	34	19,672		258,100		13,950		177,154
Changes in proportion and differences between employer contributions and proportionate share of contributions.	1.0	13,137		667,171		69,930		370,017
					-			
Total Deferred Outflows of Resources	\$3,10	39,742	\$	2,236,861	\$	154,772	\$	1,447,416
Deferred inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$ <u>1,39</u>	97,430	. \$	55,196	\$ _	94,619	\$	373,588
Pension Expense Proportionate share of plan pension expense	\$ 2,10	07,697	\$	1,555,734	\$	84,087	\$	1,067,820
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		8,640		301,037		(78,268)		(50,131
Total Employer Pension Expense		16,337	\$	1,856,771	\$	5,819	\$	1,017,689
Contributions Statutory required contribution.	\$ 1.58	53,947	\$	1.250.129	\$	62.228	\$	808.324
Contribution in relation to statutory required contribution	(1,58	54,944)	·	(1,250,129)		(62,228)		(808,324
Contribution deficiency/(excess)		(997)	\$	_	\$	-	\$	
Contributions as a percentage of covered payroll		31.57%		28.42%	-	14.01%		25.90%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2024		26,190	\$	474,719	\$	(59,088)	\$	151,452
June 30, 2025		70,959		399,379		29,585		212,777
June 30, 2026		53,376		552,228		39,102		308,014
June 30, 2027		91,787		755,339	-	50,554		401,585
Future Pension Expense	\$1,74	12,312	\$	2,181,665	\$ _	60,153	\$	1,073,828
Discount Rate Sensitivity								
1% decrease (6.15%).	\$ 25,00	58,249	\$	18,503,387	\$	1,000,103	\$	12,700,299
Current discount rate (7.15%)	\$ 20,2	51,238	\$	14,947,853	\$	807,927	\$	10,259,862
1% increase (8.15%)	\$ 16,19	95,713	\$	11,954,387	\$	646,13 1	\$	8,205,216
Covered Payroll.	\$ 4,92	25,006	\$	4,398,476	\$	444,259	\$	3,120,449
See notes to schedule of employer allocations and schedule of pension amounts by employer.	р 4,9 2	20,006	\$	4,398,476	Þ	444,259	\$	3,120,44 (continue

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	Nashoba Valley Technical High School District	<u>t</u> .	North Chelmsford Water District	_	North Middlesex Regional School District		Shawsheen Valley Regional Vocational Fechnical School
Net Pension Liability Beginning net pension liability/(asset)\$	3,439,271	\$	628,790	\$	11,254,512	\$	8,099,773
Ending net pension liability/(asset)\$		\$	1,229,309	\$	14,660,062	\$	9,786,464
Deferred Outflows of Resources Differences between expected and actual experience	27.729	•	9.033	¢	107,721	4	71,910
Net difference between projected and actual	21,720	Ÿ	0,000	۳	101,721	Ψ	11,010
investment earnings on pension plan investments	303,397		98,832		1,178,618		786,798
Changes of assumptions	65,160		21,226		253,131		168,980
Changes in proportion and differences between employer contributions and proportionate share of contributions	165.092		283.324		288.633		330,749
		- '		•		-	
Total Deferred Outflows of Resources\$	561,378	\$	412,415	\$	1,828,103	\$ =	1,358,437
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions	407,788	- \$:	180,580	.\$	18,442	\$_	422,464
Pension Expense Proportionate share of plan pension expense \$	392,763	\$	127,944	\$	1,525,780	\$	1,018,549
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	(81,663)	<u>1</u> .	22,318		101,664	_	(19,139)
Total Employer Pension Expense\$	311,100	\$	150,262	\$	1,627,444	\$ _	999,410
Contributions							
Contributions Statutory required contribution\$	348,527	\$	84,480	\$	1,299,482	\$	787,076
Contribution in relation to statutory required contribution	(348,527))	(84,480)		(1,299,482)		(787,076)
Contribution deficiency/(excess)\$		\$	-	\$		\$_	_
Contributions as a percentage of covered payroll	32.13%		14.08%	•	21.54%	Ī	25.45%
Deferred Outflows/(Inflows) Recognized in							
Future Pension Expense June 30, 2024\$	23,653	e	24,649	4	328,913	œ	175,935
June 30, 2025.	20.021	Φ	28.133	Φ	304,121	Φ	164,497
June 30, 2026.	37.669		51,478		436,182		248.448
June 30, 2027	72,247		127,575		740,445		347,093
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense\$	153,590	\$	231,835	\$	1,809,661	\$	935,973
		- '		-		-	
Discount Rate Sensitivity 1% decrease (6.15%)\$	4,671,389	\$	1,521,716	\$	18,147,142	\$	12,114,297
Current discount rate (7.15%)\$	3,773,754	\$	1,229,309	\$	14,660,062	\$	9,786,464
1% increase (8.15%)\$	3,018,020	\$	983,127	\$	11,724,229	\$	7,826,621
Covered Payroll\$	1,084,851	\$	600,183	\$	6,031,624	\$	3,092,314
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	Ţ	South Middlesex Regional Vocational echnical School	pl	Sudbury Water District		Tewksbury Housing Authority	-	Wayland Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	\$	6,194,749	\$	1,399,802	\$	1,475,444	\$	371,407
Ending net pension liability/(asset)	\$	7,705,068	\$	2,303,019	\$	1,805,120	\$	671,550
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	56,616	\$	16,922	\$	13,264	\$	4,934
Net difference between projected and actual investment earnings on pension plan investments		619,461		185,155		145,125		53,990
Changes of assumptions.		133,041		39,765		31,168		11,595
Changes in proportion and differences between employer contributions and proportionate share of contributions.		177,684		430,390		16,066		142,300
			•		•		-	
Total Deferred Outflows of Resources Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate share of contributions.				672,232		205,623	`=	212,819
Pension Expense Proportionate share of plan pension expense	٠	801,924		239,694		187,872	-	69,896
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(39,484)		(1,784)		(12,743)	_	(11,243
Total Employer Pension Expense	\$	762,440	\$	237,910	\$	175,129	\$ _	58,653
Contributions Statutory required contribution	\$	619,647	\$	192,1 1 6	\$	152,028	\$	61,744
Contribution in relation to statutory required contribution		(619,647)		(192,116)		(152,028)	_	(61,744
Contribution deficiency/(excess)	\$	-	\$		\$	-	\$ _	
Contributions as a percentage of covered payroll		26.49%		18.49%		30.10%		17.859
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2024.	•	85.798	•	16.878	\$	22,720	•	(5,802
June 30, 2025. June 30, 2026. June 30, 2027.	¥	136,363 210,348 314,018	Ψ	(55,209) (18,019) 196,202	¥	17,215 35,233 69,539	y	5,425 15,366 66,572
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$		\$		\$	144,707	\$	81,561
Discount Rate Sensitivity 1% decrease (6.15%)	\$	9,537,815	\$	2,850,821	\$	2,234,490	\$	831,287
Current discount rate (7.15%)	\$	7,705,068	\$	2,303,019	\$	1,805,120	\$	671,550
1% increase (8.15%)	\$	6,162,046	\$	1,841,815	\$	1,443,626	\$	537,065
Covered Payroll	\$	2,339,395	\$	1,039,289	\$	505,022	\$	345,987
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

Net Pension Liability	-	Hopkinton Housing Authority		Sudbury Housing Authority	-	Wilmington Housing Authority	-	Acton Housing Authority
Beginning net pension liability/(asset)	\$	498,319	\$	458,401	\$	185,577	\$	721,454
Ending net pension liability/(asset)	\$	591,913	\$	534,374	\$	233,342	\$	1,015,501
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	4,349	\$	3,927	\$	1,715	\$	7,462
Net difference between projected and actual investment earnings on pension plan investments		47,588		42,962		18,760		81,643
Changes of assumptions.		10,220		9,227		4,029		17,534
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	25,052		30,438		15,528		67,574
Total Deferred Outflows of Resources	\$_	87,209	\$	86,554	\$	40,032	\$	174,213
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate	_	0.4.750	_	27.047		00.040		00.054
share of contributions	\$ =	34,752	\$	37,017	\$.	86,313	\$.	30,654
Pension Expense Proportionate share of plan pension expense	\$	61,606	\$	55,615	\$	24,287	\$	105,691
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	1,109		(693)		(23,288)		15,858
Total Employer Pension Expense	\$ _	62,715	\$	54,922	\$	999	\$.	121,549
Contributions Statutory required contribution	\$	46,820	\$	46,012	\$	37,810	\$	81,483
Contribution in relation to statutory required contribution	_	(46,820)		(46,012)		(37,810)		(81,483)
Contribution deficiency/(excess)	\$ _		\$		\$	-	\$.	
Contributions as a percentage of covered payroll		36.28%		28.12%		57.22%		16.37%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u>								
June 30, 2024. June 30, 2025.	\$	10,034	\$	8,881 9,894	\$	(19,043)	\$	26,507
June 30, 2026		8,936 14,534		14.805		(21,076) (19,933)		21,178 33,296
June 30, 2027	_	18,953		15,957		13,771		62,578
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	52,457	\$	49,537	\$	(46,281)	\$	143,559
	-							
Discount Rate Sensitivity 1% decrease (6.15%)	\$	732,707	\$	661,482	\$	288,845	\$	1,257,051
Current discount rate (7.15%)	\$	591,913	\$	534,374	\$	233,342	\$	1,015,501
1% increase (8.15%)	\$	473,376	\$	427,360	\$	186,613	\$	812,136
Covered Payroll	\$	129,068	\$	163,618	\$	66,080	\$	497,848
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	_	Burlington Housing Authority	Ayer Housing Authority	-	Holliston Housing Authority	_	Littleton Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	\$	4,057	\$ 691,363	\$	93,451	\$	665,340
Ending net pension liability/(asset)		198,080	\$ 753,718	\$	159,405	\$	660,639
Deferred Outflows of Resources							
Differences between expected and actual experience	\$	1,455	\$ 5,538	\$	1,171	\$	4,854
Net difference between projected and actual investment earnings on pension plan investments		15,925	60,596		12,816		53,113
Changes of assumptions.		3,420	13,014		2,752		11,407
Changes in proportion and differences between							
employer contributions and proportionate share of contributions		183,083	7,985		37,101		96,126
Total Deferred Outflows of Resources			\$ 87,133	\$	53,840	\$	165,500
Deferred Inflows of Resources Changes in proportion and differences between employer contributions and proportionate	-			-		=	
share of contributions.	\$ =	180,433	\$ 130,815	\$.	31,374	\$ _	135,424
Pension Expense Proportionate share of plan pension expense	\$	20,616	\$ 78,446	\$	16,590	\$	68,758
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	21,174	(38,436)		2,562	_	7,598
Total Employer Pension Expense	\$ =	41,790	\$ 40,010	\$	19,152	\$ _	76,356
Contributions							
Statutory required contribution	\$	37,587	\$ 71,552	\$	21,143	\$	51,652
Contribution in relation to statutory required contribution	_	(37,587)	(71,552)		(21,143)	-	(51,652)
Contribution deficiency/(excess)	\$ _	-	\$ 	\$	-	\$ _	
Contributions as a percentage of covered payroll		16.49%	34.85%		23.58%		N/A
Deferred Outflows/(Inflows) Recognized in Future Pension Expense							
June 30, 2024	\$	11,285	\$ (15,986)	\$	3,472	\$	22,480
June 30, 2025		(20,132)	(23,759)		988		2,821
June 30, 2026. June 30, 2027.		(14,790) 47,087	(17,760) 13,823		2,089 15,917		8,137 (3,362)
Total Deferred Outflows/(Inflows) Recognized in	-	47,007	10,020		10,517	-	(3,302)
Future Pension Expense	\$ =	23,450	\$ (43,682)	\$.	22,466	\$ _	30,076
Discount Rate Sensitivity							
1% decrease (6.15%).	\$	245,196	\$ 932,999	\$	197,321	\$	817,780
Current discount rate (7.15%)	\$	198,080	\$ 753,718	\$	159,405	\$	660,639
1% increase (8.15%)	\$	158, 41 2	\$ 602,778	\$	127,482	\$	528,339
Covered Payroll	\$	227,993	\$ 205,342	\$	89,653	\$	-
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	_	Westford Housing Authority	Shirley Water District	Tyngsborough Housing Authority	_	Pepperell Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	\$	285,368	\$ 310,034	\$ 504,387	\$	212,725
Ending net pension liability/(asset)	\$	456,630	\$ 558,390	\$ 577,242	\$	248,169
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	3,355	\$ 4,103	\$ 4,242	\$	1,824
Net difference between projected and actual investment earnings on pension plan investments		36,711	44,893	46,408		19,952
Changes of assumptions		7,884	9,642	9,967		4,285
Changes in proportion and differences between employer contributions and proportionate share of contributions.	_	79,432	115,404	34,151	_	10,814
Total Deferred Outflows of Resources	\$_	127,382	\$ 174,042	\$ 94,768	\$_	36,875
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$	116,846	\$ 69,057	\$ 47,588	\$	14.941
Pension Expense Proportionate share of plan pension expense	-	47,525	58,116	\$ 60,077	-	25,827
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(20,724)	14,846	(5,005)	_	5,442
Total Employer Pension Expense	\$ =	26,801	\$ 72,962	\$ 55,072	\$ _	31,269
Contributions						
Statutory required contribution.	\$	57,003	\$ 38,322	50,360	\$	25,571
Contribution in relation to statutory required contribution	-	(57,003)	(38,322)	(50,360)	-	(25,571)
Contribution deficiency/(excess)	\$ =	-	\$ 	\$ -	\$ =	=
Contributions as a percentage of covered payroll		20.64%	16.05%	26.75%		24.73%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u>						
June 30, 2024 June 30, 2025	\$	(12,091) (11,711)	\$ 20,122 11,235	\$ 8,279 10,197	\$	10,627 736
June 30, 2026		(6,596)	21,146	13,395		2,285
June 30, 2027	_	40,934	52,482	15,309	_	8,286
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ _	10,536	\$ 104,985	\$ 47,180	\$_	21,934
Discount Rate Sensitivity						
1% decrease (6.15%)	\$	565,245	\$ 691,210	\$ 714,546	\$	307,199
Current discount rate (7.15%)	\$	456,630	\$ 558,390	\$ 577,242	\$	248,169
1% increase (8.15%)	\$	365,185	\$ 446,566	\$ 461,643	\$	198,471
Covered Payroll	\$	276,231	\$ 238,722	\$ 188,264	\$	103,391
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	_	Groton Housing Authority		Tyngsborough Water District		North Reading Housing Authority		West Groton Water
Net Pension Liability Beginning net pension liability/(asset)	\$	_	\$	370,151	\$	26,035	\$	(39,887)
Ending net pension liability/(asset)		_	\$	597,899	\$	65,307	\$	76,911
Deferred Outflows of Resources								
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	-	\$	4,393	\$	480	\$	565
Net difference between projected and actual investment earnings on pension plan investments		-		48,069		5,250		6,183
Changes of assumptions		-		10,324		1,128		1,328
Changes in proportion and differences between								
employer contributions and proportionate		0.440		05 400		40.000		
share of contributions	-	3,412		85,428		48,320		86,684
Total Deferred Outflows of Resources	\$ =	3,412	\$	148,214	\$	55,178	\$	94,760
Deferred Inflows of Resources								
Changes in proportion and differences between								
employer contributions and proportionate share of contributions	\$		\$	16,813	\$	98,346	\$	40.870
	* =		. *	,	٠.		٠,	15,515
Pension Expense Proportionate share of plan pension expense	\$	-	\$	62,227	\$	6,797	\$	8,006
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		4,832		22,395		(11,778)		8,723
Total Employer Pension Expense	\$ _	4,832	\$	84,622	\$	(4,981)	\$	16,729
Contributions				40.000		00.740	_	0.000
Statutory required contribution			\$	46,380	\$	23,748	\$	2,960
Contribution in relation to statutory required contribution	_					(23,748)		(2,960)
Contribution deficiency/(excess)	\$ =		\$		\$.	<u>-</u>	\$	-
Contributions as a percentage of covered payroll		N/A		19.09%		37.90%		1.48%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2024	\$	2.839	\$	25,412	\$	(12,373)	\$	7.894
June 30, 2025		573		24,187		(21,185)		8,502
June 30, 2026		-		33,069		(21,886)		12,274
June 30, 2027	-			48,733		12,276		25,220
Future Pension Expense	\$ =	3,412	\$	131,401	\$	(43,168)	\$	53,890
Discount Rate Sensitivity								
1% decrease (6.15%).	\$	-	\$	740,117	\$	80,841	\$	95,205
Current discount rate (7.15%)	\$	-	\$	597,899	\$	65,307	\$	76,911
1% increase (8.15%)	\$	-	\$	478,163	\$	52,229	\$	61,509
Covered Payroll	\$	-	\$	242,904	\$	62,656	\$	199,771
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2022

	Ayer-Shirley Regional School District	Northern Middlesex Regional Emergency Communications Center	Totals
Net Pension Liability Beginning net pension liability/(asset)	\$ 2,097,697	\$ 328,026	\$ 1,340,727,512
Ending net pension liability/(asset)	\$ 4,746,593	\$ 582,488	\$ 1,697,060,700
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$ 34,877	\$ 4,280	\$ 12,469,834
Net difference between projected and actual investment earnings on pension plan investments	381,610	46,830	136,437,755
Changes of assumptions	81,958	10,058	29,302,605
Changes in proportion and differences between employer contributions and proportionate share of contributions.	1.564,488	287,619	64,007,005
Total Deferred Outflows of Resources	\$ 2,062,933	\$ 348,787	\$ 242,217,199
<u>Deferred Inflows of Resources</u> Changes in proportion and differences between employer contributions and proportionate share of contributions.	\$ 1,081,219	\$ 5,226	\$ 64,007,005
Pension Expense Proportionate share of plan pension expense	\$ 494,013	\$ 60,622	\$ 177,084,875
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	70,975	86,980	
Total Employer Pension Expense	\$ 564,988	\$ 147,602	\$ 177,084,875
Contributions Statutory required contribution	\$ 545,398	\$ -	\$ 153,677,331
Contribution in relation to statutory required contribution	(545,398)		(156,335,119
Contribution deficiency/(excess)	\$ 	\$ 	\$ (2,657,788
Contributions as a percentage of covered payroll	12.90%	N/A	28.889
Deferred Outflows/(Inflows) Recognized in Future Pension Expense			
June 30, 2024. June 30, 2025. June 30, 2026. June 30, 2027.	46,738 127,668 197,086 610,222	\$ 96,998 96,674 104,167 45 ,722	\$ 29,182,639 28,236,293 42,456,355 78,334,907
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ 981,714	\$ 343,561	\$ 178,210,194
Discount Rate Sensitivity 1% decrease (6.15%)	\$ 5,875,630	\$ 721,040	\$ 2,100,727,873
Current discount rate (7.15%)	\$ 4,746,593	\$ 582,488	\$ 1,697,060,700
1% increase (8.15%)	\$ 3,796,037	\$ 465,839	\$ 1,357,206,313
Covered Payroll	\$ 4,228,745	\$ 948,422	\$ 541,233,353
See notes to schedule of employer allocations and schedule of pension amounts by employer.			(concluded

Middlesex County Retirement System

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NOTE A - Schedule of Employer Allocations

Governmental Accounting Standards Board (GASB) Statement #68 requires employers participating in a costsharing pension plan to recognize pension liabilities as employees provide services to the government and earn their pension benefits. Employers participating in cost-sharing plans are required to recognize their proportionate share of the plan's collective pension amounts for all benefits provided through the plan including the net pension liability, deferred outflows of resources, deferred inflows of resources, pension expense, and contributions.

GASB Statement #68 requires the allocation of the collective pension amounts be consistent with the manner in which contributions to the plan are determined. As permissible under GASB Statement #68, The Schedule of Employer Allocations is used to demonstrate the allocation of Middlesex County Retirement System's collective pension amounts.

Massachusetts General Law (MGL) Chapter 32 Section 22 Paragraph 7c dictates that Massachusetts cost sharing defined benefit pension plans allocate the annual required pension fund appropriation to employer units based on their proportionate share of the aggregate of the annual rates of regular compensation of all members in service of the system. The Public Employee Retirement Administration Commission (PERAC) approves each system's proportionate share of the annual required contribution. PERAC can accept alternative allocation methodologies and as such the MCRS has elected to use an actuarial based allocation methodology. Accordingly, each member unit's proportionate share of the total pension liability has been calculated based on each member unit's actual current employees, retirees and inactive participants. Each member's share of the MCRS's net position at year end is calculated by starting with the balance carried forward from the prior year. Each member unit is then credited with the actual required contribution received during the year along with any excess contributions received. Each member unit's share is reduced by the actual payment made to their specific retirees. Net investment income is allocated based on each member's money-weighted rate of return. All other shared expenses are allocated based on the proportionate share of the total pension liability. The difference between the total pension liability and the net position is reported as the net pension liability.

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County and Middlesex Hospital be transferred to the Commonwealth. The legislation required that County and Hospital retirees and beneficiaries remain with the County Retirement System. The Commonwealth provided a mechanism, in the legislation, that fully funded the actuarially determined liability of those retirees. At December 31, 2018, the remaining liabilities for Middlesex County and the Middlesex Hospital retirees and beneficiaries were actuarially determined and are separately identified in the MCRS's funding schedule. No assets have been allocated to cover the remaining liability and therefore the liability has been allocated to the remaining member units.

The current employees, retirees, beneficiaries and inactive participants of the MCRS have been identified and their total pension liability has been actuarially determined. For transparency purposes, the MCRS has historically paid a contribution as an employer to itself. However, with the implementation of GASB 67 & 68 the net pension liability is allocated to each member unit.

NOTE B - Schedule of Pension Amounts by Employer

The Schedule of Pension Amounts by Employer presents the net pension liability, the various categories of deferred outflows of resources and deferred inflows of resources, contributions and pension expense for all participating employers including differences between expected and actual economic experience; differences between projected and actual investment earnings, net; and changes of assumptions.

Middlesex County Retirement System

52 Audit of Specific Elements, Accounts and Items of Financial Statements

The following assumption changes were reflected in the January 1, 2022 actuarial valuation.

Changes in Assumptions

- The net investment return assumption was lowered from 7.30% to 7.15%.
- The mortality projection scale was updated from MP-2017 to MP-2021.

Changes in Plan Provisions

None.

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2021

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2021

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Financial Section

Middlesex County Retirement System

Financial Section

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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Opinion

We have audited the accompanying financial statements of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2021, and the related notes to the financial statements, which collectively comprise the MCRS's 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 financial position of the MCRS as of December 31, 2021, and the changes in its financial 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 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 Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the MCRS 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's for the Financial Statements

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

Auditor's 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 auditor's 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 generally accepted 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 judgement made by a reasonable user based on the financial statements.

In performing an audit in accordance with generally accepted auditing standards, we:

- Exercise professional judgement 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 auditing 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 MCRS'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 judgement, there are conditions or events, considered in the aggregate, that
 raise substantial doubt about the MCRS'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 Management's Discussion and Analysis; the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information is the responsibility of management and, although not a part of the financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated August 23, 2022, on our consideration of the MCRS's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, 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 MCRS'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 MCRS's internal control over financial reporting and compliance.

Restriction on Use

This report is intended solely for the information and use of MCRS, the Public Employee Retirement Administration Commission and all member units and is not intended to be and should not be used by anyone other than these specified parties.

August 23, 2022

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Management's Discussion and Analysis

As management of the Middlesex County Retirement System (MCRS), we offer readers of these financial statements this narrative overview and analysis of the financial activities for the year ended December 31, 2021. The MCRS complies with financial reporting requirements issued by the Governmental Accounting Standards Board (GASB).

The GASB is the authoritative standard setting body that provides guidance on how to prepare financial statements in conformity with generally accepted accounting principles (GAAP). Users of these financial statements rely on the GASB to establish consistent reporting standards for all governments in the United States. This consistent application is the only way users can assess the financial condition of a public retirement system compared to others.

Financial Highlights

- The MCRS's assets exceeded its liabilities at the close of the most recent year by \$2.1 billion (net
 position).
- The MCRS's net position increased by \$353.6 million for the year ended December 31, 2021.
- Total investment income was \$349.7 million; investment expenses were \$9.4 million; and net investment income was \$340.2 million.
- Total contributions were \$214.5 million, primarily consisting of \$147.8 million from employers, \$51.7 million from members, \$8.4 million in transfers from other systems and \$6.5 million in other contributions.
- Retirement benefits, refunds, and transfers of member deductions to other systems amounted to \$197.7 million
- Depreciation, administrative and building expenses were \$3.4 million.
- The total pension liability was \$3.5 billion as of December 31, 2021, while the net pension liability was \$1.3 billion.
- The Plan fiduciary net position as a percentage of the total pension liability was 61.14%.

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the MCRS's fiduciary financial statements. These fiduciary financial statements comprise of four components: 1) management's discussion and analysis, 2) fiduciary financial statements, 3) notes to the financial statements and 4) required supplementary information.

Fiduciary Financial Statements

The *statement of fiduciary net position* presents information on all assets and deferred outflows less deferred inflows and liabilities with the difference reported as *net position*. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position is improving or deteriorating.

The statement of changes in fiduciary net position presents information showing how the MCRS's net position changed during the most recent year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, additions and deductions are reported in this statement for some items that will only result in cash flows in future periods.

Notes to the financial statements

The notes provide additional information that is essential to a full understanding of the data provided in the fiduciary financial statements.

Middlesex County Retirement System

Management's Discussion and Analysis

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context.

Financial Analysis

As noted earlier, net position may serve over time as a useful indicator of the MCRS's financial position. The MCRS's assets exceeded liabilities by \$2.1 billion at the close of 2021.

The assets accumulated are held to provide pension benefits for qualified retirees along with active and inactive employees of the member units. At year-end, the MCRS's net position included investments of \$2.08 billion, cash of \$18.5 million and current accounts receivable of \$4.9 million. The system also had capital assets, net of accumulated depreciation, of \$4.1 million at year-end primarily consisting of land, an office building, and building improvements.

In 2021, the MCRS's contributions were \$214.5 million while deductions were \$201.1 million which resulted in a current surplus of \$13.4 million. In 2020, the MCRS's contributions were \$196.5 million while deductions were \$191.3 million which resulted in a prior year surplus of \$5.2 million. Therefore, for these two years the MCRS was able to sustain operations independent of investment income.

The primary change in net position over the prior year relates to each year's investment performance. Net investment income was \$340.2 million in 2021, and \$185.4 million in 2020. The annual money weighted rate of return was 19.86% and 12.26% in 2021, and 2020, respectively. The MCRS's investment policy is designed to achieve a long-term rate of return of 7.15% and fluctuation in annual investment returns is expected.

The following tables present summarized financial information for the past two years:

	2021		2020
Assets:		•	
Cash\$	18,455,232	\$	41,101,439
Investments	2,082,386,263		1,706,314,629
Receivables	4,949,242		4,435,670
Capital assets, net of accumulated depreciation	4,108,907		4,429,195
Total assets	2,109,899,644		1,756,280,933
Liabilities:			
Accounts payable	102,089		115,997
Other liabilities	26,556		26,606
Total liabilities	128,645		142,603
Net Position Restricted for Pensions\$	2,109,770,999	\$	1,756,138,330

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Middlesex County Retirement System

Management's Discussion and Analysis

	2021	2020
Additions:		
Contributions:		
Member contributions\$	51,747,946	\$ 50,973,950
Employer contributions	147,955,483	138,327,737
Other contributions	14,791,325	7,185,413
Total contributions	214,494,754	196,487,100
Net investment income:		
Total investment income	349,671,539	192,871,896
Less, investment expenses	(9,428,015)	(7,442,169)
Net investment income	340,243,524	185,429,727
Total additions	554,738,278	381,916,827
Deductions:		
Administration	2,878,819	2,781,367
Retirement benefits, refunds and transfers	197,701,698	187,995,148
Building operations and maintenance	204,804	208,858
Depreciation	320,288	321,386
Total deductions	201,105,609	191,306,759
Net increase (decrease) in fiduciary net position	353,632,669	190,610,068
Fiduciary net position at beginning of year	1,756,138,330	1,565,528,262
Fiduciary net position at end of year\$	2,109,770,999	\$ 1,756,138,330

Requests for Information

This financial report is designed to provide a general overview of the MCRS's finances for all those with an interest in the MCRS's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the MCRS's Chief Administrative Officer, 25 Linnell Circle, Billerica, Massachusetts 01865.

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STATEMENT OF FIDUCIARY NET POSITION

DECEMBER 31, 2021

Assets		
Cash and cash equivalents	\$	18,455,232
Investments:		
Investments in Pension Reserve Investment Trust		2,077,485,448
Pooled alternative investments		4,863,412
Pooled real estate funds		37,403
Total investments		2,082,386,263
Receivables, net of allowance for uncollectibles:		
Member deductions		4,294,279
Member contributions		9,017
Employer pension appropriation		42,295
Member make-up payments and redeposits		217,870
Transfers from other systems		345,041
Other accounts receivable		40,740
Total Receivables		4,949,242
Capital assets, net of accumulated depreciation		4,108,907
Total Assets		2,109,899,644
Liabilities		
Accounts payable		102,089
Other liabilities		26,556
		·
Total Liabilities		128,645
Mar Barrer Branch Articles	•	0.400.770.600
Net Position Restricted for Pensions	Э,	2,109,770,999

See notes to financial statements.

Middlesex County Retirement System

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STATEMENT OF CHANGES IN FIDUCIARY NET POSITION

YEAR ENDED DECEMBER 31, 2021

Additions: Contributions:	
Employer pension appropriation\$	147,849,683
Member contributions	51,747,946
Transfers from other systems	8,391,579
3(8)(c) contributions from other systems	4,620,024
Workers' compensation settlements	105,800
Retirement benefits - state COLA reimbursements	556,170
Members' makeup payments and redeposits	1,000,847
Interest not refunded	222,705
Total contributions	214,494,754
Net investment income:	
Investment income	349,671,539
Less: investment expense	(9,428,015)
Net investment income	340,243,524
Total additions	554,738,278
Deductions:	
Administration	2,878,819
Building operations and maintenance	204,804
Retirement benefits and refunds	182,979,923
Transfers to other systems	6,860,647
3(8)(c) transfer to other systems	7,861,128
Depreciation	320,288
Total deductions	201,105,609
Net increase (decrease) in fiduciary net position	353,632,669
Fiduciary net position at beginning of year	1,756,138,330
Fiduciary net position at end of year\$	2.109.770.999
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Middlesex County Retirement System

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Financial Statements

See notes to financial statements.

NOTE 1 - PLAN DESCRIPTION

The Middlesex County Retirement System (MCRS) is a multiple-employer, cost-sharing, contributory defined benefit pension plan covering all employees of the governmental member units deemed eligible by the Middlesex County Retirement Board (the Board), with the exception of school department employees who serve in a teaching capacity. The pensions of such school employees are administered by the Commonwealth of Massachusetts' Teachers Retirement System. Membership in the System is mandatory immediately upon the commencement of employment for all permanent employees working a minimum of 20 hours per week and who are paid annual compensation of no less than \$5,000. As of January 1, 2022, the MCRS had 71 participating employers.

The MCRS is a Massachusetts Contributory Retirement System and is governed by Chapter 32 of the Massachusetts General Laws. Membership in the Plan is mandatory immediately upon the commencement of employment for all permanent, full-time employees.

Massachusetts contributory retirement system benefits are, with certain exceptions, uniform from system to system. The MCRS provides for retirement allowance benefits up to a maximum of 80% of a member's highest three-year average annual rate of regular compensation for those hired prior to April 2, 2012, and the highest five-year average for members hired after that date. Benefit payments are based upon a member's age, length of creditable service, level of compensation, and group classification.

Members become vested after ten years of creditable service. A superannuation retirement allowance may be received upon the completion of 20 years of service or upon reaching the age of 55 with 10 years of service for those hired prior to April 2, 2012. For those hired on or after April 2, 2012, a superannuation allowance may be received upon reaching the age of 60 with 10 years of service. Normal retirement for most employees occurs at age 65 for those hired prior to April 2, 2012, and at age 67 for those hired after April 2, 2012 (except for certain hazardous duty and public safety positions, whose normal retirement is at age 55).

A retirement allowance consists of two parts: an annuity and a pension. A member's accumulated total deductions and the interest they generate constitute the annuity. The differential between the total retirement benefit and the annuity is the pension.

Active members contribute between 5% and 11% of their gross regular compensation. The percentage rate is keyed to the date upon which an employee's membership commences. These deductions are deposited in the Annuity Savings Fund and earn interest at a rate determined by the Public Employee Retirement Administration Commission's (PERAC) actuary. When a member's retirement becomes effective, his/her deductions and related interest are transferred to the Annuity Reserve Fund. Any cost-of-living adjustments granted between 1981 and 1997 and any increase in other benefits imposed by the Commonwealth of Massachusetts' state law during those years are borne by the Commonwealth and are deposited into the Pension Fund. Cost-of-living adjustments granted after 1997 must be approved by the MCRS and all costs are borne by the MCRS.

The pension portion of any retirement benefit is paid from the Pension Fund. The governmental unit employing the member must annually appropriate and contribute the amount of current-year pension assessment.

Administrative expenses are paid from investment income.

Members who become permanently and totally disabled for further duty may be eligible to receive a disability retirement allowance. The amount of benefits to be received in such cases is dependent on several factors, including whether or not the disability is work related, the member's age, years of creditable service, level of compensation, veterans' status and group classification.

Middlesex County Retirement System

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Survivor benefits are extended to eligible beneficiaries of members whose death occurs prior to or following retirement

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements of the Middlesex County Retirement System have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The Governmental Accounting Standards Board (GASB) is the recognized standard-setting body for establishing governmental accounting and financial reporting principles.

MCRS is a special-purpose government engaged only in fiduciary activities. Accordingly, the financial statements are reported using the flow of economic resources measurement focus and use the accrual basis of accounting. Under this method, additions are recorded when earned and deductions are recorded when the liabilities are incurred.

Cash and Investments

Cash and cash equivalents are 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 carried at fair value. The fair values were determined by the closing price for those securities traded on national stock exchanges and at the average bid-and-asked quotation for those securities traded in the over-the-counter market. The fair value of private equities are based on management's valuation of estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values. Real estate assets are reported at fair value utilizing an income approach to valuation along with independent appraisals and estimates by management.

Fair Value Measurements

The MCRS reports required types of financial instruments in accordance with the fair value standards. These standards require an entity to maximize the use of observable inputs (such as quoted prices in active markets) and minimize the use of unobservable inputs (such as appraisals or valuation techniques) to determine fair value. Fair value standards also require the government to classify these financial instruments into a three-level hierarchy, based on the priority of inputs to the valuation technique or in accordance with net asset value practical expedient rules, which allow for either Level 2 or Level 3 depending on lock up and notice periods associated with the underlying funds.

Instruments measured and reported at fair value are classified and disclosed in one of the following categories:

Level 1 – Quoted prices are available in active markets for identical instruments as of the reporting date. Instruments, which are generally included in this category, include actively traded equity and debt securities, U.S. government obligations, and mutual funds with quoted market prices in active markets.

Level 2 – Pricing inputs are other than quoted in active markets, which are either directly or indirectly observable as of the reporting date, and fair value is determined through the use of models or other valuation methodologies. Certain fixed income securities, primarily corporate bonds, are classified as Level 2 because fair values are estimated using pricing models, matrix pricing, or discounted cash flows.

Level 3 – Pricing inputs are unobservable for the instrument and include situations where there is little, if any, market activity for the instrument. The inputs into the determination of fair value require significant management judgment or estimation.

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In some instances the inputs used to measure fair value may fall into different levels of the fair value hierarchy and is based on the lowest level of input that is significant to the fair value measurement.

Market price is affected by a number of factors, including the type of instrument and the characteristics specific to the instrument. Instruments with readily available active quoted prices generally will have a higher degree of market price observability and a lesser degree of judgment used in measuring fair value. It is reasonably possible that change in values of these instruments will occur in the near term and that such changes could materially affect amounts reported in these financial statements. For more information on the fair value of the MCRS's financial instruments, see Note 5 – Cash and Investments.

Accounts Receivable

Accounts receivable consist of member deductions, pension fund appropriations, and other miscellaneous reimbursements. These receivables are considered 100% collectible and therefore do not report an allowance for uncollectibles.

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of fiduciary net position will sometimes report a separate section for deferred outflows of resources. This separate financial statement element, *deferred outflows of resources*, represents a consumption of fiduciary net position that applies to a future period(s) and so will not be recognized as an outflow of resources (deduction) until then. The MCRS did not have any items that qualify for reporting in this category.

In addition to liabilities, the statement of fiduciary net position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, *deferred inflows of resources*, represents an acquisition of net position that applies to a future period(s) and so will not be recognized as an inflow of resources (addition) until that time. The MCRS did not have any items that qualify for reporting in this category.

NOTE 3 – PLAN ADMINISTRATION

The MCRS is administered by a five-person Board of Retirement consisting of a first member, who shall serve as Chairman/Treasurer, who shall be appointed by the other four members, a second member elected by the Advisory Council consisting of representatives from the member units, a third and fourth member who shall be elected by the members in or retired from the service of such system, and a fifth member who shall be chosen by the other four members.

Chairman	Thomas F. Gibson	Term Expires:	12/31/2026
Advisory Council Member	Brian P. Curtin	Term Expires:	12/31/2024
Elected Member	John Brown	Term Expires:	12/31/2023
Elected Member	Joseph W. Kearns	Term Expires:	12/31/2022
Appointed Member	Robert W. Healy, Jr.	Term Expires:	12/16/2025

Board members are required to meet at least once a month. The Board must keep a record of all of its proceedings. The Board must annually submit to the appropriate authority an estimate of the expenses of administration and cost of operation of the MCRS. The Board must annually file a financial statement of condition

Middlesex County Retirement System

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for the MCRS with the Executive Director of PERAC.

The investment of the MCRS's funds is the responsibility of the Board. All retirement allowances must be approved by the Retirement Board. The PERAC Actuary performs verification prior to payment, unless the MCRS has obtained a waiver for superannuation calculations allowing them to bypass this requirement. All expenses incurred by the MCRS must be approved by a majority vote of the Board. Payments shall be made only upon vouchers signed by three persons designated by the Board.

The following retirement board members and employees are bonded by an authorized agent representing a company licensed to do business in Massachusetts as follows:

Treasurer-Custodian: \$10,000,000 Fiduciary Ex-Officio Member: RLI Insurance Company

Elected Members:

Appointed Members: \$1,000,000 Fidelity

Staff Employees: National Union Fire Insurance

NOTE 4 - OFFICE BUILDING

The MCRS owns an office building that was purchased as an investment and for the administrative offices of the System. The building is a two story, 1986-built office building consisting of 62,307 square feet of net rentable area. The property is situated on a 4.23-acre site in Billerica, Middlesex County, Massachusetts.

NOTE 5 - CASH AND INVESTMENTS

Custodial Credit Risk - Deposits

At December 31, 2021, the carrying amount of the MCRS's deposits totaled \$10,778,530, and the bank balance totaled \$13,352,131, all of which was covered by Federal Depository Insurance.

Investments

The MCRS's investments were as follows:

December 31, 2021
2,077,485,448
7,676,702
4,863,412
37,403
2,090,062,965

Approximately 99.4% of the Retirement MCRS's investments are in Pension Reserve Investment Trust (PRIT). This investment pool was established by the Treasurer of the Commonwealth of Massachusetts, who serves as Trustee. PRIT is administered by the Pension Reserves Investment Management Board. The fair values of the positions in each investment Pool are the same as the value of each Pool's shares. The Administration does not

Middlesex County Retirement System

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have the ability to control any of the investment decisions relative to its funds in PRIT. The effective weighted duration rate for PRIT investments ranged from 1.33 to 15.12 years.

Approximately 0.2% of the MCRS's funds are invested in pooled alternative investments and pooled real estate funds. The market values of assets in those funds are based on the quoted values obtained from each pool.

Approximately 0.4% of the MCRS's funds are invested in money market mutual funds. The market values of assets in those funds are valued using prices quoted in active markets for those securities.

The Administration's annual money-weighted rate of return on pension plan investments was 19.86%. The money-weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested, measured monthly.

Fair Value of Investments

The retiree pension defined benefit plan holds significant amounts of investments that are measured at fair value on a recurring basis. Because investing is a key part of the plan's activities, the plan shows greater disaggregation in its disclosures. The plan chooses a tabular format for disclosing the levels within the fair value hierarchy.

The MCRS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles.

The MCRS had the following recurring fair value measurements as of December 31, 2021:

		Fair Value Measurements Using			Jsing	
Investment Type	12/31/2021	 Quoted Prices in Active Markets for Identical Assets (Level 1)		Significant Other Observable Inputs (Level 2)	_	Significant Unobservable Inputs (Level 3)
Investments by fair value level:						
Money Market Mutual Funds\$ Pooled Alternative Investments Pooled Real Estate Funds	7,676,702 4,863,412 37,403	\$ 7,676,702 - -	\$	- - -	\$	4,863,412 37,403
Total Investments by fair value level	12,577,517	\$ 7,676,702	\$		\$	4,900,815
Investments measured at the net asset value (NAV):						
PRIT Investments.	2,077,485,448					
Total Investments\$	2,090,062,965					

Money market mutual funds in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Pooled alternative investments and pooled real estate funds classified in level 3 are valued using either a discounted cash flow or market comparable company's technique.

PRIT Investments are valued using the net asset value (NAV) method.

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NOTE 6 - CAPITAL ASSETS

All purchases and building costs in excess of \$25,000 are capitalized at the date of acquisition. Capital assets are depreciated on a straight-line basis. The estimated useful lives of capital assets are as follows:

	Estimated Useful Life
0 214 47	
Capital Asset Type	(in years)
Building	40
Building improvements	40
Vehicles	5
Software and equipment	5

Capital asset activity for the year ended December 31, 2021, was as follows:

	Beginning Balance	Increases	Decreases	Ending Balance
Capital assets not being depreciated:				
Land\$	672,657_\$	\$	\$	672,657
Capital assets being depreciated:				
Buildings	5,417,136	-	-	5,417,136
Building improvements	1,099,492	-	-	1,099,492
Vehicles	30,913	-	-	30,913
Software and equipment	757,189	<u> </u>		757,189
Total capital assets being depreciated	7,304,730	<u> </u>		7,304,730
Less accumulated depreciation for:				
Buildings	(2,442,066)	(135,428)	-	(2,577,494)
Building improvements	(491,557)	(29,740)	-	(521,297)
Vehicles	(30,912)	-	-	(30,912)
Software and equipment	(583,657)	(155,120)		(738,777)
Total accumulated depreciation	(3,548,192)	(320,288)		(3,868,480)
Total capital assets being depreciated, net	3,756,538	(320,288)		3,436,250
Total capital assets, net\$	4,429,195 \$	(320,288) \$	\$	4,108,907

NOTE 7 - MEMBERSHIP

The following table represents the MCRS's membership at December 31, 2021:

Active members	9,432
Inactive members entitled to a return of their employee contributions	3,581
Inactive members with a vested right to a deferred or immediate benefit	403
Retirees and beneficiaries currently receiving benefits	6,284
·	
Total	19.700

NOTE 8 – ACTUARIAL VALUATION

Components of the net pension liability as of December 31, 2021, were as follows:

Total pension liability\$	3,450,498,511
The MCRS's fiduciary net position	2,109,770,999
The net pension liability\$	1,340,727,512
The MCRS's fiduciary net position as a percentage of the total pension liability	61.14%

The total pension liability was determined by an actuarial valuation as of January 1, 2022, using the following actuarial assumptions, applied to all periods included in the measurement that was rolled back to December 31, 2021:

Valuation date	January 1, 2022.
Actuarial cost method	Entry Age Normal Cost Method.
Amortization method	Prior year's total contribution increased by 6.50% for fiscal 2022 through fiscal 2028, and thereafter the remaining unfunded liability will be amortized on a 4.00% annual increasing basis; ERI liability amortized in level payments.
Remaining amortization period	17 years from July 1, 2020, for non-ERI liability, and 2 years from July 1, 2020 for 2010 ERI.
Asset valuation method	The difference between the expected return and the actual investment return on a market value basis is recognized over a five year period. Asset value is adjusted as necessary to be within 20% of the market value.
Investment rate of return/Discount rate	7.15%, previously 7.30%.
Inflation rate	3.25%

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Projected salary increases	Varies by length of service with ultimate rates of 4.00% for Group 1, 4.25% for Group 2 and 4.50% for Group 4
Cost of living adjustments	3.00% of the first \$16,000 of retirement income.
Mortality Rates: Pre-Retirement	The RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2021.
Healthy Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2021.
Disabled Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021.

Investment policy: The MCRS's policy in regard to the allocation of invested assets is established by PRIT. Plan assets are managed on a total return basis with a long-term objective of achieving a fully funded status for the benefits provided through the pension plan.

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 MCRS's target asset allocation as of December 31, 2021, are summarized in the following table:

Asset Class	Long-Term Expected Asset Allocation	Long-Term Expected Real Rate of Return
		0.110/
Domestic equity	22.00%	6.11%
International developed markets equity	11.50%	6.49%
International emerging markets equity	4.50%	8.12%
Core fixed income	15.00%	0.38%
High-yield fixed income	8.00%	2.48%
Real estate	10.00%	3.72%
Timber	4.00%	3.44%
Hedge funds, GTAA, risk parity	10.00%	2.63%
Private equity	15.00%	9.93%
	100.00%	

Discount rate: The discount rate used to measure the total pension liability was 7.15% at December 31, 2021, and 7.30% at December 31, 2020. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rate. Based on those assumptions, the MCRS'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.

Middlesex County Retirement System

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Sensitivity of the net pension liability to changes in the discount rate: The following presents the net pension liability, calculated using the discount rate of 7.15%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.15%) or 1-percentage-point higher (8.15%) than the current rate:

	Current				
	1% Decrease	Discount	1% Increase		
	(6.15%)	(7.15%)	(8.15%)		
Middlesex County Retirement System's net					
pension liability as of December 31, 2021\$	1,734,275,212 \$	1,340,727,512 \$	1,009,270,759		

Contributions: Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The pension fund appropriations are allocated amongst employers based on the actuarial valuation.

NOTE 9 - IMPLEMENTATION OF GASB PRONOUNCEMENTS

There were no GASB pronouncements required to be implemented in 2021 that impacted the MCRS's financial statements.

None of the issued GASB statements that are required to be implemented in future years are anticipated to impact the MCRS's financial statements.

NOTE 10 - SUBSEQUENT EVENTS

Management has evaluated subsequent events through August 23, 2022, which is the date the financial statements were available to be issued.

The Retirement System carries its investments at fair (market) value in accordance with Generally Accepted Accounting Principles (GAAP). Market value adjustments are recorded monthly. Subsequent to year end, the System's investments had declined in value by approximately 7.0%. The market value decline is consistent with recent trends in the overall financial securities market.

In accordance with GAAP, the System has not recorded the losses in its financial statements as the impairments were not known as of December 31, 2021. The System has recorded the losses associated with the investment during the year 2022.

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Required Supplementary Information

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

Total pension liability: Service cost	\$ December 31, 2014 52,132,389 172,094,226	\$ December 31, 2015 54,217,685 179,703,272	\$ December 31, 2016 56,386,392 187,359,946	\$ December 31, 2017 60,585,598 200,298,121
Changes in benefit terms Differences between expected and actual experience Changes in assumptions Benefit payments	- - - (125,082,678)	- - - (134,295,504)	7,976,453 96,500,754 (143,428,636)	(9,059,393) 97,195,824 (150,780,931)
Net change in total pension liability	99,143,937	99,625,453	204,794,909	198,239,219
Total pension liability - beginning	2,195,732,452	2,294,876,389	2,394,501,842	2,599,296,751
Total pension liability - ending (a)	\$ 2,294,876,389	\$ 2,394,501,842	\$ 2,599,296,751	\$ 2,797,535,970
Plan fiduciary net position: Employer pension appropriation. Member contributions. Other contributions. Net investment income (loss). Administrative expenses. Building operations and maintenance. Retirement benefits and refunds. Other retirement deductions. Depreciation.	\$ 93,368,685 39,048,869 6,405,881 74,904,315 (2,996,390) (381,899) (125,082,678) (5,556,930) (162,594)	\$ 99,792,641 40,340,741 8,668,378 7,732,128 (2,824,803) (302,771) (134,295,504) (8,025,993) (162,594)	\$ 107,032,211 42,015,296 12,337,414 74,917,546 (3,062,521) (235,667) (143,428,636) (11,475,752) (162,594)	\$ 115,377,205 44,177,815 10,405,773 189,343,574 (2,619,464) (306,177) (150,780,931) (9,358,262) (308,508)
Net increase (decrease) in fiduciary net position	79,547,259	10,922,223	77,937,297	195,931,025
Fiduciary net position - beginning of year	1,014,013,415	1,093,560,674	1,104,482,897	1,182,420,194
Fiduciary net position - end of year (b)	\$ 1,093,560,674	\$ 1,104,482,897	\$ 1,182,420,194	\$ 1,378,351,219
Net pension liability - ending (a)-(b)	\$ 1,201,315,715	\$ 1,290,018,945	\$ 1,416,876,557	\$ 1,419,184,751
Plan fiduciary net position as a percentage of the total pension liability	47.65%	46.13%	45.49%	49.27%
Covered payroll.	\$ 415,752,810	\$ 432,382,921	\$ 439,644,322	\$ 451,777,105
Net pension liability as a percentage of covered payroll.	288.95%	298.35%	322.28%	314.13%

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Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

Middlesex County Retirement System

Required Supplementary Information

208,614,148 216,905,943 229,825,239 238,805,957 - 29,156,339 - - 46,671,873 - 5,225,766 - 65,013,900 - 27,166,375 (161,259,804) (168,486,003) (181,769,445) (184,028,124 111,970,254 256,078,053 121,647,179 163,267,056								
2018 2019 2020 2021 \$ 64,615,910 \$ 66,816,001 \$ 73,591,385 \$ 76,097,08* 208,614,148 216,905,943 229,825,239 238,805,95* - 29,156,339 - - - 46,671,873 - 5,225,766* - 65,013,900 - 27,166,375* (161,259,804) (168,486,003) (181,769,445) (184,028,124* 111,970,254 256,078,053 121,647,179 163,267,055*		December 31.		December 31.		December 31.		December 31.
\$ 64,615,910 \$ 66,816,001 \$ 73,591,385 \$ 76,097,081 208,614,148 216,905,943 229,825,239 238,805,957 - 29,156,339 - 5,225,766 - 65,013,900 - 27,166,375 (161,259,804) (168,486,003) (181,769,445) (184,028,124 111,970,254 256,078,053 121,647,179 163,267,055						,		
208,614,148 216,905,943 229,825,239 238,805,957 - 29,156,339 - - 46,671,873 - 5,225,766 - 65,013,900 - 27,166,375 (161,259,804) (168,486,003) (181,769,445) (184,028,124 111,970,254 256,078,053 121,647,179 163,267,056								
- 29,156,339 - 5,225,766 - 46,671,873 - 5,225,766 - 65,013,900 - 27,166,375 (161,259,804) (168,486,003) (181,769,445) (184,028,124 111,970,254 256,078,053 121,647,179 163,267,055	\$	64,615,910	\$	66,816,001	\$	73,591,385	\$	76,097,081
- 46,671,873 - 5,225,766 - 65,013,900 - 27,166,375 (161,259,804) (168,486,003) (181,769,445) (184,028,124 111,970,254 256,078,053 121,647,179 163,267,055		208,614,148		216,905,943		229,825,239		238,805,957
- 65,013,900 - 27,166,375 (161,259,804) (168,486,003) (181,769,445) (184,028,124 111,970,254 256,078,053 121,647,179 163,267,055		-		29,156,339		-		-
(161,259,804) (168,486,003) (181,769,445) (184,028,124) 111,970,254 256,078,053 121,647,179 163,267,058		-		46,671,873		-		5,225,766
111,970,254 256,078,053 121,647,179 163,267,058		-		65,013,900		-		27,166,375
		(161,259,804)		(168,486,003)		(181,769,445)		(184,028,124)
2,797,535,970 2,909,506,224 3,165,584,277 3,287,231,456		111,970,254		256,078,053		121,647,179		163,267,055
<u>2,797,535,970</u> <u>2,909,506,224</u> <u>3,165,584,277</u> <u>3,287,231,456</u>								
		2,797,535,970		2,909,506,224		3,165,584,277		3,287,231,456
\$ <u>2,909,506,224</u> \$ <u>3,165,584,277</u> \$ <u>3,287,231,456</u> \$ <u>3,450,498,511</u>	\$	2,909,506,224	\$	3,165,584,277	\$	3,287,231,456	\$	3,450,498,511
	\$		\$		\$		\$	147,849,683
								51,747,946
								14,897,125
								340,243,524
		,						(2,878,819)
								(204,804)
								(184,028,124)
								(13,673,574)
(318,812) (318,812) (321,386) (320,288		(318,812)		(318,812)		(321,386)		(320,288)
·								
(28,311,454) 215,488,497 190,610,068 353,632,669		(28,311,454)		215,488,497		190,610,068		353,632,669
4 270 254 240		4 270 254 240		4 250 020 705		4 505 509 000		4 750 400 000
<u>1,378,351,219</u> <u>1,350,039,765</u> <u>1,565,528,262</u> <u>1,756,138,330</u>		1,376,331,219		1,300,039,765		1,365,326,262		1,756,138,330
\$ 1,350,039,765 \$ 1,565,528,262 \$ 1,756,138,330 \$ 2,109,770,999	\$	1 350 039 765	\$	1 565 528 262	\$	1 756 138 330	\$	2,109,770,999
Ψ 1,335,033,703 Ψ 1,353,325,262 Ψ 1,736,136,336 Ψ 2,103,776,336	Ψ	1,000,000,700	Ψ	1,000,020,202	Ψ	1,730,130,330	Ψ	2,103,110,333
\$ 1,559,466,459 \$ 1,600,056,015 \$ 1,531,093,126 \$ 1,340,727,512	\$	1 559 466 459	\$	1 600 056 015	\$	1 531 093 126	\$	1,340,727,512
¥ 1,000,100,100	*	1,000,100,100	*	1,000,000,010	*	1,001,000,120	*	1,010,121,012
46.40% 49.45% 53.42% 61.149		46 40%		49 45%		53 42%		61.14%
10.1070		10.1070		10.1070		00.1270		01.1170
\$ 471,115,185 \$ 492,109,775 \$ 513,201,283 \$ 519,239,589	\$	471,115,185	\$	492,109,775	\$	513,201,283	\$	519,239,589
331.02% 325.14% 298.34% 258.219		331.02%		325.14%		298.34%		258.21%

SCHEDULE OF CONTRIBUTIONS

<u>Year</u>	Actuarially determined contribution	Contributions in relation to the actuarially determined contribution	Contribution deficiency (excess)	Covered payroll	Contributions as a percentage of covered payroll
December 31, 2021 \$	144,255,207 \$	(147,852,245) \$	(3,597,038) \$	519,239,589	28.47%
December 31, 2020	135,472,822	(138,290,237)	(2,817,415)	513,201,283	26.95%
December 31, 2019	127,151,838	(129,685,754)	(2,533,916)	492,109,775	26.35%
December 31, 2018	119,298,291	(120,614,676)	(1,316,385)	471,115,185	25.60%
December 31, 2017	112,017,087	(115,426,815)	(3,409,728)	451,777,105	25.55%
December 31, 2016	105,246,797	(107,067,707)	(1,820,910)	439,644,322	24.35%
December 31, 2015	98,792,642	(99,820,481)	(1,027,839)	432,382,921	23.09%
December 31, 2014	92,826,743	(93,400,946)	(574,203)	415,752,810	22.47%

Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

SCHEDULE OF INVESTMENT RETURNS

Annual money-weighted rate of return.

Year	rate of return, net of investment expense
Tour	net of investment expense
December 31, 2021	19.86%
December 31, 2020	12.26%
December 31, 2019	16.21%
December 31, 2018	-2.52%
December 31, 2017	17.25%
December 31, 2016	7.35%
December 31, 2015	0.61%
December 31, 2014	7.54%

Note: this schedule is intended to present information for 10 years. Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

NOTE A - CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

The Schedule of Changes in the Net Pension Liability and Related Ratios includes the detailed changes in the system's total pension liability, changes in the system's net position, and the ending net pension liability. It also demonstrates the plan's net position as a percentage of the total pension liability and the net pension liability as a percentage of covered payroll.

NOTE B - CONTRIBUTIONS

Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The total appropriations are payable on July 1 and January 1. Employers may choose to pay the entire appropriation in July at a discounted rate. Accordingly, actual employer contributions may be less than the "total appropriation". The pension fund appropriations are allocated amongst employers based on the actuarial valuation results. In addition, an employer may contribute more than the amount required.

NOTE C - MONEY WEIGHTED RATE OF RETURN

The money weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense. A money weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested. Inputs to the money weighted rate of return calculation are determined monthly.

NOTE D - CHANGES IN ASSUMPTIONS AND PLAN PROVISIONS

The following changes were reflected in the January 1, 2022 actuarial valuation.

Changes in Assumptions

- The net investment return assumption was lowered from 7.30% to 7.15%.
- The mortality projection scale was updated from MP-2017 to MP-2021.

Changes in Plan Provisions

None.

Middlesex County Retirement System

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Required Supplementary Information

Audit of Specific Elements, Accounts and Items of Financial Statements

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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Report on the Audit of the Schedule of Employer Allocations and Schedule of Pension Amounts by Employer

Opinion

We have audited the accompanying schedule of employer allocations of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2021, and the related notes. We have also audited the total for all entities of the rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total contributions and total pension expense included in the accompanying schedule pension amounts by employer of the MCRS Pension Plan as of and for the year ended December 31, 2021, and the related notes.

In our opinion, the accompanying schedule of employer allocations and schedule of pension amounts by employer present fairly, in all material respects, the employer allocations and net pension liability, total deferred outflows of resources, total deferred inflows of resources, total contributions and total pension expense for the total of all participating entities for the MCRS as of and for the year ended December 31, 2021, 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). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Schedules section of our report. We are required to be independent of the MCRS 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 opinions.

Responsibilities of Management for the Schedules

Management is responsible for the preparation and fair presentation of the schedules 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 the schedules that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibilities for the Audit of the Schedules

Our objectives are to obtain reasonable assurance about whether the schedule of employer allocations and the specified row totals included in the schedule of pension amounts by employer as a whole are free from material

misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. 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 will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than 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 judgement made by a reasonable user based on the schedules.

In performing an audit in accordance with GAAS, we:

- Exercise professional judgement and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the schedules, 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 schedules.
- 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 purposes of expressing an opinion on the
 effectiveness of the MCRS'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
 schedules.

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.

Other Matter

We have audited, in accordance with GAAS, the financial statements of the MCRS as of and for the year ended December 31, 2021, and our report thereon, dated August 23, 2022, expressed an unmodified opinion on those financial statements.

Restriction on Use

This report is intended solely for the information and use of the MCRS management, the MCRS employers and their auditors and is not intended to be and should not be used by anyone other than these specified parties.

August 23, 2022

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SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2021

Employer	Share of Net Pension Liability/(Asset)	Percent of Total Net Pension Liability
Middlesex County Retirement Board\$	-	0.000000%
Middlesex County	-	0.000000%
Middlesex Hospital	-	0.000000%
Town of Acton	44,317,853	3.305508%
Town of Ashby	1,370,949	0.102254%
Town of Ashland	29,025,102	2.164877%
Town of Ayer	16,034,552	1.195959%
Town of Bedford	44,033,584	3.284305%
Town of Billerica	136,488,741	10.180200%
Town of Boxborough	10,220,882	0.762338%
Town of Burlington	118,806,981	8.861382%
Town of Carlisle	8,806,565	0.656850%
Town of Chelmsford	100,318,386	7.482384%
Town of Dracut	62,185,294	4.638175%
Town of Dunstable.	2,299,674	0.171524%
Town of Groton	19,238,916	1.434961%
Town of Holliston.	18,170,200	1.355249%
Town of Hopkinton	16,725,088	1.247464%
Town of Hudson	59,893,267	4.467221%
Town of Lincoln.	24,515,962	1.828557%
Town of Littleton	19,636,977	1.464651%
Town of North Reading.	44,566,036	3.324019%
3	15,377,884	1.146981%
Town of Pepperell	8,564,819	0.638819%
		0.643734%
Town of Shirley	8,630,720 11,352,166	0.846717%
Town of Sudbury	54,643,133	4.075633%
Town of Tewksbury	99,361,547	7.411017%
Town of Townsend	4,774,763	0.356132%
Town of Tyngsborough	21,175,029	1.579369%
Town of Wayland	46,247,117	3.449405%
Town of Westford	44,844,218	3.344767%
Town of Weston	59,360,735	4.427502%
Town of Wilmington	76,302,617	5.691135%
Acton-Boxborough Regional School District	24,866,009	1.854665%
Acton Water Supply	3,246,366	0.242135%
Bedford Housing Authority	255,587	0.019063%
Billerica Housing Authority	1,042,229	0.077736%
Chelmsford Motor District	1,656,493	0.123552%
Chelmsford Water District	(1,005,744) 1,703,681	-0.075015% 0.127071%
Dracut Housing Authority Dracut Water Supply	3,204,541	0.127071%
Diacut water Suppry	3,204,341	0.23901376

(Continued)

Middlesex County Retirement System

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Employer Allocations

SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2021

Employer	Share of Net Pension Liability/(Asset)	Percent of Total Net Pension Liability
East Chelmsford Water District	183,163	0.013661%
East Middlesex Mosquito Control	465,506	0.034720%
Greater Lowell Regional Vocational Technical School District	17,260,795	1.287420%
Groton-Dunstable Regional School District	11,406,839	0.850795%
Hudson Housing Authority	568,228	0.042382%
Lincoln-Sudbury Regional School District	8,307,816	0.619650%
Nashoba Valley Technical High School District	3,439,271	0.256523%
North Chelmsford Water District	628,790	0.046899%
North Middlesex Regional School District	11,254,512	0.839433%
Shawsheen Valley Regional Vocational School	8,099,773	0.604133%
South Middlesex Regional Vocational Technical School	6,194,749	0.462044%
Sudbury Water District	1,399,802	0.104406%
Tewksbury Housing Authority	1,475,444	0.110048%
Wayland Housing Authority	371,407	0.027702%
Hopkinton Housing Authority	498,319	0.037168%
Sudbury Housing Authority	458,401	0.034190%
Wilmington Housing Authority	185,577	0.013842%
Acton Housing Authority	721,454	0.053811%
Burlington Housing Authority	4,057	0.000303%
Ayer Housing Authority	691,363	0.051566%
Holliston Housing Authority	93,451	0.006970%
Littleton Housing Authority	665,340	0.049625%
Westford Housing Authority	285,368	0.021285%
Shirley Water District	310,034	0.023124%
Tyngsborough Housing Authority	504,387	0.037620%
Pepperell Housing Authority	212,725	0.015866%
Groton Housing Authority	-	0.000000%
Tyngsborough Water District	370,151	0.027608%
North Reading Housing Authority	26,035	0.001942%
West Groton Water	(39,887)	-0.002975%
Ayer-Shirley Regional School District	2,097,697	0.156460%
Northern Middlesex Regional Emergency Communications Center	328,026	0.024466%
Total\$	1,340,727,512	100.000%

(Concluded)

See notes to schedule of employer allocations and schedule of pension amounts by employer.

FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Middlesex County Retirement Board		Middlesex County		Middlesex Hospital	-	Town of Acton
Net Pension Liability Beginning net pension liability/(asset)	d.		\$		\$		s	52,615,628
		-	*	-	*	-	-	
Ending net pension liability/(asset)	\$	-	\$	-	\$	-	S	44,317,853
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	-	\$	-	\$	=	s	755,287
Changes of assumptions		-		-		-		1,578,005
Changes in proportion and differences between employer contributions and proportionate share of contributions.		-		-				14,416
Total Deferred Outflows of Resources	\$.	_	\$.	_	\$.		s	2,347,708
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments	\$	-	\$	-	\$	-	s	7,535,277
Changes in proportion and differences between employer contributions and proportionate share of contributions		-		-			_	1,784,770
Total Deferred Inflows of Resources	\$ _	-	\$.	-	\$.		s _	9,320,047
Pension Expense Proportionate share of plan pension expense	\$	428,815	\$	-	\$	-	s	3,711,239
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions				_				(110,017)
Total Employer Pension Expense	\$ _	428,815	\$	-	\$	-	S _	3,601,222
Contributions Statutory required contribution	\$	428,815	\$		\$	-		4,814,701
Contribution in relation to statutory required contribution	-	(428,815)		-			-	(4,821,666)
Contribution deficiency/(excess)	\$ _	-	\$	-	\$		s	(6,965)
Contributions as a percentage of covered payroll		32.02%		0.00%		0.00%		32.31%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2023		-	\$	-	\$	-	S	(1,190,679) (2,094,556)
June 30, 2025		-		-		-		(2,089,241)
June 30, 2026		-		-		<u> </u>	-	(1,597,863)
Future Pension Expense	\$		\$		\$		s	(6,972,339)
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	-	\$	-	\$	-	s	57,326,603
Current discount rate (7.15%)	\$	-	\$	-	\$	-	s	44,317,853
1% increase (8.15%)	\$	-	\$	-	\$	-	S	33,361,524
Covered Payroll	\$	1,339,300	\$	-	\$	-	s	14,922,594
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Town of Ashby	-	Town of Ashland		Town of Ayer		Town of Bedford
Net Pension Liability Beginning net pension liability/(asset)	\$	1,775,392	\$	35,887,576	\$	19,150,544	\$	51,394,381
Ending net pension liability/(asset)		1,370,949	\$	29,025,102	\$	16,034,552	\$	44,033,584
Deferred Outflows of Resources Differences between expected and actual experience	\$	23,364	s.	494,661	s	273.269	\$	750.443
Changes of assumptions		48,815	*	1.033,483	•	570,935	•	1,567,883
Changes in proportion and differences between		10,010		1,000,100		0,000		1,007,000
employer contributions and proportionate share of contributions.		41,871		356,649		71,405		94,043
Total Deferred Outflows of Resources			\$		\$			2,412,369
Deferred Inflows of Resources	-		•					
Net difference between projected and actual investment earnings on pension plan investments	\$	233,100	\$	4,935,081	\$	2,726,323	\$	7,486,944
Changes in proportion and differences between employer contributions and proportionate share of contributions.		165,720		1.976.868		436.870		1.808.571
	-							
Total Deferred Inflows of Resources	\$ =	398,820	\$.	6,911,949	\$.	3,163,193	\$	9,295,515
Pension Expense Proportionate share of plan pension expense	\$	114,805	\$	2,430,602	\$	1,342,754	\$	3,687,434
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		49.164		(136,315)		74.178		(721,874)
Total Employer Pension Expense		· ·	\$	2,294,287	\$	1,416,932	\$	2,965,560
Contributions Statutory required contribution	\$	240,126	\$	3,563,976	\$	1,934,480	\$	4,965,363
Contribution in relation to statutory required contribution		(240,126)		(3,598,325)		(2,234,480)		(4,966,807)
Contribution deficiency/(excess)	\$		\$	(34,349)	\$	(300,000)	\$	(1,444)
Contributions as a percentage of covered payroll		24.19%		23.28%		30.58%		25.38%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023 June 30, 2024 June 30, 2025 June 30, 2026 Total Deferred Outflows/(Inflows) Recognized in		(44,300) (106,627) (73,015) (60,828)	\$	(733,783) (1,461,335) (1,587,638) (1,244,400)	\$	(341,208) (731,463) (671,996) (502,917)	\$	(1,305,064) (2,282,864) (1,919,816) (1,375,402)
Future Pension Expense	\$ _	(284,770)	\$	(5,027,156)	\$	(2,247,584)	\$	(6,883,146)
<u>Discount Rate Sensitivity</u> 1% decrease (6.15%).	\$	1,773,368	\$	37,544,926	\$	20,741,221	\$	56,958,892
Current discount rate (7.15%)	\$	1,370,949	\$	29,025,102	\$	16,034,552	\$	44,033,584
1% increase (8.15%)	\$	1,032,021	\$	21,849,471	\$	12,070,465	\$	33,147,532
Covered Payroll	\$	992,577	\$	15,457,970	\$	7,307,387	\$	19,572,584
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Town of Billerica		Town of Boxborough		Town of Burlington		Town of Carlisle
Net Pension Liability Beginning net pension liability/(asset)	\$	152,215,238	\$	12,166,423	\$	133,422,263	\$	10,349,764
Ending net pension liability/(asset)	\$	136,488,741	\$	10,220,882	\$	118,806,981	\$	8,806,565
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	2,326,115	\$	174,189	\$	2,024,769	\$	150,086
Changes of assumptions		4,859,892		363,930		4,230,305		313,571
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		2,837,939		357,785		2,927,496		148,410
Total Deferred Outflows of Resources	\$.	10,023,946	\$.	895,904	\$	9,182,570	\$.	612,067
Deferred Inflows of Resources								
Net difference between projected and actual investment earnings on pension plan investments	\$	23,206,914	\$	1,737,836	\$	20,200,517	\$	1,497,363
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		591,897		379,548		334,022		223,522
Total Deferred Inflows of Resources	\$:	23,798,811	\$.	2,117,384	\$	20,534,539	\$.	1,720,885
Pension Expense Proportionate share of plan pension expense	\$	11,429,756	\$	855,910	\$	9,949,061	\$	737,473
Net amortization of deferred amounts from changes in proportion and differences between employer		(470.054)		111.338		1.179.597		(45.040)
contributions and proportionate share of contributions		(472,654)		111,338		1,179,597		(15,013)
Total Employer Pension Expense	\$.	10,957,102	\$	967,248	\$	11,128,658	\$	722,460
Contributions Statutory required contribution	\$	13,584,397	\$	1.144.434	\$	11.757.449	\$	1,192,106
		10,001,007	*	.,,	*	,,,,,,,,,	•	1,102,100
Contribution in relation to statutory required contribution		(13,587,241)		(1,144,434)		(11,757,449)		(1,192,106)
Contribution deficiency/(excess)	\$.	(2,844)	\$.	-	\$		\$.	
Contributions as a percentage of covered payroll		35.49%		32.45%		31.59%		19.37%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023	\$	(1,965,504)	\$	(92,511)	\$	(1,067,956)	\$	(81,370)
June 30, 2024		(4,112,940)	Ψ.	(297,684)	۳	(3,118,396)	•	(406,529)
June 30, 2025		(4,491,409)		(462,882)		(4,176,403)		(371,363)
June 30, 2026		(3,205,012)		(368,403)		(2,989,214)		(249,556)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	(13,774,865)	\$	(1,221,480)	\$	(11,351,969)	\$	(1,108,818)
Discount Rate Sensitivity								
1% decrease (6.15%)		176,552,684			\$		\$	11,391,582
Current discount rate (7.15%)	\$	136,488,741	\$	10,220,882	\$	118,806,981	\$	8,806,565
1% increase (8.15%)		102,745,781	\$	7,694,060	\$	89,435,333	\$	6,629,392
Covered Payroll	\$	38,284,144	\$	3,526,748	\$	37,219,280	\$	6,153,577
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Town of Chelmsford	-	Town of Dracut	-	Town of Dunstable	-	Town of Groton
Net Pension Liability Beginning net pension liability/(asset)	\$	110,931,084	\$	66,580,110	\$	3,218,104	\$	24,595,262
Ending net pension liability/(asset)	\$	100,318,386	\$	62,185,294	\$	2,299,674	\$	19,238,916
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	1,709,677	\$	1,059,793	\$	39,192	\$	327,879
Changes of assumptions		3,571,990		2,214,203		81,883		685,031
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		3,002,347	-	3,692,727	-	150,370		577,786
Total Deferred Outflows of Resources	\$.	8,284,014	\$ =	6,966,723	\$ _	271,445	\$.	1,590,696
Deferred Inflows of Resources								
Net difference between projected and actual investment earnings on pension plan investments	\$	17,056,938	\$	10,573,243	\$	391,009	\$	3,271,155
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		552,719	-	120,361	-	382,628		1,886,868
Total Deferred Inflows of Resources	\$.	17,609,657	\$ _	10,693,604	\$ _	773,637	\$.	5,158,023
Pension Expense Proportionate share of plan pension expense	\$	8,400,801	\$	5,207,483	\$	192,579	\$	1,611,095
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		873.243		1,257,711		50.819		(322,137)
		· · ·	-	1,237,711	-	50,018		(322,131)
Total Employer Pension Expense	\$.	9,274,044	\$ _	6,465,194	\$ _	243,398	\$	1,288,958
Contributions	•	0.000.400	•	0.450.004	•	207 220	•	2 205 255
Statutory required contribution	Þ	9,883,109	Þ	6,152,234	\$	367,320	\$	2,385,255
Contribution in relation to statutory required contribution		(10,283,109)		(6,152,234)	-	(367,320)		(2,385,255)
Contribution deficiency/(excess)	\$.	(400,000)	\$ =		\$ _		\$.	
Contributions as a percentage of covered payroll		34.29%		35.54%		25.59%		28.98%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023	\$	(1,362,912)	\$	(94,404)	\$	(51,974)	\$	(497,951)
June 30, 2024		(2,823,588)	•	(1,222,104)	•	(120,447)	-	(902,577)
June 30, 2025		(3,032,297)		(1,497,342)		(172,573)		(1,180,239)
June 30, 2026		(2,106,846)	-	(913,031)	_	(157,198)		(986,560)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	(9,325,643)	\$ _	(3,726,881)	\$	(502,192)	\$.	(3,567,327)
Discount Rate Sensitivity								
1% decrease (6.15%)		129,765,138		80,438,727		2,974,704		24,886,172
Current discount rate (7.15%)	\$	100,318,386	\$	62,185,294	\$	2,299,674	\$	19,238,916
1% increase (8.15%)		75,517,518		,,.	\$	1,731,145		14,482,641
Covered Payroll	\$	29,987,946	\$	17,308,432	\$	1,435,309	\$	8,229,713
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Town of Holliston		Town of Hopkinton		Town of Hudson		Town of Lincoln
Net Pension Liability								
Beginning net pension liability/(asset)	\$	25,050,502	\$	24,095,505	\$	66,148,477	\$	26,477,563
Ending net pension liability/(asset)	\$	18,170,200	\$	16,725,088	\$	59,893,267	\$	24,515,962
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	309,666	\$	285,037	\$	1,020,732	\$	417,814
Changes of assumptions		646,978		595,522		2,132,592		872,928
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		223,070		596,398		1,697,746		1,207,163
Total Deferred Outflows of Resources	\$.	1,179,714	\$.	1,476,957	\$.	4,851,070	\$.	2,497,905
Deferred Inflows of Resources								
Net difference between projected and actual investment earnings on pension plan investments	\$	3,089,443	\$	2,843,734	\$	10,183,534	\$	4,168,401
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		3,586,151		3,457,221		672,302		249,099
Total Deferred Inflows of Resources	\$:	6,675,594	\$.	6,300,955	\$.	10,855,836	\$.	4,417,500
Pension Expense Proportionate share of plan pension expense	\$	1,521,598	\$	1,400,584	\$	5,015,544	\$	2,053,002
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(833,925)		(416,652)		219,026		100,907
Total Employer Pension Expense					\$	5,234,570	\$	2,153,909
Contributions Statutory required contribution	•	2,589,575	•	2.910,419	e.	6,381,731	\$	2,587,296
Statutory required contribution.	φ	2,009,010	Φ	2,910,419	φ	0,361,731	φ	2,301,290
Contribution in relation to statutory required contribution		(2,589,575)		(2,916,805)		(6,387,468)		(2,589,045)
Contribution deficiency/(excess)	\$.	-	\$.	(6,386)	\$.	(5,737)	\$.	(1,749)
Contributions as a percentage of covered payroll		22.16%		15.72%		27.94%		22.71%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023	¢	(1,094,841)	¢	(627,969)	•	(868,990)	¢	(168,864)
June 30, 2024		(1,682,588)	Ψ	(1,447,759)	Ψ	(2,118,814)	Ψ	(736,219)
June 30, 2025		(1,489,246)		(1,515,705)		(1,824,938)		(641,414)
June 30, 2026		(1,229,205)		(1,232,565)		(1,192,024)		(373,098)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	(5,495,880)	\$	(4,823,998)	\$	(6,004,766)	\$	(1,919,595)
Discount Rate Sensitivity								
1% decrease (6.15%)		23,503,752		21,634,452		77,473,914		31,712,205
Current discount rate (7.15%)	\$	18,170,200	\$	16,725,088	\$	59,893,267	\$	24,515,962
1% increase (8.15%)	\$	13,678,135	\$	12,590,286	\$	45,086,360	\$	18,455,088
Covered Payroll	\$	11,683,621	\$	18,552,588	\$	22,864,683	\$	11,398,289
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Town of Littleton	Town of North Reading	_	Town of Pepperell		Town of Sherborn
Net Pension Liability							
Beginning net pension liability/(asset)	\$	23,466,261	\$ 50,095,267	\$	17,612,899	\$	9,801,713
Ending net pension liability/(asset)	\$	19,636,977	\$ 44,566,036	\$	15,377,884	\$	8,564,819
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	334,663	\$ 759,517	\$	262,078	\$	145,966
Changes of assumptions		699,205	1,586,842		547,553		304,964
Changes in proportion and differences between employer contributions and proportionate share of contributions		1,451,193	392,765		19,470		120,522
Total Deferred Outflows of Resources	\$ _	2,485,061	\$ 2,739,124	\$ _	829,101	\$	571,452
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments	\$	3,338,837	\$ 7,577,475	\$	2,614,671	\$	1,456,259
Changes in proportion and differences between employer contributions and proportionate share of contributions		159,606	662,566		111,471		481,950
Total Deferred Inflows of Resources	\$ _	3,498,443	\$ 8,240,041	\$	2,726,142	\$	1,938,209
Pension Expense Proportionate share of plan pension expense		1,644,428	\$ 3,732,022	\$	1,287,765	\$	717,230
in proportion and differences between employer contributions and proportionate share of contributions		577,715	(256,301)	_	(93,579)		(208,249)
Total Employer Pension Expense	\$ _	2,222,143	\$ 3,475,721	\$ _	1,194,186	\$	508,981
Contributions Statutory required contribution	\$	2,730,527	\$ 4,553,483	\$	1,671,047	\$	1,047,555
Contribution in relation to statutory required contribution		(4,061,166)	(4,553,483)	-	(1,672,631)		(1,047,555)
Contribution deficiency/(excess).	\$ _	(1,330,639)	\$ 	\$ _	(1,584)	\$	
Contributions as a percentage of covered payroll		27.22%	32.25%		30.54%		22.66%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense	_	212.221					
June 30, 2023		349,254	\$ (1,025,673)	\$	(294,464)	\$	(317,880)
June 30, 2024		(393,914) (615,099)	(1,808,640) (1,564,551)		(594,960) (582,114)		(535,800) (300,870)
June 30, 2026		(353,623)	(1,102,053)		(425,503)		(212,207)
Total Deferred Outflows/(Inflows) Recognized in	-	(000,020)	(1,102,000)	-	(120,000)	-	(212,201)
Future Pension Expense	\$ =	(1,013,382)	\$ (5,500,917)	\$ _	(1,897,041)	\$	(1,366,757)
Discount Rate Sensitivity 1% decrease (6.15%)	\$	25,401,077	\$ 57,647,636	\$	19,891,800	\$	11,078,876
Current discount rate (7.15%)	\$	19,636,977	\$ 44,566,036	\$	15,377,884	\$	8,564,819
1% increase (8.15%)	\$	14,782,293	\$ 33,548,351	\$	11,576,139	\$	6,447,411
Covered Payroll	\$	14,917,191	\$ 14,117,838	\$	5,476,497	\$	4,623,108
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Town of Shirley		Town of Stow		Town of Sudbury		Town of Tewksbury
Net Pension Liability								
Beginning net pension liability/(asset)	\$	8,952,975	\$	11,389,407	\$	61,745,935	\$	104,198,258
Ending net pension liability/(asset)	\$	8,630,720	\$	11,352,166	\$	54,643,133	\$	99,361,547
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	147,089	\$	193,469	\$	931,256	\$	1,693,370
Changes of assumptions		307,310		404,211		1,945,653		3,537,920
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	-	643,092		1,147,453		304,228		6,514,025
Total Deferred Outflows of Resources	\$ =	1,097,491	\$.	1,745,133	\$.	3,181,137	\$.	11,745,315
Deferred Inflows of Resources								
Net difference between projected and actual investment earnings on pension plan investments	\$	1,467,464	\$	1,930,186	\$	9,290,864	\$	16,894,248
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	-	1,403		20,129		759,061		565,487
Total Deferred Inflows of Resources	\$ =	1,468,867	\$.	1,950,315	\$.	10,049,925	\$.	17,459,735
Pension Expense Proportionate share of plan pension expense	\$	722,749	\$	950,646	\$	4,575,891	\$	8,320,672
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		83,762		280.843		(97,985)		1.808.853
contributions and proportionate share of contributions	-	03,702	-	200,043		(87,863)		1,000,000
Total Employer Pension Expense	\$ _	806,511	\$	1,231,489	\$	4,477,906	\$	10,129,525
Contributions								
Statutory required contribution	\$	812,736	\$	1,077,698	\$	5,622,886	\$	9,177,392
Contribution in relation to statutory required contribution	-	(812,736)		(1,077,698)		(5,622,886)		(9,177,392)
Contribution deficiency/(excess)	\$ _	-	\$	-	\$		\$	
Contributions as a percentage of covered payroll		41.84%		28.15%		29.89%		37.23%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023	¢	19,201	\$	106,023	\$	(1,304,168)	¢	(534,543)
June 30, 2024	Φ	(152,615)	Φ	(144,249)	Φ	(2,198,073)	Ф	(1,963,247)
June 30, 2025		(160,637)		(144,421)		(1,958,505)		(2,064,903)
June 30, 2026	_	(77,325)		(22,535)		(1,408,042)		(1,151,727)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ =	(371,376)	\$	(205,182)	\$	(6,868,788)	\$	(5,714,420)
Discount Rate Sensitivity								
1% decrease (6.15%)		11,164,121		14,684,401		70,682,693		128,527,435
Current discount rate (7.15%)	\$	8,630,720	\$	11,352,166	\$	54,643,133	\$	99,361,547
1% increase (8.15%)	\$	6,497,020	\$	8,545,666	\$	41,134,172	\$	74,797,230
Covered Payroll	\$	1,942,258	\$	3,828,104	\$	18,814,338	\$	24,651,278
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Town of Townsend		Town of Tyngsborough		Town of Wayland		Town of Westford
Net Pension Liability								
Beginning net pension liability/(asset)	\$	8,103,799	\$	24,002,922	\$	56,416,777	\$	56,098,309
Ending net pension liability/(asset)	\$	4,774,763	\$	21,175,029	\$	46,247,117	\$	44,844,218
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	81,374	\$	360,876	\$	788,167	\$	764,258
Changes of assumptions		170,013		753,969		1,646,700		1,596,747
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		96,188		759,785		58,540		500,972
Total Deferred Outflows of Resources	\$ _	347,575	\$	1,874,630	\$.	2,493,407	\$	2,861,977
Deferred Inflows of Resources								
Net difference between projected and actual investment earnings on pension plan investments	\$	811,844	\$	3,600,349	\$	7,863,306	\$	7,624,774
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	-	2,033,266				3,252,009		3,693,847
Total Deferred Inflows of Resources	\$ _	2,845,110	\$	3,600,349	\$.	11,115,315	\$	11,318,621
Pension Expense Proportionate share of plan pension expense	\$	399,844	\$	1,773,226	\$	3,872,798	\$	3,755,317
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(655,438)		44.324		(1,229,247)		(678,704)
contributions and proportionate share of contributions	-	(055,000)		44,324		(1,225,247)		(070,704)
Total Employer Pension Expense	\$	(255,594)	\$	1,817,550	\$	2,643,551	\$	3,076,613
Contributions								
Statutory required contribution	\$	934,704	\$	2,462,187	\$	5,378,336	\$	5,950,276
Contribution in relation to statutory required contribution		(934,704)		(2,462,187)		(5,378,336)		(5,950,276)
Contribution deficiency/(excess)	\$		\$	_	\$	-	\$	
Contributions as a percentage of covered payroll	-	25.91%		27.23%		25.39%	•	22.31%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2023	\$	(560,101)	\$	4,103	\$	(1,659,902)	\$	(1,276,212)
June 30, 2024		(737,920)	•	(506,516)	•	(2,646,624)	•	(2,677,209)
June 30, 2025		(622,711)		(719,204)		(2,414,757)		(2,528,293)
June 30, 2026	-	(576,803)		(504,102)		(1,900,625)		(1,974,930)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ _	(2,497,535)	\$	(1,725,719)	\$	(8,621,908)	\$	(8,456,644)
Discount Rate Sensitivity								
1% decrease (6.15%)		6,176,313		,,	\$	59,822,170		58,007,474
Current discount rate (7.15%)	\$	4,774,763	\$	21,175,029	\$	46,247,117	\$	44,844,218
1% increase (8.15%)	\$	3,594,339	\$	15,940,105	\$	34,813,832	\$	33,757,760
Covered Payroll	\$	3,607,178	\$	9,042,420	\$	21,184,193	\$	26,671,296
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

		Town of Weston	-	Town of Wilmington	Acton- Boxborough Regional School District	-	Acton Water Supply
Net Pension Liability Beginning net pension liability/(asset)	. \$	64,849,395	\$	86,423,315	\$ 30,083,545	\$	3,548,184
Ending net pension liability/(asset)	. \$	59,360,735	\$	76,302,617	\$ 24,866,009	\$	3,246,366
Deferred Outflows of Resources							
Differences between expected and actual experience	\$	1,011,656	\$	1,300,388	\$ 423,779	\$	55,326
Changes of assumptions.		2,113,630		2,716,872	885,392		115,592
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,851,892		1,345,055	408,886		56,708
			•		400,000		50,700
Total Deferred Outflows of Resources	\$	4,977,178	\$	5,362,315	\$ 1,718,057	\$.	227,626
Deferred Inflows of Resources							
Net difference between projected and actual investment earnings on pension plan investments	\$	10,092,989	\$	12.973,584	\$ 4,227.919	\$	551,973
Changes in proportion and differences between employer contributions and proportionate							
share of contributions		544,687		261,431	1,039,352		119,417
Total Deferred Inflows of Resources	\$	10,637,676	. \$	13,235,015	\$ 5,267,271	\$	671,390
Pension Expense							
Proportionate share of plan pension expense	\$	4,970,950	\$	6,389,687	\$ 2,082,316	\$	271,855
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(280,114)		372,046	(85,208)		(46,644)
Total Employer Pension Expense	. \$	4,690,836	. \$	6,761,733	\$ 1,997,108	\$	225,211
Contributions							
Statutory required contribution	. \$	5,898,122	\$	7,801,298	\$ 3,124,290	\$	268,502
Contribution in relation to statutory required contribution		(5,898,122)		(9,306,639)	(3,124,290)		(268,502)
Contribution deficiency/(excess)	. \$		\$	(1,505,341)	\$ 	\$.	
Contributions as a percentage of covered payroll		27.13%		36.92%	21.25%		21.54%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense							
June 30, 2023	. \$	(842,684)	\$	(1,177,785)	\$ (451,305)	\$	(94,722)
June 30, 2024		(1,928,421)		(2,467,635)	(1,015,154)		(152,066)
June 30, 2025		(1,763,843)		(2,511,551)	(1,157,489)		(124,279)
June 30, 2026		(1,125,550)		(1,715,729)	(925,266)		(72,697)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	(5,660,498)	\$	(7,872,700)	\$ (3,549,214)	\$	(443,764)
Discount Bata Constitute				_	_		
Discount Rate Sensitivity 1% decrease (6.15%).	\$	76,785,067	\$	98,699,949	\$ 32,165,002	\$	4,199,281
Current discount rate (7.15%)	. \$	59,360,735	\$	76,302,617	\$ 24,866,009	\$	3,246,366
1% increase (8.15%)	\$	44,685,481	\$	57,438,965	\$ 18,718,595	\$	2,443,794
Covered Payroll	. \$	21,737,198	\$	25,210,625	\$ 14,699,280	\$	1,246,732
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Bedford Housing Authority		Billerica Housing Authority		Chelmsford Housing Authority		Chelmsford Water District
Net Pension Liability		045 500	•	4 040 000	•	0.040.050	•	04.404
Beginning net pension liability/(asset) Ending net pension liability/(asset)		315,580 255,587	\$	1,612,020	\$	2,016,950 1,656,493	\$	24,164 (1.005,744)
	*		•	.,	*	1,000,100	•	(1,000,111)
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	œ.	4,356	\$	17,762	e	28.231	\$	(17 140)
Changes of assumptions		9.101	Φ	37.110	J	58.982	Φ	(17,140)
Changes of assumptions		3,101		37,110		30,302		(55,611)
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	-	478		51,504		34,021		137,703
Total Deferred Outflows of Resources	\$ =	13,935	\$	106,376	\$	121,234	\$.	84,752
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments	\$	43,457	\$	177,208	\$	281,650	\$	(171,005)
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	24,585		335,044		111,642		1,053,282
Total Deferred Inflows of Resources	•	68,042		512,252	6	393.292	\$	882,277
Total Deletted littlows of Resources	Φ =	00,042	4	512,232	\$	393,292	Φ.	002,211
Pension Expense Proportionate share of plan pension expense	\$	21,404	\$	87,278	\$	138,715	\$	(84,224)
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(6,054)		(65,098)		152,538		(191,293)
Total Employer Pension Expense	\$ _	15,350	\$	22,180	\$	291,253	\$	(275,517)
Contributions								
Statutory required contribution	\$	28,862	\$	130,292	\$	248,780	\$	70,601
Contribution in relation to statutory required contribution	-	(28,862)		(130,292)		(248,780)		(70,601)
Contribution deficiency/(excess)	\$_	-	\$		\$	-	\$	-
Contributions as a percentage of covered payroll		23.86%		33.67%		8.04%		4.57%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023	\$	(11,104)	\$	(83,024)	\$	(30.816)	\$	(150,403)
June 30, 2024		(16,712)		(94,270)		(98,083)		(267,921)
June 30, 2025		(14,856)		(119,348)		(87,072)		(207,483)
June 30, 2026	_	(11,435)		(109,234)		(56,087)		(171,718)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$_	(54,107)	\$	(405,876)	\$	(272,058)	\$	(797,525)
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	330,610	\$	1,348,158	\$	2,142,728	\$	(1,300,963)
Current discount rate (7.15%)	\$	255,587	\$	1,042,229	\$	1,656,493	\$	(1,005,744)
1% increase (8.15%)	\$	192,400	\$	784,568	\$	1,246,972	\$	(757,102)
Covered Payroll	\$	120,957	\$	386,955	\$	3,092,974	\$	1,544,300
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	-	Dracut Housing Authority		Dracut Water Supply		East Chelmsford Water District	-	East Middlesex Mosquito Control
Net Pension Liability Beginning net pension liability/(asset)	\$	2,264,513	\$	3,240,627	\$	366,619	\$	649,547
Ending net pension liability/(asset)	\$	1,703,681	\$	3,204,541	\$	183,163	\$	465,506
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	29,035	\$	54,613	\$	3,122	\$	7,933
Changes of assumptions		60,662		114,103		6,522		16,575
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		18,316		255,912		7,870		24,008
Total Deferred Outflows of Resources	\$.	108,013	\$	424,628	\$	17,514	\$	48,516
Deferred Inflows of Resources								
Net difference between projected and actual investment earnings on pension plan investments	\$	289,674	\$	544,862	\$	31,143	\$	79,149
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	-	290,811		56,010		117,389	-	111,666
Total Deferred Inflows of Resources	\$:	580,485	\$	600,872	\$	148,532	\$.	190,815
Pension Expense Proportionate share of plan pension expense	\$	142,670	\$	268,354	\$	15,337	\$	38,982
Net amortization of deferred amounts from changes in proportion and differences between employer								
contributions and proportionate share of contributions		(62,397)		94,931		(23,272)	-	(23,007)
Total Employer Pension Expense	\$	80,273	\$	363,285	\$	(7,935)	\$	15,975
Contributions Statutory required contribution	•	170,394	•	252,748	•	37,612	¢	58,341
				(252,748)	φ	(37,612)	φ	
Contribution in relation to statutory required contribution					_			(58,341)
Contribution deficiency/(excess)	\$.		\$		\$		\$ _	
Contributions as a percentage of covered payroll		41.32%		40.36%		17.52%		14.76%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2023		(108,543)	\$	(27,177)	\$	(25,964)	\$	(17,251)
June 30, 2024		(120,980) (130,093)		(68,172) (59,117)		(35,486) (36,627)		(43,180) (47,219)
June 30, 2026		(112,856)		(21,778)		(32,941)		(34,649)
Total Deferred Outflows/(Inflows) Recognized in							-	
Future Pension Expense	\$ _	(472,472)	\$	(176,244)	\$	(131,018)	\$	(142,299)
<u>Discount Rate Sensitivity</u> 1% decrease (6.15%)	\$	2,203,768	\$	4,145,179	\$	236,927	\$	602,147
Current discount rate (7.15%)	\$	1,703,681	\$	3,204,541	\$	183,163	\$	465,506
1% increase (8.15%)	\$	1,282,494	\$	2,412,309	\$	137,881	\$	350,423
Covered Payroll	\$	412,422	\$	626,182	\$	214,654	\$	395,169
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

		Greater Lowell						
		Regional Vocation Technical School District		Groton- Dunstable Regional School District		Hudson Housing Authority		Lincoln- Sudbury Regional School Distric
Net Pension Liability								
Beginning net pension liability/(asset)	\$	17,820,793	\$	12,381,614	\$	616,643	\$	8,715,281
Ending net pension liability/(asset)	\$	17,260,795	\$	11,406,839	\$	568,228	\$	8,307,816
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	294,167	\$	194,401	\$	9,684	\$	141,586
Changes of assumptions		614,597		406,158		20,233		295,813
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		1,446,808		669,010		22,520		493.356
share of contributions.	-	1,440,000		010,800		22,320		493,330
Total Deferred Outflows of Resources	\$ =	2,355,572	\$	1,269,569	\$	52,437	\$	930,755
Deferred Inflows of Resources								
Net difference between projected and actual	_		_		_		_	
investment earnings on pension plan investments	\$	2,934,819	\$	1,939,482	\$	96,615	\$	1,412,562
Changes in proportion and differences between								
employer contributions and proportionate		107.101		00.704		404 777		407.046
share of contributions	-	107,491		82,794		191,777		187,046
Total Deferred Inflows of Resources	\$ =	3,042,310	\$	2,022,276	\$	288,392	\$	1,599,608
Pension Expense								
Proportionate share of plan pension expense	\$	1,445,444	\$	955,224	\$	47,584	\$	695,708
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		451,134		295,624		(140,304)		56,763
dominations and proportionate order of contributions	-	101,101				(110,001)		
Total Employer Pension Expense	\$ =	1,896,578	\$	1,250,848	\$	(92,720)	\$	752,471
Contributions								
Statutory required contribution	\$	1,453,154	\$	1,173,066	\$	58,322	\$	756,986
Contribution in relation to statutory required contribution		(1,453,154)		(1,173,066)		(58,322)		(756,986
Contribution deficiency/(excess)	æ.		æ		\$		¢.	
Contribution delicency (excess)	Ψ=		Ψ		•		•	
Contributions as a percentage of covered payroll		30.69%		27.72%		13.77%		25.29%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2023	\$	65,263	\$	46,428	\$	(100,955)	\$	(115,961
June 30, 2024		(211,852)		(265,868)		(107,073)		(257,546
June 30, 2025		(367,974)		(340,924)		(18,351)		(196,364
Total Deferred Outflows/(Inflows) Recognized in	-	(172,175)		(192,343)		(9,576)		(98,982
Future Pension Expense.	\$ _	(686,738)	\$	(752,707)	\$	(235,955)	\$	(668,853
Discount Rate Sensitivity								
1% decrease (6.15%)	\$	22,327,407	\$	14,755,122	\$	735,022	\$	10,746,434
Current discount rate (7.15%)	\$	17,260,795	\$	11,406,839	\$	568,228	\$	8,307,816
	_	12,993,554	\$	8.586,822	\$	427,750	\$	6,253,945
1% increase (8.15%)	\$	12,993,554	•		*			
1% increase (8.15%)		4,734,333	\$	4,231,955	\$	423,443	\$	2,993,714

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	Nashoba Valley Technical High School District		North Chelmsford Water District		North Middlesex Regional School District		Shawsheen Valley Regional Vocational Technical School
Net Pension Liability Beginning net pension liability/(asset)	\$ 3,650,910	\$	977,691	\$	12,806,518	\$	8,542,800
Ending net pension liability/(asset)	\$ 3,439,271	\$	628,790	\$	11,254,512	\$	8,099,773
Deferred Outflows of Resources							
Differences between expected and actual experience	\$ 58,614	\$	10,716	\$	191,805	\$	138,040
Changes of assumptions	122,461		22,389		400,734		288,405
Changes in proportion and differences between employer contributions and proportionate	005 700		40.000				444.000
share of contributions	225,799		18,806		80,780		444,986
Total Deferred Outflows of Resources	\$ 406,874	\$	51,911	\$	673,319	\$	871,431
Deferred Inflows of Resources							
Net difference between projected and actual investment earnings on pension plan investments	\$ 584,772	\$	106,912	\$	1,913,583	\$	1,377,188
Changes in proportion and differences between							
employer contributions and proportionate							
share of contributions	40,422		247,901		27,663		32,627
Total Deferred Inflows of Resources	\$ 625,194	\$	354,813	\$	1,941,246	\$	1,409,815
Pension Expense Proportionate share of plan pension expense	\$ 288,008	\$	52,655	\$	942,468	\$	678,286
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	59,612		(34,445)		(1,235)		(14,567)
Total Employer Pension Expense	\$ 347,620	\$	18,210	\$	941,233	\$	663,719
Contributions Statutory required contribution	\$ 327,120	s	78,589	\$	1,219,851	s	723.882
Contribution in relation to statutory required contribution	(327,120)	•	(78,589)	*	(1,219,851)		(723,882)
Contribution deficiency/(excess)		s	(10,000)	\$	(1,210,001)	\$	(120,002)
Contributions as a percentage of covered payroll	31.50%	٥	13.61%	Ψ	21.04%	٥	24 28%
	31.3076		13.01%		21.0476		24.2070
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense							
June 30, 2023	\$ (36,775)	\$	(58,947)	\$	(148,808)	\$	(48,876)
June 30, 2024	(65,380)		(90,373)		(399,528)		(184,656)
June 30, 2025	(69,335)		(86,648)		(424,089)		(196,354)
June 30, 2026	(46,830)		(66,934)		(295,502)		(108,498)
Future Pension Expense	\$ (218,320)	\$	(302,902)	\$	(1,267,927)	\$	(538,384)
Discount Rate Sensitivity							
1% decrease (6.15%).	\$ 4,448,810	\$	813,361	\$	14,558,082	\$	10,477,323
Current discount rate (7.15%).	\$ 3,439,271	\$	628,790	\$	11,254,512	\$	8,099,773
1% increase (8.15%)	\$ 2,589,009	\$	473,340	\$	8,472,154	\$	6,097,334
Covered Payroll	\$ 1,038,502	\$	577,414	\$	5,799,083	\$	2,981,397
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	South Middlesex Regional Vocational Fechnical Schoo	ol	Sudbury Water District	Tewksbury Housing Authority	 Wayland Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	\$ 6,677,782	\$	2,449,672	\$ 1,645,758	\$ 625,875
Ending net pension liability/(asset)	\$ 6,194,749	\$	1,399,802	\$ 1,475,444	\$ 371,407
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$ 105,574	\$	23,856	\$ 25,145	\$ 6,330
Changes of assumptions	220,574		49,842	52,535	13,225
Changes in proportion and differences between employer contributions and proportionate share of contributions	244,125		162,541_	24,420	 6,105
Total Deferred Outflows of Resources	\$ 570,273	\$	236,239	\$ 102,100	\$ 25,660
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments	\$ 1,053,281	\$	238,006	\$ 250,867	\$ 63,150
Changes in proportion and differences between employer contributions and proportionate share of contributions	137,991		715,804	13,101	 184,183
Total Deferred Inflows of Resources	\$ 1,191,272	\$	953,810	\$ 263,968	\$ 247,333
Pension Expense Proportionate share of plan pension expense	\$ 518,757	\$	117,223	\$ 123,557	\$ 31,102
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	(137,550)		(150,161)	6,208	 (48,108)
Total Employer Pension Expense	\$ 381,207	\$	(32,938)	\$ 129,765	\$ (17,006)
<u>Contributions</u> Statutory required contribution	\$ 580,201	\$	178,572	\$ 142,280	\$ 57,807
Contribution in relation to statutory required contribution			(178,572)	(142,280)	 (57,807)
Contribution deficiency/(excess)		\$		\$ _	\$ _
Contributions as a percentage of covered payroll	25.69%		17.89%	29.34%	17.38%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2023. June 30, 2024. June 30, 2025. June 30, 2026. Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.	(100,619) (232,161) (181,673) (106,546) (620,999)		(114,909) (163,940) (235,730) (202,992) (717,571)	(23,442) (48,629) (54,169) (35,628) (161,868)	 (52,982) (66,541) (55,201) (46,949)
Discount Rate Sensitivity 1% decrease (6.15%).	\$ 8,013,112	\$	1,810,690	\$ 1,908,535	\$ 480,427
Current discount rate (7.15%)	\$ 6,194,749	\$	1,399,802	\$ 1,475,444	\$ 371,407
1% increase (8.15%)	\$ 4,663,273	\$	1,053,741	\$ 1,110,682	\$ 279,587
Covered Payroll	\$ 2,258,149	\$	998,296	\$ 484,993	\$ 332,528
See notes to schedule of employer allocations and schedule of pension amounts by employer.					(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Hopkinton Housing Authority		Sudbury Housing Authority		Wilmington Housing Authority	_	Acton Housing Authority
Net Pension Liability	•	E47.677	\$	405.040	•	270.672	•	004.470
Beginning net pension liability/(asset) Ending net pension liability/(asset)		517,677 498,319	\$	465,613 458,401	\$	370,673 185,577	\$	861,176 721,454
	•		•	,	•	,	•	
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	g.	8,493	\$	7,812	9	3.163	\$	12,295
Changes of assumptions		17.743	Ψ	16.322	Ψ	6.608	Ψ	25.688
Changes in proportion and differences between employer contributions and proportionate share of contributions		35,164		40,584		6,243		46 227
share of contributions	-	33,104		40,364		0,243	-	16,337
Total Deferred Outflows of Resources	\$ =	61,400	\$	64,718	\$	16,014	\$ =	54,320
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments Changes in proportion and differences between	\$	84,728	\$	77,941	\$	31,553	\$	122,667
employer contributions and proportionate share of contributions.	_	1,914		4,303		115,318	_	42,075
Total Deferred Inflows of Resources	•	86,642		82,244	•	146.871	\$	164,742
Total Deferred limows of Resources	Φ =	00,042	4	02,244	Э,	140,071	⊅ =	104,742
Pension Expense Proportionate share of plan pension expense	\$	41,729	\$	38,387	\$	15,538	\$	60,416
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(1,043)		18,865		(23,145)		(42,956)
Total Employer Pension Expense	\$ =	40,686	\$	57,252	\$	(7,607)	\$ _	17,460
Contributions Statutory required contribution	\$	43,799	\$	43,182	\$	35,519	\$	77,609
Contribution in relation to statutory required contribution	_	(43,799)		(43,182)		(35,519)		(77,609)
Contribution deficiency/(excess)	\$ _		\$		\$		\$_	_
Contributions as a percentage of covered payroll		35.01%		27.40%		56.04%		16.24%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2023		1,206	\$	415	\$	(29,369)	\$	(11,816)
June 30, 2024 June 30, 2025		(10,045)		(8,403)		(32,859)		(33,108)
June 30, 2026.		(11,164) (5,239)		(7,416) (2,122)		(34,892) (33,737)		(38,379) (27,119)
Total Deferred Outflows/(Inflows) Recognized in	-	(-,)		(=, -=-)		(==,:=:)	-	(=:(:::)
Future Pension Expense.	\$ =	(25,242)	\$	(17,526)	\$	(130,857)	\$ =	(110,422)
Discount Rate Sensitivity 1% decrease (6.15%)	\$	644,592	\$	592,957	\$	240,050	\$	933,225
Current discount rate (7.15%)	\$	498,319	\$	458,401	\$	185,577	\$	721,454
1% increase (8.15%)	\$	375,124	\$	345,074	\$	139,698	\$	543,095
Covered Payroll	\$	125,114	\$	157,571	\$	63,386	\$	477,825
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Burlington Housing Authority	Ayer Housing Authority	-	Holliston Housing Authority	_	Littleton Housing Authority
Net Pension Liability							
Beginning net pension liability/(asset)	\$	327,467	\$ 858,485	\$	168,599	\$	607,838
Ending net pension liability/(asset)	\$	4,057	\$ 691,363	\$	93,451	\$	665,340
Deferred Outflows of Resources							
Differences between expected and actual experience	\$	69	\$ 11,783	\$	1,593	\$	11,339
Changes of assumptions		144	24,617		3,327		23,690
Changes in proportion and differences between employer contributions and proportionate							
share of contributions	-	75,912	15,654	-	7,322	-	141,102
Total Deferred Outflows of Resources	\$ _	76,125	\$ 52,054	\$ _	12,242	\$ _	176,131
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments Changes in proportion and differences between	\$	690	\$ 117,551	\$	15,889	\$	113,126
employer contributions and proportionate share of contributions.	_	241,805	72,082	_	41,832	_	3,524
Total Deferred Inflows of Resources	\$ _	242,495	\$ 189,633	\$ _	57,721	\$	116,650
Pension Expense Proportionate share of plan pension expense	\$	339	\$ 57,896	\$	7,825	\$	55,716
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(15,922)	(214,539)		(19,696)		43,282
Total Employer Pension Expense	\$ _	(15,583)	\$ (156,643)	\$ _	(11,871)	\$ _	98,998
Contributions Statutory required contribution	\$	35,290	\$ 66,830	\$	19,951	\$	48,297
Contribution in relation to statutory required contribution	-	(35,290)	(66,830)	-	(19,951)	-	(48,297)
Contribution deficiency/(excess)	\$ _		\$ -	\$ _	_	\$ _	
Contributions as a percentage of covered payroll		16 .16%	33.75%		23.14%		#DIV/0!
Deferred Outflows/(Inflows) Recognized in Future Pension Expense							
June 30, 2023		(16,834)	\$ (28,936)	\$	(7,551)	\$	30,413
June 30, 2024		(30,214)	(33,326)		(11,254)		20,584
June 30, 2025		(61,524)	(41,167)		(13,715)		823
June 30, 2026	_	(57,798)	(34,150)		(12,959)		7,661
Total Deferred Outflows/(Inflows) Recognized in							
Future Pension Expense	\$ =	(166,370)	\$ (137,579)	\$ _	(45,479)	\$ =	59,481
Discount Rate Sensitivity							
1% decrease (6.15%)	\$	5,248	\$ 894,301	\$	120,882	\$	860,639
Current discount rate (7.15%)	\$	4,057	\$ 691,363	\$	93,451	\$	665,340
1% increase (8.15%)	\$	3,054	\$ 520,443	\$	70,348	\$	500,854
Covered Payroll	\$	218,402	\$ 198,031	\$	86,205	\$	-
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Westford Housing Authority	Shirley Water District	Tyngsborough Housing Authority	-	Pepperell Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	¢	537,128	\$ 453,772	\$ 516,453	\$	247,338
Ending net pension liability/(asset)		285,368	\$ 310,034	\$ 504,387	\$	212,725
Defeated Outlines of Bossesses						
<u>Deferred Outflows of Resources</u> <u>Differences between expected and actual experience</u>	\$	4,863	\$ 5,284	\$ 8,596	\$	3,625
Changes of assumptions		10,161	11,039	17,959		7,574
Changes in proportion and differences between employer contributions and proportionate						
share of contributions	-		21,480	46,081		21,097
Total Deferred Outflows of Resources	\$ _	15,024	\$ 37,803	\$ 72,636	\$ _	32,296
Deferred Inflows of Resources Net difference between projected and actual investment earnings on pension plan investments Changes in proportion and differences between	\$	48,521	\$ 52,714	\$ 85,760	\$	36,169
employer contributions and proportionate share of contributions	_	157,431	93,820	7,839	_	3,939
Total Deferred Inflows of Resources	\$ _	205,952	\$ 146,534	\$ 93,599	\$ _	40,108
Pension Expense						
Proportionate share of plan pension expense	\$	23,897	\$ 25,961	\$ 42,238	\$	17,815
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(33,256)	(17,914)	13,081		11,245
Total Employer Pension Expense	\$ =	(9,359)	\$ 8,047	\$ 55,319	\$	29,060
Contributions Statutory required contribution	\$	53,528	\$ 36,292	47,279	\$	24,032
Contribution in relation to statutory required contribution	_	(53,528)	(36,292)	(47,279)		(24,032)
Contribution deficiency/(excess)	\$ _		\$ 	\$ 	\$ _	_
Contributions as a percentage of covered payroll		20.20%	15. 81 %	26.28%		24.64%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense						
June 30, 2023		(45,319)	\$ (17,003)	\$ (2,037)	\$	5,080
June 30, 2024		(50,263)	(27,553)	(8,801)		1,729
June 30, 2025		(49,830)	(36,348)	(6,917)		(8,173)
June 30, 2026	-	(45,516)	(27,827)	(3,208)	-	(6,448)
Future Pension Expense	\$ _	(190,928)	\$ (108,731)	\$ (20,963)	\$	(7,812)
Discount Rate Sensitivity						
1% decrease (6.15%)	\$	369,133	\$ 4 01, 03 9	\$ 652, 44 1	\$	275,167
Current discount rate (7.15%)	\$	285,368	\$ 310,034	\$ 504,387	\$	212,725
1% increase (8.15%)	\$	214,819	\$ 233,387	\$ 379,692	\$	160,135
Covered Payroll	\$	265,045	\$ 229,540	\$ 179,917	\$	97,538
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	_	Groton Housing Authority		Tyngsborough Water District		North Reading Housing Authority		West Groton Water
Net Pension Liability Beginning net pension liability/(asset)	\$	-	\$	440,581	\$	212,881	\$	18,060
Ending net pension liability/(asset)	\$	=	\$	370,151	\$	26,035	\$	(39,887)
<u>Deferred Outflows of Resources</u>	_		_		_			
Differences between expected and actual experience		-	\$	6,308	\$	444 927	\$	(680)
Changes of assumptions		-		13,180		927		(1,420)
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		8,244		9,051		23,015		2,149
Total Deferred Outflows of Resources	\$_	8,244	\$	28,539	\$	24,386	\$	49
Deferred Inflows of Resources	-							
Net difference between projected and actual								
investment earnings on pension plan investments	\$	-	\$	62,936	\$	4,427	\$	(6,782)
Changes in proportion and differences between employer contributions and proportionate								
share of contributions and proportionate	_	-		23,708		131,128		55,970
Total Deferred Inflows of Resources	\$ _	-	\$	86,644	\$	135,555	\$	49,188
Pension Expense								
Proportionate share of plan pension expense	\$	=	\$	30,996	\$	2,179	\$	(3,342)
Net amortization of deferred amounts from changes in proportion and differences between employer								
contributions and proportionate share of contributions	_	546		(3,199)		(21,538)		(11,521)
Total Employer Pension Expense	\$ =	546	\$	27,797	\$	(19,359)	\$	(14,863)
Contributions								
Statutory required contribution	\$	-	\$	43,481	\$	22,357	\$	2,709
Contribution in relation to statutory required contribution	-	-		(43,481)		(22,357)		(2,709)
Contribution deficiency/(excess)	\$ _	-	\$		\$		\$	
Contributions as a percentage of covered payroll		0.00%		18.69%		36.50%		1.40%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2023	œ	4.832	æ	(4,877)	•	(21,471)	•	(12.289)
June 30, 2024		2,839	φ	(19,573)	φ	(23,712)	φ	(13,638)
June 30, 2025		573		(20,726)		(32,507)		(12,959)
June 30, 2026				(12,929)		(33,479)		(10,253)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.	_	8,244	¢	(58,105)	æ	(111,169)	¢	
Tutale Folision Expense.	Ψ =	0,2-1-1	Ψ	(00,100)	Ψ	(111,100)	Ψ	(40,100)
Discount Rate Sensitivity								
1% decrease (6.15%)		-	\$	478,803	\$	33,677	\$	(51,595)
Current discount rate (7.15%)	\$	-	\$	370,151	\$	26,035	\$	(39,887)
1% increase (8.15%)	\$	-	\$	278,642	\$	19,599	\$	(30,026)
Covered Payroll	\$	-	\$	232,657	\$	61,252	\$	193,409

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2021

	Ayer-Shirley Regional School District	Northern Middlesex Regional Emergency Communications Center	Totals
Net Pension Liability Beginning net pension liability/(asset)	\$ 4,239,976	\$ (14,725)	\$ 1,531,093,126
Ending net pension liability/(asset)	\$ 2,097,697	\$ 328,026	\$ 1,340,727,512
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$ 35,750	\$ 5,590	\$ 22,849,362
Changes of assumptions	74,692	11,680	47,738,660
Changes in proportion and differences between employer contributions and proportionate share of contributions	105,858	283,044	38,895,800
Total Deferred Outflows of Resources	\$ 216,300	\$ 300,314	\$ 109,483,822
Deferred Inflows of Resources			
Net difference between projected and actual investment earnings on pension plan investments	\$ 356,667	\$ 55,774	\$ 227,961,260
Changes in proportion and differences between employer contributions and proportionate share of contributions	1,507,225	7.839	38.895.800
Total Deferred Inflows of Resources		\$ 63,613	\$ 266,857,060
Pension Expense Proportionate share of plan pension expense	\$ 175,664	\$ 27,474	\$ 112,703,191
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	(393,228)	68,149	_
Total Employer Pension Expense		\$	\$ 112,703,191
Contributions Statutory required contribution	\$ 513,767	\$ -	\$ 144,255,207
Contribution in relation to statutory required contribution	(513,767)		(147,852,245)
Contribution deficiency/(excess)	\$ 	\$ 	\$ (3,597,038)
Contributions as a percentage of covered payroll	12.60%	0.00%	28.47%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense			
June 30, 2023. June 30, 2024. June 30, 2025. June 30, 2026.	(354,951) (502,909) (420,813) (368,919)	\$ 62,706 56,122 55,891 61,982	\$ (22,243,804) (49,152,268) (50,098,614) (35,878,552)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ (1,647,592)	\$ 236,701	\$ (157,373,238)
Discount Rate Sensitivity 1% decrease (6.15%)	\$ 2,713,437	\$ 424,312	\$ 1,73 4 ,275,212
Current discount rate (7.15%)	\$ 2,097,697	\$ 328,026	\$ 1,340,727,512
1% increase (8.15%)	\$ 1,579,101	\$ 246,931	\$ 1,009,270,759
Covered Payroll	\$ 4,076,791	\$ 923,210	\$ 519,239,589
See notes to schedule of employer allocations and schedule of pension amounts by employer.			(Concluded)

Middlesex County Retirement System

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NOTE A - Schedule of Employer Allocations

Governmental Accounting Standards Board (GASB) Statement #68 requires employers participating in a costsharing pension plan to recognize pension liabilities as employees provide services to the government and earn their pension benefits. Employers participating in cost-sharing plans are required to recognize their proportionate share of the plan's collective pension amounts for all benefits provided through the plan including the net pension liability, deferred outflows of resources, deferred inflows of resources, pension expense, and contributions.

GASB Statement #68 requires the allocation of the collective pension amounts be consistent with the manner in which contributions to the plan are determined. As permissible under GASB Statement #68, The Schedule of Employer Allocations is used to demonstrate the allocation of Middlesex County Retirement System's collective pension amounts.

Massachusetts General Law (MGL) Chapter 32 Section 22 Paragraph 7c dictates that Massachusetts cost sharing defined benefit pension plans allocate the annual required pension fund appropriation to employer units based on their proportionate share of the aggregate of the annual rates of regular compensation of all members in service of the system. The Public Employee Retirement Administration Commission (PERAC) approves each system's proportionate share of the annual required contribution. PERAC can accept alternative allocation methodologies and as such the MCRS has elected to use an actuarial based allocation methodology. Accordingly, each member unit's proportionate share of the total pension liability has been calculated based on each member unit's actual current employees, retirees and inactive participants. Each member's share of the MCRS's net position at year end is calculated by starting with the balance carried forward from the prior year. Each member unit is then credited with the actual required contribution received during the year along with any excess contributions received. Each member unit's share is reduced by the actual payment made to their specific retirees. Net investment income is allocated based on each member's money-weighted rate of return. All other shared expenses are allocated based on the proportionate share of the total pension liability. The difference between the total pension liability and the net position is reported as the net pension liability.

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County and Middlesex Hospital be transferred to the Commonwealth. The legislation required that County and Hospital retirees and beneficiaries remain with the County Retirement System. The Commonwealth provided a mechanism, in the legislation, that fully funded the actuarially determined liability of those retirees. At December 31, 2018, the remaining liabilities for Middlesex County and the Middlesex Hospital retirees and beneficiaries were actuarially determined and are separately identified in the MCRS's funding schedule. No assets have been allocated to cover the remaining liability and therefore the liability has been allocated to the remaining member units.

The current employees, retirees, beneficiaries and inactive participants of the MCRS have been identified and their total pension liability has been actuarially determined. For transparency purposes, the MCRS has historically paid a contribution as an employer to itself. However, with the implementation of GASB 67 & 68 the net pension liability is allocated to each member unit.

When a member unit accepts an Early Retirement Incentive Program (E.R.I. or ERIP), PERAC completes an analysis of the costs and liabilities attributable to the additional benefits payable in accordance with the ERIP. The accrued liability for the members who accept the ERIP as retirees including the ERIP less the accrued liability for the members as active employees excluding the ERIP represents the increase in accrued liability due to the ERIP. The net increase is amortized for each member unit accepting the ERIP and is separately identified in the MCRS's funding schedule. The 2010 ERIP amortization is straight line ending in fiscal 2022.

Middlesex County Retirement System

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NOTE B - Schedule of Pension Amounts by Employer

The Schedule of Pension Amounts by Employer presents the net pension liability, the various categories of deferred outflows of resources and deferred inflows of resources, contributions and pension expense for all participating employers including differences between expected and actual economic experience; differences between projected and actual investment earnings, net; and changes of assumptions.

The following assumption changes were reflected in the January 1, 2022 actuarial valuation.

Changes in Assumptions

- The net investment return assumption was lowered from 7.30% to 7.15%.
- The mortality projection scale was updated from MP-2017 to MP-2021.

Changes in Plan Provisions

None.

Middlesex County Retirement System

53 Audit of Specific Elements, Accounts and Items of Financial Statements

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2020

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2020

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Financial Section

Middlesex County Retirement System

Financial Section

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Powers & Sullivan, LLC

Certified Public Accountants



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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Report on the Financial Statements

We have audited the accompanying financial statements of Middlesex County Retirement System as of and for the year ended December 31, 2020, and the related notes to the financial statements, which collectively comprise the Middlesex County Retirement System's financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

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

Auditor's Responsibility

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

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

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

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Middlesex County Retirement System as of December 31, 2020, and the results of its operations and changes in its financial position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

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

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated July 13, 2021 on our consideration of the Middlesex County Retirement System's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, grant agreements and other matters. The purpose of that report is 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 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 Middlesex County Retirement System's internal control over financial reporting and compliance.

Restriction on Use

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This report is intended solely for the information and use of the Middlesex County Retirement System, the Public Employee Retirement Administration Commission and all member units and is not intended to be and should not be used by anyone other than these specified parties.

July 13, 2021

Management's Discussion and Analysis

As management of the Middlesex County Retirement System (MCRS), we offer readers of these financial statements this narrative overview and analysis of the financial activities for the year ended December 31, 2020. The MCRS complies with financial reporting requirements issued by the Governmental Accounting Standards Board (GASB).

The GASB is the authoritative standard setting body that provides guidance on how to prepare financial statements in conformity with generally accepted accounting principles (GAAP). Users of these financial statements rely on the GASB to establish consistent reporting standards for all governments in the United States. This consistent application is the only way users can assess the financial condition of a public retirement system compared to others.

Financial Highlights

- The MCRS's assets exceeded its liabilities at the close of the most recent year by \$1.8 billion (net
 position).
- The MCRS's net position increased by \$190.6 million for the year ended December 31, 2020.
- Total investment income was \$192.9 million; investment expenses were \$7.4 million; and net investment income was \$185.4 million.
- Total contributions were \$196.5 million, primarily consisting of \$138.3 million from employers, \$51 million from members, \$5.2 million in transfers from other systems and \$2 million in other contributions.
- Retirement benefits, refunds, and transfers of member deductions to other systems amounted to \$188 million
- Depreciation, administrative and building expenses were \$3.3 million.
- The total pension liability was \$3.3 billion as of December 31, 2020, while the net pension liability was \$1.5 billion.
- The Plan fiduciary net position as a percentage of the total pension liability was 53.42%.

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the MCRS's fiduciary financial statements. These fiduciary financial statements comprise of four components: 1) management's discussion and analysis, 2) fiduciary financial statements, 3) notes to the financial statements and 4) required supplementary information.

Fiduciary Financial Statements

The *statement of fiduciary net position* presents information on all assets and deferred outflows less deferred inflows and liabilities with the difference reported as *net position*. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position is improving or deteriorating.

The statement of changes in fiduciary net position presents information showing how the MCRS's net position changed during the most recent year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, additions and deductions are reported in this statement for some items that will only result in cash flows in future periods.

Notes to the financial statements

The notes provide additional information that is essential to a full understanding of the data provided in the fiduciary financial statements.

Middlesex County Retirement System

Management's Discussion and Analysis

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context.

Financial Analysis

As noted earlier, net position may serve over time as a useful indicator of the MCRS's financial position. The MCRS's assets exceeded liabilities by \$1.8 billion at the close of 2020.

The assets accumulated are held to provide pension benefits for qualified retirees along with active and inactive employees of the member units. At year-end, the MCRS's net position included investments of \$1.7 billion, cash of \$41.1 million and current accounts receivable of \$4.4 million. The system also had capital assets, net of accumulated depreciation, of \$4.4 million at year-end primarily consisting of land, an office building, and building improvements.

In 2020, the MCRS's contributions were \$196.5 million while deductions were \$191.3 million which resulted in a current surplus of \$5.2 million. In 2019, the MCRS's contributions were \$189 million while deductions were \$181.8 million which resulted in a prior year surplus of \$7.2 million. Therefore, for these two years the MCRS was able to sustain operations independent of investment income.

The primary change in net position over the prior year relates to each year's investment performance. Net investment income was \$185.4 million in 2020, and \$208.3 million in 2019. The annual money weighted rate of return was 12.26% and 16.21% in 2020, and 2019, respectively. The MCRS's investment policy is designed to achieve a long-term rate of return of 7.30% and fluctuation in annual investment returns is expected.

The following tables present summarized financial information for the past two years:

	2020	2019
Assets:		
Cash\$	41,101,439	\$ 40,093,110
Investments	1,706,314,629	1,512,849,318
Receivables	4,435,670	8,110,976
Capital assets, net of accumulated depreciation	4,429,195	4,722,962
Total assets	1,756,280,933	 1,565,776,366
Liabilities:		
Accounts payable	115,997	142,242
Other liabilities	26,606	105,862
Total liabilities	142,603	248,104
Net Position Restricted for Pensions \$	1,756,138,330	\$ 1,565,528,262

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Middlesex County Retirement System

Management's Discussion and Analysis

	2020	2019
Additions:		
Contributions:		
Member contributions\$	50,973,950	\$ 48,445,698
Employer contributions	138,327,737	129,763,555
Other contributions	7,185,413	10,764,996
Total contributions	196,487,100	188,974,249
Net investment income:		
Total investment income	192,871,896	215,642,272
Less, investment expenses	(7,442,169)	(7,319,761)
Net investment income	185,429,727	208,322,511
Total additions	381,916,827	397,296,760
Deductions:		
Administration	2,781,367	2,754,384
Retirement benefits, refunds and transfers	187,995,148	178,455,859
Building operations and maintenance	208,858	279,208
Depreciation	321,386	318,812
Total deductions	191,306,759	181,808,263
Net increase (decrease) in fiduciary net position	190,610,068	215,488,497
Fiduciary net position at beginning of year	1,565,528,262	1,350,039,765
Fiduciary net position at end of year \$	1,756,138,330	\$ 1,565,528,262

Requests for Information

This financial report is designed to provide a general overview of the MCRS's finances for all those with an interest in the MCRS's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the MCRS's Chief Administrative Officer, 25 Linnell Circle, Billerica, Massachusetts 01865.

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Middlesex County Retirement System

Management's Discussion and Analysis

STATEMENT OF FIDUCIARY NET POSITION

DECEMBER 31, 2020

Assets	
Cash and cash equivalents	\$ 41,101,439
Investments:	
Investments in Pension Reserve Investment Trust	1,699,992,348
Pooled alternative investments	4,436,774
Pooled real estate funds	1,885,507
Total investments	1,706,314,629
Descinables not of allowers for modificatibles.	
Receivables, net of allowance for uncollectibles: Member deductions	2 700 040
Member contributions.	3,798,949
	11,581 21,678
Employer pension appropriation	,
Member make-up payments and redeposits	181,472 319,912
Transfers from other systems Other accounts receivable	102,059
Other accounts receivable	102,039
Total Receivables	4,435,651
Interest and dividends	19
Capital assets, net of accumulated depreciation	4,429,195
Total Assets	1,756,280,933
Liabilities	
Accounts payable	115,997
Other liabilities	26,606
Total Liabilities	142,603
Net Position Restricted for Pensions	\$1,756,138,330

See notes to financial statements.

STATEMENT OF CHANGES IN FIDUCIARY NET POSITION

YEAR ENDED DECEMBER 31, 2020

Additions:	
Contributions:	
Employer pension appropriation\$	138,290,237
Member contributions	50,973,950
Transfers from other systems	5,197,904
3(8)(c) contributions from other systems	614,954
Workers' compensation settlements	37,500
Retirement benefits - state COLA reimbursements	375,346
Members' makeup payments and redeposits	859,010
Interest not refunded	138,199
Total contributions	196,487,100
Net investment income:	
Investment income	192,871,896
Less: investment expense	(7,442,169)
•	
Net investment income	185,429,727
Total additions	381,916,827
Deductions:	
Administration	2,781,367
Building operations and maintenance	208,858
Retirement benefits and refunds	171,634,862
Transfers to other systems	4,377,320
3(8)(c) transfer to other systems	11,982,966
Depreciation	321,386
	_
Total deductions	191,306,759
Net increase (decrease) in fiduciary net position	190,610,068
Fiduciary net position at beginning of year	1,565,528,262
Fiduciary net position at end of year\$	1,756,138,330

Middlesex County Retirement System

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Financial Statements

See notes to financial statements.

NOTE 1 – PLAN DESCRIPTION

The Middlesex County Retirement System (MCRS) is a multiple-employer, cost-sharing, contributory defined benefit pension plan covering all employees of the governmental member units deemed eligible by the Middlesex County Retirement Board (the Board), with the exception of school department employees who serve in a teaching capacity. The pensions of such school employees are administered by the Commonwealth of Massachusetts' Teachers Retirement System. Membership in the System is mandatory immediately upon the commencement of employment for all permanent employees working a minimum of 20 hours per week and who are paid annual compensation of no less than \$5,000. As of January 1, 2020, the MCRS had 71 participating employers.

The MCRS is a member of the Massachusetts Contributory Retirement System and is governed by Chapter 32 of the Massachusetts General Laws. Membership in the Plan is mandatory immediately upon the commencement of employment for all permanent, full-time employees.

Massachusetts contributory retirement system benefits are, with certain exceptions, uniform from system to system. The MCRS provides for retirement allowance benefits up to a maximum of 80% of a member's highest three-year average annual rate of regular compensation for those hired prior to April 2, 2012, and the highest five-year average for members hired after that date. Benefit payments are based upon a member's age, length of creditable service, level of compensation, and group classification.

Members become vested after ten years of creditable service. A superannuation retirement allowance may be received upon the completion of 20 years of service or upon reaching the age of 55 with 10 years of service for those hired prior to April 2, 2012. For those hired on or after April 2, 2012, a superannuation allowance may be received upon reaching the age of 60 with 10 years of service. Normal retirement for most employees occurs at age 65 for those hired prior to April 2, 2012, and at age 67 for those hired after April 2, 2012 (except for certain hazardous duty and public safety positions, whose normal retirement is at age 55).

A retirement allowance consists of two parts: an annuity and a pension. A member's accumulated total deductions and the interest they generate constitute the annuity. The differential between the total retirement benefit and the annuity is the pension.

Active members contribute between 5% and 11% of their gross regular compensation. The percentage rate is keyed to the date upon which an employee's membership commences. These deductions are deposited in the Annuity Savings Fund and earn interest at a rate determined by the Public Employee Retirement Administration Commission's (PERAC) actuary. When a member's retirement becomes effective, his/her deductions and related interest are transferred to the Annuity Reserve Fund. Any cost-of-living adjustments granted between 1981 and 1997 and any increase in other benefits imposed by the Commonwealth of Massachusetts' state law during those years are borne by the Commonwealth and are deposited into the Pension Fund. Cost-of-living adjustments granted after 1997 must be approved by the MCRS and all costs are borne by the MCRS.

The pension portion of any retirement benefit is paid from the Pension Fund. The governmental unit employing the member must annually appropriate and contribute the amount of current-year pension assessment.

Administrative expenses are paid from investment income.

Members who become permanently and totally disabled for further duty may be eligible to receive a disability retirement allowance. The amount of benefits to be received in such cases is dependent on several factors, including whether or not the disability is work related, the member's age, years of creditable service, level of compensation, veterans' status and group classification.

Middlesex County Retirement System

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Survivor benefits are extended to eligible beneficiaries of members whose death occurs prior to or following retirement

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements of the Middlesex County Retirement System have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The Governmental Accounting Standards Board (GASB) is the recognized standard-setting body for establishing governmental accounting and financial reporting principles.

MCRS is a special-purpose government engaged only in fiduciary activities. Accordingly, the financial statements are reported using the flow of economic resources measurement focus and use the accrual basis of accounting. Under this method, additions are recorded when earned and deductions are recorded when the liabilities are incurred.

Cash and Investments

Cash and cash equivalents are 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 carried at fair value. The fair values were determined by the closing price for those securities traded on national stock exchanges and at the average bid-and-asked quotation for those securities traded in the over-the-counter market. The fair value of private equities are based on management's valuation of estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values. Real estate assets are reported at fair value utilizing an income approach to valuation along with independent appraisals and estimates by management.

Fair Value Measurements

The MCRS reports required types of financial instruments in accordance with the fair value standards. These standards require an entity to maximize the use of observable inputs (such as quoted prices in active markets) and minimize the use of unobservable inputs (such as appraisals or valuation techniques) to determine fair value. Fair value standards also require the government to classify these financial instruments into a three-level hierarchy, based on the priority of inputs to the valuation technique or in accordance with net asset value practical expedient rules, which allow for either Level 2 or Level 3 depending on lock up and notice periods associated with the underlying funds.

Instruments measured and reported at fair value are classified and disclosed in one of the following categories:

Level 1 – Quoted prices are available in active markets for identical instruments as of the reporting date. Instruments, which are generally included in this category, include actively traded equity and debt securities, U.S. government obligations, and mutual funds with quoted market prices in active markets.

Level 2 – Pricing inputs are other than quoted in active markets, which are either directly or indirectly observable as of the reporting date, and fair value is determined through the use of models or other valuation methodologies. Certain fixed income securities, primarily corporate bonds, are classified as Level 2 because fair values are estimated using pricing models, matrix pricing, or discounted cash flows.

Level 3 – Pricing inputs are unobservable for the instrument and include situations where there is little, if any, market activity for the instrument. The inputs into the determination of fair value require significant management judgment or estimation.

Middlesex County Retirement System

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In some instances the inputs used to measure fair value may fall into different levels of the fair value hierarchy and is based on the lowest level of input that is significant to the fair value measurement.

Market price is affected by a number of factors, including the type of instrument and the characteristics specific to the instrument. Instruments with readily available active quoted prices generally will have a higher degree of market price observability and a lesser degree of judgment used in measuring fair value. It is reasonably possible that change in values of these instruments will occur in the near term and that such changes could materially affect amounts reported in these financial statements. For more information on the fair value of the MCRS's financial instruments, see Note 5 – Cash and Investments.

Accounts Receivable

Accounts receivable consist of member deductions, pension fund appropriations, and other miscellaneous reimbursements. These receivables are considered 100% collectible and therefore do not report an allowance for uncollectibles.

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of fiduciary net position will sometimes report a separate section for deferred outflows of resources. This separate financial statement element, *deferred outflows of resources*, represents a consumption of fiduciary net position that applies to a future period(s) and so will not be recognized as an outflow of resources (deduction) until then. The MCRS did not have any items that qualify for reporting in this category.

In addition to liabilities, the statement of fiduciary net position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, *deferred inflows of resources*, represents an acquisition of net position that applies to a future period(s) and so will not be recognized as an inflow of resources (addition) until that time. The MCRS did not have any items that qualify for reporting in this category.

NOTE 3 – PLAN ADMINISTRATION

The MCRS is administered by a five-person Board of Retirement consisting of a first member, who shall serve as Chairman/Treasurer, who shall be appointed by the other four members, a second member elected by the Advisory Council consisting of representatives from the member units, a third and fourth member who shall be elected by the members in or retired from the service of such system, and a fifth member who shall be chosen by the other four members.

Chairman	Thomas F. Gibson	Term Expires:	12/31/2026
Advisory Council Member	Brian P. Curtin	Term Expires:	12/31/2021
Elected Member	John Brown	Term Expires:	12/31/2023
Elected Member	Joseph W. Kearns	Term Expires:	12/31/2022
Appointed Member	Robert W. Healy, Jr.	Term Expires:	12/16/2025

Board members are required to meet at least once a month. The Board must keep a record of all of its proceedings. The Board must annually submit to the appropriate authority an estimate of the expenses of administration and cost of operation of the MCRS. The Board must annually file a financial statement of condition

Middlesex County Retirement System

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for the MCRS with the Executive Director of PERAC.

The investment of the MCRS's funds is the responsibility of the Board. All retirement allowances must be approved by the Retirement Board. The PERAC Actuary performs verification prior to payment, unless the MCRS has obtained a waiver for superannuation calculations allowing them to bypass this requirement. All expenses incurred by the MCRS must be approved by a majority vote of the Board. Payments shall be made only upon vouchers signed by three persons designated by the Board.

The following retirement board members and employees are bonded by an authorized agent representing a company licensed to do business in Massachusetts as follows:

Treasurer-Custodian:) \$10,000,000 Fiduciary Ex-Officio Member:) RLI Insurance Company

Elected Members:

Appointed Members:) \$1,000,000 Fidelity

Staff Employees:) National Union Fire Insurance

NOTE 4 - OFFICE BUILDING

The MCRS owns an office building that was purchased as an investment and for the administrative offices of the System. The building is a two story, 1986-built office building consisting of 62,307 square feet of net rentable area. The property is situated on a 4.23 acre site in Billerica, Middlesex County, Massachusetts

NOTE 5 - CASH AND INVESTMENTS

Custodial Credit Risk - Deposits

At December 31, 2020, the carrying amount of the MCRS's deposits totaled \$33,445,095, and the bank balance totaled \$39,406,777, all of which was covered by Federal Depository Insurance.

Investments

The MCRS's investments were as follows:

	December 31,
	2020
Investment Type	
PRIT Pooled Funds\$	1,699,992,348
Money Market Mutual Funds	7,656,344
Pooled Alternative Investments	4,436,774
Pooled Real Estate Funds	1,885,507
•	
Total Investments\$	1,713,970,973

Approximately 99.2% of the Retirement MCRS's investments are in Pension Reserve Investment Trust (PRIT). This investment pool was established by the Treasurer of the Commonwealth of Massachusetts, who serves as Trustee. PRIT is administered by the Pension Reserves Investment Management Board. The fair values of the positions in each investment Pool are the same as the value of each Pool's shares. The Administration does not

Middlesex County Retirement System

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have the ability to control any of the investment decisions relative to its funds in PRIT. The effective weighted duration rate for PRIT investments ranged from 0.19 to 16.28 years.

Approximately 0.4% of the MCRS's funds are invested in pooled alternative investments and pooled real estate funds. The market values of assets in those funds are based on the quoted values obtained from each pool.

Approximately 0.4% of the MCRS's funds are invested in money market mutual funds. The market values of assets in those funds are valued using prices quoted in active markets for those securities.

The Administration's annual money-weighted rate of return on pension plan investments was 12.26%. The money-weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested, measured monthly.

Fair Value of Investments

The retiree pension defined benefit plan holds significant amounts of investments that are measured at fair value on a recurring basis. Because investing is a key part of the plan's activities, the plan shows greater disaggregation in its disclosures. The plan chooses a tabular format for disclosing the levels within the fair value hierarchy.

The MCRS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles.

The MCRS had the following recurring fair value measurements as of December 31, 2020:

	Fair Value Measurements Using		Jsing			
Investment Type	12/31/2020		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)		Significant Unobservable Inputs (Level 3)
Investments by fair value level:						
Money Market Mutual Funds\$ Pooled Alternative Investments Pooled Real Estate Funds	7,656,344 4,436,774 1,885,507	\$	7,656,344 - -	\$ -	\$	- 4,436,774 1,885,507
Total Investments by fair value level	13,978,625	\$	7,656,344	\$ 	\$	6,322,281
Investments measured at the net asset value (NAV):						
PRIT Investments.	1,699,992,348					
Total Investments\$	1,713,970,973					

Money market mutual funds in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Pooled alternative investments and pooled real estate funds classified in level 3 are valued using either a discounted cash flow or market comparable company's technique.

PRIT Investments are valued using the net asset value (NAV) method.

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NOTE 6 - CAPITAL ASSETS

All purchases and building costs in excess of \$25,000 are capitalized at the date of acquisition. Capital assets are depreciated on a straight-line basis. The estimated useful lives of capital assets are as follows:

	Estimated
	Useful Life
Capital Asset Type	(in years)
Building	40
Building improvements	40
Vehicles	5
Software and equipment	5

Capital asset activity for the year ended December 31, 2020, was as follows:

	Beginning Balance	Increases	Decreases	Ending Balance
Capital assets not being depreciated:				
Land\$	672,657	\$		672,657
Capital assets being depreciated:				
Buildings	5,417,136	-	-	5,417,136
Building improvements	1,099,492	-	-	1,099,492
Vehicles	30,913	-	-	30,913
Software and equipment	729,570	27,619	-	757,189
Total capital assets being depreciated	7,277,111	27,619		7,304,730
Less accumulated depreciation for:				
Buildings	(2,306,638)	(135,428)	-	(2,442,066)
Building improvements	(461,817)	(29,740)	-	(491,557)
Vehicles	(20,608)	(10,304)	-	(30,912)
Software and equipment	(437,743)	(145,914)	<u> </u>	(583,657)
Total accumulated depreciation	(3,226,806)	(321,386)		(3,548,192)
Total capital assets being depreciated, net	4,050,305	(293,767)		3,756,538
Total capital assets, net\$	4,722,962 \$	(293,767) \$	\$	4,429,195

NOTE 7 - MEMBERSHIP

The following table represents the MCRS's membership at December 31, 2019:

Active members	9,282
Inactive members entitled to a return of their employee contributions	3,082
Inactive members with a vested right to a deferred or immediate benefit	381
Retirees and beneficiaries currently receiving benefits	5,862
Total	18,607

NOTE 8 – ACTUARIAL VALUATION

Components of the net pension liability as of December 31, 2020, were as follows:

Total pension liability\$	3,287,231,456
The pension plan's fiduciary net position	1,756,138,330
The net pension liability\$	1,531,093,126
The pension plan's fiduciary net position as a percentage of the total pension liability	53.42%

The total pension liability was determined by an actuarial valuation as of January 1, 2020, using the following actuarial assumptions, applied to all periods included in the measurement that was rolled forward to December 31, 2020:

Valuation date	January 1, 2020.
Actuarial cost method	Entry Age Normal Cost Method.
Amortization method	Prior year's total contribution increased by 6.50% for fiscal 2022 through fiscal 2028, and thereafter the remaining unfunded liability will be amortized on a 4.00% annual increasing basis; ERI liability amortized in level payments.
Remaining amortization period	17 years from July 1, 2018, for non-ERI liability, 1 year from July 1, 2018, for 2002 ERI, 2 years from July 1, 2018, for 2033 ERI, and 4 years from July 1, 2018, for 2010 ERI.
Asset valuation method	The difference between the expected return and the actual investment return on a market value basis is recognized over a five year period. Asset value is adjusted as necessary to be within 20% of the market value.
Investment rate of return/Discount rate	7.30%, net of pension plan investment expense, including inflation

Middlesex County Retirement System

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Projected salary increases	Varies by length of service with ultimate rates of 4.00% for Group 1, 4.25% for Group 2 and 4.50% for Group 4
Cost of living adjustments	3.00% of the first \$16,000 of retirement income.
Mortality Rates: Pre-Retirement	The RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017.
Healthy Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2017.
Disabled Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017.

Investment policy: The MCRS's policy in regard to the allocation of invested assets is established by PRIT. Plan assets are managed on a total return basis with a long-term objective of achieving a fully funded status for the benefits provided through the pension plan.

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 MCRS's target asset allocation as of December 31, 2020, are summarized in the following table:

Asset Class	Long-Term Expected Asset Allocation	Long-Term Expected Real Rate of Return
Domestic equity	22.00% 12.00% 5.00% 15.00% 8.00% 10.00% 4.00% 10.00%	6.28% 7.00% 8.82% 0.38% 2.97% 3.50% 3.45% 2.35% 10.11%
	100.00%	

Discount rate: The discount rate used to measure the total pension liability was 7.30%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rate. Based on those assumptions, the MCRS'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.

Middlesex County Retirement System

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Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability, calculated using the discount rate of 7.30%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.30%) or 1-percentage-point higher (8.30%) than the current rate:

		Current	
	1% Decrease	Discount	1% Increase
	(6.30%)	(7.30%)	(8.30%)
Middlesex County Retirement System's net			
pension liability as of December 31, 2020\$	1.907.916.916 \$	1.531.093.126 \$	1.214.072.425

Contributions: Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The pension fund appropriations are allocated amongst employers based on the actuarial valuation.

NOTE 9 - DISPUTE WITH THE COMMONWEALTH AND STATE EMPLOYEES RETIREMENT SYSTEM

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County be transferred to the Commonwealth. Therefore, the MCRS was required to transfer the Annuity Savings Fund Balances of these transferred County employees to the State Employees Retirement System (SERS). This transfer, totaling approximately \$18 million, was made during calendar year 1998.

In December of 1999, the State Legislature enacted Massachusetts General Law, Chapter 34B (Abolition of County Government). This legislation, among other things, defines the components of determining the overall surplus or deficit of an abolished County upon transfer to the Commonwealth and how regional retirement systems will be affected. Sections 8 and 18 addressed how the abolished County's unfunded liabilities in regional retirement systems will be paid for. The MCRS believes, as a result of the abolishment of Middlesex County, that the Commonwealth of Massachusetts owed them \$9,501,680 for the Unfunded Liability for retirees of the former Middlesex County.

The Commonwealth and SERS did not agree with the assertion that the MCRS was owed \$9,501,680. As a result, the MCRS acted to stop 3(8)(c) reimbursements to the State Employees Retirement System and correspondingly the State System began to intercept all COLA reimbursements which were due the MCRS. In 2012 the MCRS reinstated payments for 3(8)(c) reimbursements to the SERS.

In December 2020, the SERS and MCRS finalized the amount owed after accounting for the 3(8)(c) reimbursements and COLA reimbursements which were withheld; a final payment of \$4,104,146 was made from the MCRS to the SERS to resolve the issue. Further, MCRS began to receive COLA payments from the state in December 2020.

NOTE 10 - IMPLEMENTATION OF GASB PRONOUNCEMENTS

There were no GASB pronouncements required to be implemented in 2020 that impacted the MCRS's financial statements.

None of the issued GASB statements that are required to be implemented in future years are anticipated to impact the MCRS's financial statements.

NOTE 11 - SUBSEQUENT EVENTS

Management has evaluated subsequent events through July 13, 2021, which is the date the financial statements were available to be issued.

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Required Supplementary Information

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

Total pension liability: Service cost	\$ December 31, 2014 52,132,389 172,094,226	\$ December 31, 2015 54,217,685 179,703,272	\$ December 31, 2016 56,386,392 187,359,946	\$ December 31, 2017 60,585,598 200,298,121
Changes in benefit terms	- - - (125,082,678)	- - - (134,295,504)	7,976,453 96,500,754 (143,428,636)	(9,059,393) 97,195,824 (150,780,931)
Net change in total pension liability	99,143,937	99,625,453	204,794,909	198,239,219
Total pension liability - beginning	2,195,732,452	2,294,876,389	2,394,501,842	2,599,296,751
Total pension liability - ending (a)	\$ 2,294,876,389	\$ 2,394,501,842	\$ 2,599,296,751	\$ 2,797,535,970
Plan fiduciary net position: Employer pension appropriation. Member contributions. Other contributions. Net investment income (loss). Administrative expenses. Building operations and maintenance. Retirement benefits and refunds. Other retirement deductions. Depreciation.	\$ 93,368,685 39,048,869 6,405,881 74,904,315 (2,996,390) (381,899) (125,082,678) (5,556,930) (162,594)	\$ 99,792,641 40,340,741 8,668,378 7,732,128 (2,824,803) (302,771) (134,295,504) (8,025,993) (162,594)	\$ 107,032,211 42,015,296 12,337,414 74,917,546 (3,062,521) (235,667) (143,428,636) (11,475,752) (162,594)	\$ 115,377,205 44,177,815 10,405,773 189,343,574 (2,619,464) (306,177) (150,780,931) (9,358,262) (308,508)
Net increase (decrease) in fiduciary net position	79,547,259	10,922,223	77,937,297	195,931,025
Fiduciary net position - beginning of year	1,014,013,415	1,093,560,674	1,104,482,897	1,182,420,194
Fiduciary net position - end of year (b)	\$ 1,093,560,674	\$ 1,104,482,897	\$ 1,182,420,194	\$ 1,378,351,219
Net pension liability - ending (a)-(b)	\$ 1,201,315,715	\$ 1,290,018,945	\$ 1,416,876,557	\$ 1,419,184,751
Plan fiduciary net position as a percentage of the total pension liability	47.65%	46.13%	45.49%	49.27%
Covered payroll	\$ 415,752,810	\$ 432,382,921	\$ 439,644,322	\$ 451,777,105
Net pension liability as a percentage of covered payroll	288.95%	298.35%	322.28%	314.13%

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Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

Middlesex County Retirement System

Required Supplementary Information

	December 31, 2018		December 31, 2019		December 31, 2020
\$	64,615,910	\$	66,816,001	\$	73,591,385
•	208,614,148		216,905,943	7	229,825,239
	-		29,156,339		
	-		46,671,873		-
	-		65,013,900		-
	(161,259,804)		(168,486,003)		(181,769,445)
	111,970,254		256,078,053		121,647,179
	2,797,535,970		2,909,506,224		3,165,584,277
\$	2,909,506,224	\$	3,165,584,277	\$	3,287,231,456
\$	120,614,676	\$	129,685,755	\$	138,290,237
	45,984,957		48,445,698		50,973,950
	9,581,643		10,842,796		7,222,913
	(31,074,711)		208,322,511		185,429,727
	(2,645,568)		(2,754,384)		(2,781,367)
	(309,357)		(279,208)		(208,858)
	(161,259,804)		(168,486,003)		(181,769,445)
	(8,884,478)		(9,969,856)		(6,225,703)
	(318,812)		(318,812)		(321,386)
	(28,311,454)		215,488,497		190,610,068
	1,378,351,219		1,350,039,765		1,565,528,262
\$	1,350,039,765	\$	1,565,528,262	\$	1,756,138,330
\$	1,559,466,459	\$	1,600,056,015	\$	1,531,093,126
Ť	.,,	Ť	.,,,	•	
	46.40%		49.45%		53.42%
\$	471,115,185	\$	492,109,775	\$	513,201,283
	331.02%		325.14%		298.34%

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SCHEDULE OF CONTRIBUTIONS

<u>Year</u>	Actuarially determined contribution	Contributions in relation to the actuarially determined contribution	Contribution deficiency (excess)	Covered payroll	Contributions as a percentage of covered payroll
December 31, 2020 \$	135,472,822 \$	(138,290,237) \$	(2,817,415) \$	513,201,283	26.95%
December 31, 2019	127,151,838	(129,685,754)	(2,533,916)	492,109,775	26.35%
December 31, 2018	119,298,291	(120,614,676)	(1,316,385)	471,115,185	25.60%
December 31, 2017	112,017,087	(115,426,815)	(3,409,728)	451,777,105	25.55%
December 31, 2016	105,246,797	(107,067,707)	(1,820,910)	439,644,322	24.35%
December 31, 2015	98,792,642	(99,820,481)	(1,027,839)	432,382,921	23.09%
December 31, 2014	92,826,743	(93,400,946)	(574,203)	415,752,810	22.47%

Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

SCHEDULE OF INVESTMENT RETURNS

Annual money-weighted rate of return.

	rate of return,
Year	net of investment expense
December 31, 2020	12.26%
December 31, 2019	16.21%
December 31, 2018	-2.52%
December 31, 2017	17.25%
December 31, 2016	7.35%
December 31, 2015	0.61%
December 31, 2014	7.54%

Note: this schedule is intended to present information for 10 years. Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

NOTE A - CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

The Schedule of Changes in the Net Pension Liability and Related Ratios includes the detailed changes in the system's total pension liability, changes in the system's net position, and the ending net pension liability. It also demonstrates the plan's net position as a percentage of the total pension liability and the net pension liability as a percentage of covered payroll.

NOTE B - CONTRIBUTIONS

Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The total appropriations are payable on July 1 and January 1. Employers may choose to pay the entire appropriation in July at a discounted rate. Accordingly, actual employer contributions may be less than the "total appropriation". The pension fund appropriations are allocated amongst employers based on the actuarial valuation results. In addition, an employer may contribute more than the amount required.

NOTE C - MONEY WEIGHTED RATE OF RETURN

The money weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense. A money weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested. Inputs to the money weighted rate of return calculation are determined monthly.

NOTE D - CHANGES IN ASSUMPTIONS AND PLAN PROVISIONS

The following changes were reflected in the January 1, 2020 actuarial valuation.

Changes in Assumptions

• The net investment return assumption was lowered from 7.50% to 7.30%.

Changes in Plan Provisions

 As permitted by Section 19 of Chapter 188 of the Acts of 2010, the Cost of Living Adjustment base was increased from \$14,000 to \$16,000 as of July 1, 2019.

Middlesex County Retirement System

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Required Supplementary Information

Audit of Specific Elements, Accounts and Items of Financial Statements

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Certified Public Accountants



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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

We have audited the accompanying schedule of employer allocations of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2020, and the related notes. We have also audited the total for all entities of the rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total pension expense and contributions included in the accompanying schedule of pension amounts by employer of the MCRS Pension Plan as of and for the year ended December 31, 2020, and the related notes.

Management's Responsibility for the Schedules

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

Auditor's Responsibility

Our responsibility is to express opinions on the schedule of employer allocations and the specified row totals included in the schedule of pension amounts by employer based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the schedule of employer allocations and specified row totals included in the schedule of pension amounts by employer are free from material misstatement.

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

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

Opinions

In our opinion, the schedules referred to above present fairly, in all material respects, the employer allocations and total for all rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total pension expense and contributions for the total of all participating entities for the Middlesex County Retirement System as of and for the year ended December 31, 2020, in accordance with accounting principles generally accepted in the United States of America.

Other Matter

We have audited, in accordance with auditing standards generally accepted in the United States of America, the financial statements of the Middlesex County Retirement System as of and for the year ended December 31, 2020, and our report thereon, dated July 13, 2021, expressed an unmodified opinion on those financial statements.

Restriction on Use

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This report is intended solely for the information and use of the Middlesex County Retirement System management, the Middlesex County Retirement System employers and their auditors and is not intended to be and should not be used by anyone other than these specified parties.

July 13, 2021

SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2020

Employer	Share of Net Pension Liability	Percent of Total Net Pension Liabi
Middlesex County Retirement Board.	\$ _	0.000000%
Middlesex County.	-	0.000000%
Middlesex Hospital.	-	0.000000%
Town of Acton	52,615,628	3.436475%
Town of Ashby	1,775,392	0.115956%
Town of Ashland	35.887.576	2.343919%
Town of Ayer	19.150.544	1.250776%
Town of Bedford.	51,394,381	3.356712%
Town of Billerica	152,215,238	9.941605%
Town of Boxborough.	12,166,423	0.794623%
Town of Burlington	133,422,263	8 714183%
Town of Carlisle	10.349.764	0.675972%
Town of Chelmsford	110,931.084	7.245221%
Town of Dracut.	66,580,110	4.348534%
Town of Dunstable		0.210183%
	3,218,104	1.606386%
Town of Groton.	24,595,262	
Town of Holliston	25,050,502	1.636119%
Town of Hopkinton	24.095,505	1.573745%
Town of Hudson	66,148,477	4.320343%
Town of Lincoln	26,477,563	1.729324%
Town of Littleton	23,466,261	1.532648%
Town of North Reading	50.095,267	3.271863%
Town of Pepperell.	17,612,899	1.150348%
Town of Sherborn	9.801.713	0.640177%
Town of Shirley.	8,952,975	0.584744%
Town of Stow.	11,389,407	0.743874%
Town of Sudbury	61.745,935	4.032801%
Town of Tewksbury	104,198,258	6.805481%
Town of Townsend.	8,103,799	0.529282%
Town of Tyngsborough	24.002,922	1.567698%
Town of Wayland	56,416,777	3.684738%
Town of Westford	56,098,309	3.663938%
Town of Weston	64.849,395	4.235496%
Town of Wilmington	86,423,315	5.644550%
Acton-Boxborough Regional School District	30.083,545	1.964841%
Acton Water Supply	3.548,184	0.231742%
Bedford Housing Authority	315,580	0.020611%
Billerica Housing Authority	1,612,020	0.105286%
Chelmsford Housing Authority	2.016,950	0.131733%
Chelmsford Water District	24,164	0.001578%
Dracut Housing Authority	2,264,513 3,240,627	0.14/902%
Dracut Water Supply	3.240,627	0.211654%
East Chelmsford Water District	649.547	0.042424%
Greater Lowell Regional Vocational Technical School District	17.820,793	1.163926%
Groton-Dunstable Regional School District	12,381,614	0.808678%
Hudson Housing Authority	616,643	0.040275%
Lincoln-Sudbury Regional School District.	8,715,281	0.569220%
Nashoba Valley Technical High School District.	3,650,910	0.2384519
North Chelmsford Water District	977 691	0.263856%
North Middlesex Regional School District	12,806,518	0.836430%
Shawsheen Valley Regional Vocational School	8,542,800	0.557954%
South Middlesex Regional Vocational Technical School	6,677,782	0.436145%
Sudbury Water District	2,449,672	0.159995%
Tewksbury Housing Authority	1.645,758	0.107489%
Wayland Housing Authority	625,875	0.040878%
Hopkinton Housing Authority	517,677	0.033811%
Sudbury Housing Authority	465,613	0.030410%
Wilmington Housing Authority	370,673	0.024210%
Acton Housing Authority	861,176	0.056246%
Burlington Housing Authority	327,467	0.021388%
Ayer Housing Authority	858,485	0.056070%
Holliston Housing Authority.	168,599	0.011012%
Littleton Housing Authority	607,838	0.039700%
Westford Housing Authority	537,128	0.035081%
Shirley Water District	453,772	
Tyngsborough Housing Authority	516,453	0.033731%
Pepperell Housing Authority	247,338	0.016154%
Groton Housing Authority	440,581	0.000000%
	212.881	0.028776%
		0.001180%
North Reading Housing Authority		
North Reading Housing Authority	18,060 4 239 976	
Tyngsborough Water District. North Reading Housing Authority. West Groton Water. Ayer-Shirley Regional School District. Northern Middlesey Regional Emergency Communications Center.	4,239,976	0.276925%
North Reading Housing Authority		0.276925%

See notes to schedule of employer allocations and schedule of pension amounts by employer.

Middlesex County Retirement System

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Employer Allocations

FOR THE YEAR ENDED DECEMBER 31, 2020

		Middlesex County Retirement Board		Middlesex County		Middlesex Hospital		Town of Acton
Net Pension Liability								
Beginning net pension liability/(asset)	\$	=	\$	-	\$	=	\$	54,966,604
Ending net pension liability/(asset)	\$	=	\$	=	\$	=	\$	52,615,628
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	-	\$	-	\$	-	\$	962,320
Changes of assumptions		-		-		-		2,008,534
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		-		_		_		374,225
			•				-	
Total Deferred Outflows of Resources	\$	-	\$		\$	-	\$ =	3,345,079
Deferred Inflows of Resources								
Differences between expected and actual experience	\$	-	\$	-	\$	-	\$	62,265
Net difference between projected and actual								
investment earnings on pension plan investments		-		-		-		2,982,703
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		_		_				195,119
							-	195,119
Total Deferred Inflows of Resources	\$	-	\$		\$	-	\$ =	3,240,087
Pension Expense								
Proportionate share of plan pension expense	\$	356,333	\$	-	\$	-	\$	6,017,439
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		-		_		-	_	(221,259)
Total Employer Pension Expense	€.	356 333	œ.		œ.	_	4	5,796,180
Total Employer Forbian Expanses	Ψ.	000,000	Ψ.		Ψ,		Ψ=	5,105,105
Contributions								
Statutory required contribution.	\$	356,333	\$	-	\$	-	\$	4,615,717
Contribution in relation to statutory required contribution		(356,333)		-		_		(4,615,717)
One belte diese de Feinese (feunes)							_	,
Contribution deficiency/(excess)	\$:	-	\$		\$	-	\$ =	<u> </u>
Contributions as a percentage of covered payroll		25.43%		0.00%		0.00%		30.36%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense			_				_	
June 30, 2022 June 30, 2023		-	\$	-	\$	-	\$	704,028 425,042
June 30, 2024		-		-		-		(514,077)
June 30, 2025		-				-	_	(510,001)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	_	œ.	_	\$	_	\$	104,992
	* :		٠,		*		* =	,
Discount Rate Sensitivity 1% decrease (6.30%)	æ		\$		s		\$	65,564,739
		-		-	Ψ	-		
Current discount rate (7.30%)	. \$	-	\$	-	\$	-	\$	52,615,628
1% increase (8.30%)	\$	-	\$	-	\$	-	\$	41,721,292
Covered Payroll	\$	1,401,093	\$	-	\$	=	\$	15,204,987
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Town of Ashby		Town of Ashland		Town of Ayer	_	Town of Bedford
Net Pension Liability Beginning net pension liability/(asset)	\$	1,941,210	\$	37,703,972	\$	20,395,526	\$	54,291,514
Ending net pension liability/(asset)	\$	1,775,392	\$	35,887,576	\$	19,150,544	\$	51,394,381
Deferred Outflows of Resources Differences between expected and actual experience	¢	32,471	\$	656,370	\$	350,256	\$	939,984
Changes of assumptions	Ψ	67,773	Ψ	1,369,962	J	731,047	Ψ	1,961,914
Changes in proportion and differences between		07,170		1,000,002		701,011		1,001,014
employer contributions and proportionate share of contributions		149,757		723,399		290,191		188,088
Total Deferred Outflows of Resources	\$ =	250,001	\$	2,749,731	\$	1,371,494	\$ =	3,089,986
Deferred Inflows of Resources Differences between expected and actual experience	\$	2,101	\$	42,469	\$	22,663	\$	60,819
Net difference between projected and actual investment earnings on pension plan investments		100,644		2,034,414		1,085,616		2,913,472
Changes in proportion and differences between employer contributions and proportionate								
share of contributions.	_	103,740		141,568		212,355	-	1,639,291
Total Deferred Inflows of Resources	\$ =	206,485	, \$.	2,218,451	\$	1,320,634	\$ =	4,613,582
Pension Expense Proportionate share of plan pension expense	\$	203,044	\$	4,104,317	\$	2,190,173	\$	5,877,769
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		21,073		729,031		(122,402)		(827,170)
Total Employer Pension Expense	\$ _	224,117	\$	4,833,348	\$	2,067,771	\$ _	5,050,599
Contributions								
Statutory required contribution	\$	251,979	\$	3,209,995	\$	1,787,745	\$	4,786,602
Contribution in relation to statutory required contribution	_	(251,979)		(3,243,063)		(2,087,745)	-	(4,787,530)
Contribution deficiency/(excess)	\$ =		\$	(33,068)	\$	(300,000)	\$ =	(928)
Contributions as a percentage of covered payroll		21.72%		21.43%		27.59%		23.42%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense								
June 30, 2022	\$	86,876	\$	605,652	\$	294,371	\$	(132,021)
June 30, 2023	-	18,395	-	535,028	•	169,184	-	80,209
June 30, 2024		(47,619)		(240,701)		(235,821)		(917,073)
June 30, 2025		(14,136)		(368,699)		(176,874)		(554,711)
Total Deferred Outflows/(Inflows) Recognized in	-	(14,150)		(500,033)		(170,074)	-	(554,711)
Future Pension Expense.	\$ _	43,516	\$	531,280	\$	50,860	\$ =	(1,523,596)
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	2,212,330	\$	44,719,784	\$	23,863,640	\$	64,042,933
Current discount rate (7.30%)	\$	1,775,392	\$	35,887,576	\$	19,150,5 4 4	\$	51,394,381
1% increase (8.30%)	\$	1,407,788	\$	28,456,869	\$	15,185,325	\$	40,752,910
Covered Payroll	\$	1,160,138	\$	15,134,292	\$	7,568,121	\$	20,438,300
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

		Town of Billerica	Town of Boxborough	Town of Burlington		Town of Carlisle
Net Pension Liability Beginning net pension liability/(asset)	\$	157,213,941	\$ 12,546,753	\$ 137,604,549	\$	11,101,958
Ending net pension liability/(asset)	\$	152,215,238	\$ 12,166,423	\$ 133,422,263	\$	10,349,764
Deferred Outflows of Resources Differences between expected and actual experience	\$	2,783,960	\$ 222,519	\$ 2,440,244	\$	189,293
Changes of assumptions		5,810,620	464,437	5,093,223		395,089
Changes in proportion and differences between employer contributions and proportionate share of contributions		1,491,321	564,014	3,490,509		296,813
Total Deferred Outflows of Resources			\$ 1,250,970	\$ 11,023,976	\$	881,195
Deferred Inflows of Resources						
Differences between expected and actual experience	\$	180,130	\$ 14,398	\$ 157,890	\$	12,248
Net difference between projected and actual investment earnings on pension plan investments		8,628,859	689,697	7,563,513		586,713
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,955,419		668,051		317,499
Total Deferred Inflows of Resources	\$.	10,764,408	\$ 704,095	\$ 8,389,454	\$	916,460
Pension Expense Proportionate share of plan pension expense	\$	17,408,248	\$ 1,391,427	\$ 15,258,969	\$	1,183,66 1
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(404,712)	402,845	954,544		46,834
Total Employer Pension Expense	\$.	17,003,536	\$ 1,794,272	\$ 16,213,513	\$.	1,230,495
Contributions Statutory required contribution	\$	12,782,396	\$ 1,008,914	\$ 10,675,811	\$	1,057,819
Contribution in relation to statutory required contribution		(12,782,396)	(1,008,914)	(10,675,811)		(1,057,819)
Contribution deficiency/(excess)	\$	-	\$ 	\$ 	\$	
Contributions as a percentage of covered payroll		33.10%	28.53%	28.91%		17.57%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense						
June 30, 2022 June 30, 2023 June 30, 2024 June 30, 2025	\$	243,239 1,206,980 (876,257) (1,252,469)	\$ 299,219 280,294 66,434 (99,072)	\$ 2,009,237 1,901,187 (109,644) (1,166,258)	\$	77,979 170,793 (159,511) (124,526)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$.	(678,507)	\$ 546,875	\$ 2,634,522	\$	(35,265)
Discount Rate Sensitivity 1% decrease (6.30%)	\$	189,676,578	\$ 15,160,673	\$ 166,258,508	\$	12,896,920
Current discount rate (7.30%)	\$	152,215,238	\$ 12,166,423	\$ 133,422,263	\$	10,349,764
1% increase (8.30%)	\$	120,698,291	\$ 9,647,303	\$ 105,796,498	\$	8,206,792
Covered Payroll	\$	38,618,99 1	\$ 3,536,280	\$ 36,934,043	\$	6,020,631
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

		Town of Chelmsford	Town of Dracut	Town of Dunstable		Town of Groton
Net Pension Liability Beginning net pension liability/(asset)	\$	114,671,152	\$ 68,887,607	\$ 3,317,391	\$	25,513,416
Ending net pension liability/(asset)	\$	110,931,084	\$ 66,580,110	\$ 3,218,104	\$	24,595,262
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	. \$	2,028,888	\$ 1,217,726	\$ 58,858	\$	449,838
Changes of assumptions		4,234,651	2,541,610	122,847		938,892
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,539,688	1,315,405	296,849		870,744
Total Deferred Outflows of Resources			\$ 5,074,741	\$ 478,554	\$	2,259,474
Deferred Inflows of Resources						
Differences between expected and actual experience	. \$	131,274	\$ 78,790	\$ 3,808	\$	29,106
Net difference between projected and actual investment earnings on pension plan investments		6,288,521	3,774,329	182,430		1,394,269
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,105, 44 2	240,727			1 4 3,377
Total Deferred Inflows of Resources	\$:	7,525,237	\$ 4,093,846	\$ 186,238	\$	1,566,752
Pension Expense Proportionate share of plan pension expense	\$	12,686,743	\$ 7,614,498	\$ 368,041	\$	2,812,861
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(51,174)	534,168	85,680		146,886
Total Employer Pension Expense	\$	12,635,569	\$ 8,148,666	\$ 453,721	\$.	2,959,747
Contributions Statutory required contribution		9,511,562	5,727,650	\$ 292,296	\$	2,090,290
Contribution in relation to statutory required contribution			(5,727,860)	(292,296)		(2,090,290)
Contribution deficiency/(excess)	\$:	-	\$ (210)	\$ 	\$.	-
Contributions as a percentage of covered payroll		32.68%	32.82%	19.42%		25.17%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u> June 30, 2022. June 30, 2023.		1,1 4 3,379 71 1 ,598	\$ 1,015,509 779,136	\$ 171,075 110, 4 95	\$	337,566 511,983
June 30, 2024		(685,261) (891,726)	(270,627) (543,123)	31,619 (20,873)		61,229 (218,056)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	. \$	277,990	\$ 980,895	\$ 292,316	\$	692,722
Discount Rate Sensitivity 1% decrease (6.30%)	\$	138,232,077	\$ 82,965,987	\$ 4,010,104	\$	30,648,345
Current discount rate (7.30%)	. \$	110,931,084	\$ 66,580,110	\$ 3,218,104	\$	24,595,262
1% increase (8.30%)	\$	87,962,233	\$ 52,794,356	\$ 2,551,779	\$	19,502,687
Covered Payroll	\$	29,108,756	\$ 17,454,816	\$ 1,504,932	\$	8,305,473
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

		Town of Holliston		Town of Hopkinton		Town of Hudson		Town of Lincoln
Net Pension Liability Beginning net pension liability/(asset)	\$	26,676,612	\$	26,084,382	\$	69,381,303	\$	27,767,333
Ending net pension liability/(asset)	\$	25,050,502	\$	24,095,505	\$	66,148,477	\$	26,477,563
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	458,164	\$	440,698	\$	1,209,831	\$	484,265
Changes of assumptions		956,271		919,815		2,525,133		1,010,747
Changes in proportion and differences between employer contributions and proportionate share of contributions		446,142		1,136,656		199,174		150,639
Total Deferred Outflows of Resources	\$	1,860,577	\$	2,497,169	\$	3,934,138	\$	1,645,651
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	. \$	29,644	\$	28,514	\$	78,279	\$	31,333
Net difference between projected and actual investment earnings on pension plan investments		1,420,076		1,365,939		3,749,860		1,500,974
Changes in proportion and differences between employer contributions and proportionate share of contributions		928,337		489,170		1,008,453		506,474
Total Deferred Inflows of Resources	\$	2,378,057	\$	1,883,623	\$.	4,836,592	\$	2,038,781
Pension Expense Proportionate share of plan pension expense	\$	2,864,925	\$	2,755,706	\$	7,565,135	\$	3,028,131
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(304,593)		399,656		(220,380)		(257,082)
Total Employer Pension Expense	\$	2,560,332	\$	3,155,362	\$	7,344,755	\$	2,771,049
Contributions Statutory required contribution	\$	2,385,594	\$	2,486,832	\$	6,204,177	\$	2,434,008
Contribution in relation to statutory required contribution				(2,486,832)		(6,207,788)		(2,434,721)
Contribution deficiency/(excess)	\$	-	\$		\$	(3,611)	\$	(713)
Contributions as a percentage of covered payroll		20.11%		14.63%		27.47%		22.13%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2022 June 30, 2023 June 30, 2024 June 30, 2024 June 30, 2025 Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	-	100,503 172,661 (490,664) (299,980)	\$	552,507 649,082 (258,504) (329,539) 613,546	\$	313,855 303,009 (907,292) (612,026)	\$	20,318 190,705 (349,949) (254,204)
Discount Rate Sensitivity		(,.00)			* :	<u> </u>	. * :	(, -00)
1% decrease (6.30%)		31,215,623		30,025,594	\$	82,428,126		32,993,895
Current discount rate (7.30%)		25,050,502		24,095,505	\$	66,148,477	\$	26,477,563
1% increase (8.30%)		19,863,667 11,860,989	\$	19,106, 4 07 17,002,76 1	\$	52,452,095 22,598,280	\$	20,995,247
See notes to schedule of employer allocations and schedule	Ψ	11,000,000	Ψ	17,002,701	Ψ	22,000,200	Ψ	11,002,400
of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Town of Littleton		Town of North Reading		Town of Pepperell	_	Town of Sherborn
Net Pension Liability								
Beginning net pension liability/(asset)\$	5	26,056,611	\$	52,178,434	\$	18,312,861	\$	10,450,215
Ending net pension liability/(asset)\$	5	23,466,261	\$	50,095,267	\$	17,612,899	\$	9,801,713
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience\$	6	429,189	\$	916,224	\$	322,133	\$	179,270
Changes of assumptions		895,794		1,912,322		672,350		374,168
Changes in proportion and differences between employer contributions and proportionate share of contributions.		1,320,076		70,700		25,960		100,762
			•		•		-	100,702
Total Deferred Outflows of Resources\$	-	2,645,059	\$	2,899,246	\$.	1,020,443	\$ =	654,200
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience\$	5	27,770	\$	59,282	\$	20,843	\$	11,599
Net difference between projected and actual investment earnings on pension plan investments		1,330,268		2,839,827		998,449		555,645
Changes in proportion and differences between employer contributions and proportionate share of contributions.		310,142		1,049,585		1 41 ,622		755,393
Total Deferred Inflows of Resources\$. –		Φ.	3,948,694	s -	1,160,914		1,322,637
Total Deterred Inflows of Nesources	' =	1,000,100	Ψ.	3,340,034		1,100,514	Φ =	1,522,657
Proportionate share of plan pension expense\$	5	2,683,744	\$	5,729,196	\$	2,014,317	\$	1,120,983
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		638,992		(534,216)		332,236		(303,272)
Total Employer Pension Expense\$	- -	3,322,736	\$	5,194,980	\$	2,346,553	\$ _	817,7 11
Contributions Statutory required contribution\$	5	2,355,174	\$	4,401,955	\$	1,530,300	\$	1,087,478
Contribution in relation to statutory required contribution	_	(3,281,774)		(4,401,955)		(1,531,884)	_	(1,087,478)
Contribution deficiency/(excess)\$	—	(926,600)	\$	-	\$	(1,584)	\$ _	
Contributions as a percentage of covered payroll		23.93%		30.68%		30.25%		23.79%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2022 \$		585,195	\$	36,029	\$	55,025	\$	(150,323)
June 30, 2023	,	712,148	Ψ	69,268	Ψ	131,498	Ψ	(105,486)
June 30, 2024		(49,317)		(699,664)		(169,904)		(323,772)
June 30, 2025	_	(271,147)		(455,081)		(157,090)	_	(88,856)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense\$	=	976,879	\$	(1,049,448)	\$	(140,471)	\$ _	(668,437)
Discount Bata Canaitivity								
Discount Rate Sensitivity 1% decrease (6.30%)\$	•	29,241,488	\$	62,424,097	\$	21,947,569	\$	12,213,990
Current discount rate (7.30%)\$	•	23,466,261	\$	50,095,267	\$	17,612,899	\$	9,801,713
1% increase (8.30%)\$	\$	18,607,451	\$	39,722,784	\$	13,966,058	\$	7,772,218
Covered Payroll\$	5	13,713,395	\$	14,347,517	\$	5,064,259	\$	4,571,874
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Town of Shirley	Town of Stow	Town of Sudbury	Town of Tewksbury
Net Pension Liability Beginning net pension liability/(asset)	\$	9,325,501	\$ 11,909,1 4 3	\$ 64,186,721	\$ 107,519,124
Ending net pension liability/(asset)	\$	8,952,975	\$ 11,389,407	\$ 61,745,935	\$ 104,198,258
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	. \$	163,7 4 7	\$ 208,308	\$ 1,129,310	\$ 1,905,7 4 7
Changes of assumptions		341,768	434,776	2,357,071	3,977,634
Changes in proportion and differences between employer contributions and proportionate share of contributions.		38,702	44 ,864	415,995	1,352,170
Total Deferred Outflows of Resources	\$ _	544,217	\$ 687,948	\$ 3,902,376	\$ 7,235,551
Deferred Inflows of Resources Differences between expected and actual experience	. \$	10,595	\$ 13,478	\$ 73,069	\$ 123,307
Net difference between projected and actual investment earnings on pension plan investments	,	507,531	645,649	3,500,287	5,906,847
Changes in proportion and differences between employer contributions and proportionate share of contributions.		81,437	42,971	1,239,986	1,130,973
Total Deferred Inflows of Resources	\$ _	599,563	\$ 702,098	\$ 4,813,342	\$ 7,161,127
Pension Expense Proportionate share of plan pension expense	\$	1,023,915	\$ 1,302,561	\$ 7,061,635	\$ 11,916,738
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(246,747)	51,934	(313,354)	257,644
Total Employer Pension Expense	\$ =	777,168	\$ 1,354,495	\$ 6,748,281	\$ 12,174,382
Contributions Statutory required contribution	\$	818,964	\$ 1,024,938	\$ 5,389,846	\$ 8,797,968
Contribution in relation to statutory required contribution	-	(818,964)	(1,024,938)	(5,389,846)	(8,807,233)
Contribution deficiency/(excess)	\$ =	-	\$ -	\$ 	\$ (9,265)
Contributions as a percentage of covered payroll		39.15%	27.78%	28.94%	36.29%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2022 June 30, 2023 June 30, 2024 June 30, 2025 Total Deferred Outflows/(Inflows) Recognized in		(1,447) 88,483 (67,459) (74,923)	\$ 86,640 114,535 (108,063) (107,262)	\$ 319,715 98,035 (784,345) (544,371)	\$ 1,098,016 534,620 (731,143) (827,069)
Future Pension Expense	\$ =	(55,346)	\$ (14,150)	\$ (910,966)	\$ 74,424
Discount Rate Sensitivity 1% decrease (6.30%)	\$	11,156,371	\$ 14,192,428	\$ 76,942,084	\$ 129,842,250
Current discount rate (7.30%)	. \$	8,952,975	\$ 11,389,407	\$ 61,745,935	\$ 104,198,258
1% increase (8.30%)	\$	7,099,216	\$ 9,031,172	\$ 48,961,122	\$ 82,623,473
Covered Payroll	\$	2,091,842	\$ 3,689,219	\$ 18,621,425	\$ 24,269,942
See notes to schedule of employer allocations and schedule of pension amounts by employer.					(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	-	Town of Townsend	Town of Tyngsborough	Town of Wayland		Town of Westford
Net Pension Liability Beginning net pension liability/(asset)	\$	8,637,189	\$ 25,022,982	\$ 59,191,196	\$	59,489,841
Ending net pension liability/(asset)	\$	8,103,799	\$ 24,002,922	\$ 56,416,777	\$	56,098,309
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	148,215	\$ 439,005	\$ 1,031,842	\$	1,026,017
Changes of assumptions		309,352	916,281	2,153,638		2,141,481
Changes in proportion and differences between employer contributions and proportionate share of contributions.		182,913	802,436	117,079		1,001,946
Total Deferred Outflows of Resources	\$ _	640,480	\$ 2,157,722	\$ 3,302,559	\$	4,169,444
Deferred Inflows of Resources Differences between expected and actual experience	. \$	9,590	\$ 28,405	\$ 66,763	\$	66,386
Net difference between projected and actual investment earnings on pension plan investments		459,393	1,360,69 1	3,198,185		3,180,131
Changes in proportion and differences between employer contributions and proportionate share of contributions.		530,294	311,089	1,224,644		999,143
Total Deferred Inflows of Resources	\$ _	999,277	\$ 1,700,185	\$ 4,489,592	\$	4,245,660
Pension Expense Proportionate share of plan pension expense	\$	926,800	\$ 2,745,120	\$ 6,452,162	\$	6,415,738
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(41,155)	462,648	(1,054,459)		300,562
Total Employer Pension Expense	\$ =	885,645	\$ 3,207,768	\$ 5,397,703	\$.	6,716,300
Contributions Statutory required contribution	\$	911,165	\$ 2,152,711	\$ 5,182,237	\$	5,473,719
Contribution in relation to statutory required contribution	-	(911,165)	(2,152,711)	(5,182,543)		(5,473,719)
Contribution deficiency/(excess)	\$ =	-	\$ 	\$ (306)	\$.	-
Contributions as a percentage of covered payroll		24.49%	23.68%	24.81%		20.26%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2022 June 30, 2023 June 30, 2024 June 30, 2025		(144,474) 40,309 (184,101) (70,531)	165,232 506,614 (866) (213,443)	\$ (135,015) 272,812 (777,235) (547,595)	\$	524,941 742,237 (744,645) (598,749)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.	\$ _		457,537	\$ (1,187,033)	\$	(76,216)
Discount Rate Sensitivity 1% decrease (6.30%)	\$	10,098,206	\$ 29,910,226	\$ 70,301,380	\$	69,904,534
Current discount rate (7.30%)	\$	8,103,799	\$ 24,002,922	\$ 56,416,777	\$	56,098,309
1% increase (8.30%)	\$	6,425,866	\$ 19,032,994	\$ 44,735,393	\$	44,482,866
Covered Payroll	\$	3,721,241	\$ 9,090,782	\$ 20,891,951	\$	27,016,988
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Town of Weston		Town of Wilmington		Acton- Boxborough Regional School District		Acton Water Supply
Net Pension Liability Beginning net pension liability/(asset)	\$	67,631,236	\$	91,654,915	\$	31,360,065	\$	3,732,674
			*				*	
Ending net pension liability/(asset)	\$	64,849,395	\$	86,423,315	\$	30,083,545	\$	3,548,184
Deferred Outflows of Resources Differences between expected and actual experience	\$	1,186,071	\$	1,580,650	\$	550,217	\$	64,895
Changes of assumptions		2,475,542		3,299,099		1,148,401		135,447
Changes in proportion and differences between employer contributions and proportionate share of contributions		_		337,745		629,969		_
Total Deferred Outflows of Resources	¢ -	3 661 613	¢		•	2,328,587	•	200,342
Total Bolding Gallows of Resources	Ψ =	0,001,010	Ψ	0,217,101	Ψ	£,0£0,001	Ψ=	200,012
Deferred Inflows of Resources Differences between expected and actual experience	\$	76,742	\$	102,272	\$	35,601	\$	4,199
Net difference between projected and actual investment earnings on pension plan investments		3,676,217		4,899,211		1,705,392		201,141
Changes in proportion and differences between employer contributions and proportionate share of contributions		1,287,778		512,919		46,454		180,239
Total Deferred Inflows of Resources	\$_	5,040,737	\$	5,514,402	\$	1,787,447	\$	385,579
Pension Expense Proportionate share of plan pension expense	\$	7,416,567	\$	9,883,887	\$	3,440,535	\$	405,791
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	-	(965,118)		116,078		456,183		(30,213
Total Employer Pension Expense	\$ =	5,451,449	\$	9,999,965	\$	3,896,718	\$ =	375,578
Contributions	_							
Statutory required contribution	\$	5,668,652	\$	7,593,868	\$	2,794,347	\$	256,971
Contribution in relation to statutory required contribution	-	(5,668,652)		(9,104,998)		(2,794,347)	-	(256,971
Contribution deficiency/(excess)	\$ =	-	\$	(1,511,130)	\$		\$ _	
Contributions as a percentage of covered payroll		26.44%		37.07%		18.07%		20.14%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2022	\$	(247,438)	\$	706,420	\$	404,562	\$	(33,702
June 30, 2023		256,687 (777,384)		531,592 (745,723)		488,982 (104,513)		(23, 44 2 (77,989
June 30, 2025		(610,989)		(789,197)		(247,891)		(50,104
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.	\$		•	(296,908)	\$	541,140	•	(185,237
	* =	(.,,,,,,		(===,===,	•		* =	(,
Discount Rate Sensitivity 1% decrease (6.30%)	\$	80,809,330	\$	107,692,757	\$	37,487,337	\$	4,421,419
Current discount rate (7.30%)	\$	64,849,395	\$	86,423,315	\$	30,083,545	\$	3,548,184
1% increase (8.30%)	\$	51,421,994	\$	68,528,923	\$	23,854,592	\$	2,813,514
Covered Payroll	\$	21,442,179	\$	24,560,364	\$	15,468,104	\$	1,275,867
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Bedford Housing Authority		Billerica Housing Authority		Chelmsford Housing Authority		Chelmsford Water District
Net Pension Liability								
Beginning net pension liability/(asset)	\$	332,568	\$	1,647,762	\$	2,275,176	\$	343,766
Ending net pension liability/(asset)	\$	315,580	\$	1,612,020	\$	2,016,950	\$	24,164
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	5,772	\$	29,483	\$	36,889	\$	442
Changes of assumptions		12,047		61,537		76,994		922
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	_	1,770		77,417		223,910		275,404
Total Deferred Outflows of Resources	\$ _	19,589	\$	168,437	\$	337,793	\$	276,768
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	373	\$	1,908	\$	2,387	\$	29
Net difference between projected and actual investment earnings on pension plan investments		17,890		91,383		114,338		1,370
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	_	8,952		19,343		90,196		389,104
Total Deferred Inflows of Resources	\$ _	27,215	\$	112,634	\$	206,921	\$.	390,503
Pension Expense Proportionate share of plan pension expense	\$	36,091	\$	184,361	\$	230,670	\$	2,765
Net amortization of deferred amounts from changes in proportion and differences between employer								
contributions and proportionate share of contributions	-	3,306		42,968		156,340		64,781
Total Employer Pension Expense	\$ =	39,397	\$	227,329	\$	387,010	\$.	67,546
Contributions								
Statutory required contribution	\$	27,468	\$	115,453	\$	241,136	\$	67,843
Contribution in relation to statutory required contribution	_	(27,468)		(115,453)		(271,136)		(67,843)
Contribution deficiency/(excess)	\$ _	-	\$		\$	(30,000)	\$	
Contributions as a percentage of covered payroll		15.64%		27.89%		9.93%		4.64%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2022	\$	958	\$	28,563	\$	179,710	\$	7,526
June 30, 2023		541	•	29,965	•	26,388	•	31,760
June 30, 2024		(5,483)		11,307		(43,080)		(106,367)
June 30, 2025. Total Deferred Outflows/(Inflows) Recognized in	-	(3,642)		(14,032)		(32,146)		(46,654)
Future Pension Expense	\$ =	(7,626)	\$	55,803	\$	130,872	\$	(113,735)
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	393,247	\$	2,008,751	\$	2,513,337	\$	30,111
Current discount rate (7.30%)	\$	315,580	\$	1,612,020	\$	2,016,950	\$	24,164
1% increase (8.30%)	\$	250,238	\$	1,278,243	\$	1,599,330	\$	19,16 1
Covered Payroll	\$	175,575	\$	413,931	\$	2,729,849	\$	1,463,629
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

		Dracut Housing Authority		Dracut Water Supply	•	East Chelmsford Water District		East Middlesex Mosquito Control
Net Pension Liability Beginning net pension liability/(asset)	\$	2,317,408	\$	3,356,809	\$	395,631	\$	712,131
Ending net pension liability/(asset)	\$	2,264,513	\$	3,240,627	\$	366,619	\$	649,547
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	41,417	\$	59,270	\$	6,705	\$	11,880
Changes of assumptions		86,445		123,707		13,995		24,796
Changes in proportion and differences between employer contributions and proportionate share of contributions		44,940		68,943		14,729		44,301
Total Deferred Outflows of Resources	\$ _	172,802	\$	251,920	\$	35,429	\$.	80,977
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	2,680	\$	3,835	\$	434	\$	769
Net difference between projected and actual investment earnings on pension plan investments		128,372		183,706		20,783		36,822
Changes in proportion and differences between employer contributions and proportionate share of contributions		43,511		94,000		7,321		44,010
Total Deferred Inflows of Resources	\$	174,563	\$	281,541	\$	28,538	\$.	81,601
Pension Expense Proportionate share of plan pension expense	\$	258,985	\$	370,617	\$	41,929	\$	74,286
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of confributions		(10,205)		4,119		6,314		5,358
Total Employer Pension Expense	\$	248,780	\$	374,736	\$	48,243	\$	79,644
Contributions Statutory required contribution	\$	162,257	\$	247,338	\$	35,999	\$	51,505
Contribution in relation to statutory required contribution		(162,257)		(247,338)		(35,999)		(51,505)
Contribution deficiency/(excess)	\$ _		\$		\$		\$.	
Contributions as a percentage of covered payroll		38.00%		33.60%		16.21%		13.61%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense	•	22.470	•	55.704	•	7.500	•	4.450
June 30, 2022. June 30, 2023. June 30, 2024. June 30, 2025.		22,176 7,153 (10,890) (20,200)		55,721 (9,130) (42,763) (33,449)	\$	7,568 8,380 (3,909) (5,148)	\$	4,150 18,447 (9,554) (13,667)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense						6,891	\$	(624)
Discount Rate Sensitivity 1% decrease (6.30%)	\$	2,821,827	\$	4,038,170	\$	456,847	\$	809,406
Current discount rate (7.30%)	\$	2,264,513	\$	3,240,627	\$	366,619	\$	649,547
1% increase (8.30%)	\$	1,795,634	\$	2,569,639	\$	290,709	\$	515,055
Covered Payroll	\$	426,964	\$	736,128	\$	222,136	\$	378,327
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

18,372,432 17,820,793 325,936 680,286 531,315 1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095 (48,921)	\$ \$	226,455 472,652 427,683 1,126,790 14,652 701,896 110,392 826,940 1,416,037	\$ \$	704,593 616,643 11,278 23,540 - 34,818 730 34,957 337,713 373,400	\$	9,126,061 8,715,281 159,399 332,695 34,883 526,977 10,314 494,057 288,509 792,880
325,936 680,286 531,315 1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$ \$	226,455 472,652 427,683 1,126,790 14,652 701,896 110,392 826,940	\$ \$	11,278 23,540 34,818 730 34,957 337,713 373,400	\$ \$	159,399 332,695 34,883 526,977 10,314 494,057 288,509 792,880
325,936 680,286 531,315 1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$ \$	226,455 472,652 427,683 1,126,790 14,652 701,896 110,392 826,940	\$	11,278 23,540 34,818 730 34,957 337,713 373,400	\$	159,399 332,695 34,883 526,977 10,314 494,057 288,509 792,880
531,315 1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$ \$	472,652 427,683 1,126,790 14,652 701,896 110,392 826,940 1,416,037	\$	23,540 34,818 730 34,957 337,713 373,400	\$	332,695 34,883 526,977 10,314 494,057 288,509 792,880
531,315 1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$	427,683 1,126,790 14,652 701,896 110,392 826,940 1,416,037	\$	34,816 730 34,957 337,713 373,400	\$	34,883 526,977 10,314 494,057 288,509 792,880
1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$	1,126,790 14,652 701,896 110,392 826,940 1,416,037	\$	730 34,957 337,713 373,400	\$	526,977 10,314 494,057 288,509 792,880
1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$	1,126,790 14,652 701,896 110,392 826,940 1,416,037	\$	730 34,957 337,713 373,400	\$	526.977 10,314 494,057 288,509 792,880
1,537,537 21,089 1,010,235 189,529 1,220,853 2,038,095	\$	1,126,790 14,652 701,896 110,392 826,940 1,416,037	\$	730 34,957 337,713 373,400	\$	526.977 10,314 494,057 288,509 792,880
21,089 1,010,235 189,529 1,220,853 2,038,095	\$	14,652 701,896 110,392 826,940 1,416,037	\$	730 34,957 337,713 373,400	\$	10,314 494,057 288,509 792,880
1,010,235 189,529 1,220,853 2,038,095	\$:	701,896 110,392 826,940 1,416,037	\$	34,957 337,713 373,400	\$	494,057 288,509 792,880
189,529 1,220,853 2,038,095		110,392 826,940 1,416,037		337,713 373,400		288,509 792,880
1,220,853 2,038,095		826,940 1,416,037		373,400		792,880
1,220,853 2,038,095		826,940 1,416,037		373,400		792,880
2,038,095		1,416,037				
	\$		\$	70,523	\$	996,734
(48,921)						
1,989,174	\$	351,249 1,767,286	\$	(166,362) (95,839)	\$	(162,808) 833,926
	_		_		_	
1,307,090	\$	1,077,851	\$	98,078	\$	755,859
(1,307,090)		(1,077,851)		(98,078)		(755,859)
	\$		\$		\$	
29.23%		26.52%		26.42%		25.23%
	\$		\$		\$	31 (23,854)
(23,285)		(67,935)		(97,217)		(151,870)
(178,238)		(142,593)		(8,475)		(90,210)
316,684	\$.	299,850	\$	(338,582)	\$	(265,903)
22,206,627	\$	15,428,824	\$	768,404	\$	10,860,179
17,820,793	\$	12,381,614	\$	616,643	\$	8,715,281
14,130,906	\$	9,817,937	\$	488,964	\$	6,910,737
			\$	371,288	\$	2,995,522
	29.23% 297,608 220,599 (23,285) 316,684 22,206,627 17,820,793	297,608 \$ 220,599 (23,285) (178,238) 316.684 \$ 22,206,627 \$ 17,820,793 \$	29.23% 26.52% 297,608 \$ 277,350 220,599 233,028 (23,285) (67,935) (178,238) (142,593) 316,684 \$ 299,850 22,206,627 \$ 15,428,824 17,820,793 \$ 12,381,614 14,130,906 \$ 9,817,937	297,608 \$ 277,350 \$ 220,599 233,028 (23,285) (178,238) (142,593) 316,684 \$ 299,850 \$ 22,206,627 \$ 15,428,824 \$ 17,820,793 \$ 12,381,614 \$ 14,130,906 \$ 9,817,937 \$	- \$ - \$ 29.23% 26.52% 26.42% 297,608 \$ 277,350 \$ (141,223) 220,599 233,028 (91,667) (97,217) (178,238) (142,593) (8,475) 316,684 \$ 299,850 \$ (338,582) 22,206,627 \$ 15,428,824 \$ 768,404 17,820,793 \$ 12,381,614 \$ 616,643 14,130,906 \$ 9,817,937 \$ 488,964	- \$ - \$ 29.23% 26.52% 26.42% 297,608 \$ 277,350 \$ (141,223) 220,599 233,028 (91,667) (23,285) (67,935) (97,217) (178,238) (142,593) (8,475) 316,684 \$ 299,850 \$ (338,582) \$ 22,206,627 \$ 15,428,824 \$ 768,404 \$ 17,820,793 \$ 12,381,614 \$ 616,643 \$ 14,130,906 \$ 9,817,937 \$ 488,964 \$

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

		Nashoba Valley Technical High School District		North Chelmsford Water District		North Middlesex Regional School District		Shawsheen Valley Regional Vocational Technical School
Net Pension Liability Beginning net pension liability/(asset)	\$	3,735,397	\$	1,074,652	\$	13,400,780	\$	8,870,284
Ending net pension liability/(asset)	\$	3,650,910	\$	977,691	\$	12,806,518	\$	8,542,800
Deferred Outflows of Resources								
Differences between expected and actual experience		66,774	\$	17,882	\$	234,226	\$	156,245
Changes of assumptions		139,369		37,322		488,872		326,110
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		99.809		51,684		99.538		17,943
Total Deferred Outflows of Resources	\$	305,952	\$	106,888	\$	822,636	\$	500,298
Deferred Inflows of Resources								
Differences between expected and actual experience	\$	4,320	\$	1,157	\$	15,155	\$	10,109
Net difference between projected and actual investment earnings on pension plan investments		206,965		55,424		725,983		484,279
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		80,848		64.687		76,037		161,430
			e	121,268				655,818
Total Deferred Inflows of Resources	Þ	292,133	Ъ	121,200	3	817,175	\$	655,616
Pension Expense Proportionate share of plan pension expense	\$	417,539	\$	111,814	\$	1,464,631	\$	977,006
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		(21,989)		(6,457)		(56,911)		(75,606)
• •			_		_			
Total Employer Pension Expense	\$	395,550	\$	105,357	S	1,407,720	\$	901,400
Contributions								
Statutory required contribution	\$	324,010	\$	72,338	\$	1,123,918	\$	706,293
Contribution in relation to statutory required contribution		(324,010)		(72,338)		(1,123,918)		(706,293)
Contribution deficiency/(excess)	\$		\$		\$		\$	
Contributions as a percentage of covered payroll		32.62%		10.81%		20.39%		25.77%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense		10.010		00.400		00.000		(57.500)
June 30, 2022. June 30, 2023.		42,313 7,591	\$	23,136 10,299	\$	90,969 146,283	\$	(57,529) 53,326
June 30, 2024		(16.150)		(25,690)		(103,629)		(70,028)
June 30, 2025		(19,935)		(22,125)		(128,162)		(81,289)
Total Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense	\$	13,819	\$	(14,380)	\$	5,461	\$	(155,520)
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	4,549,427	\$	1,218,308	\$	15,958,301	\$	10,645,249
Current discount rate (7.30%)	\$	3,650,910	\$	977,691	\$	12,806,518	\$	8,542,800
1% increase (8.30%)	\$	2,894,970	\$	775,255	\$	10,154,863	\$	6,773,969
Covered Payroll	\$	993,404	\$	669,355	\$	5,512,936	\$	2,741,245
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

7,195 7,782 2,134 4,916 4,425 1,475 7,902 8,435 3,711 4,756) 8,955	\$ \$ \$	2,899 138,868 130,042 271,809 280,158 74,527	\$ \$ \$ - \$ \$	1,723,517 1,645,758 30,100 62,825 18,666 111,591 1,948 93,296 20,416 115,660 188,221 22,571 210,792	\$ = \$ = \$ = \$ = \$ = \$	675,751 625,873 11,44 23,893 12,211 47,549 74 35,481 53,344 89,56 71,581
7,782 2,134 4,916 4,425 7,902 8,554 1,979 8,435 3,711 4,756)	\$ \$ \$	2,449,672 44,804 93,513 254,281 392,598 2,899 138,868 130,042 271,809 280,158 74,527	\$ \$ \$ - \$ \$	1,645,758 30,100 62,825 18,666 111,591 1,948 93,296 20,416 115,660 188,221 22,571	\$ = \$ = \$	625,879 11,441 23,899 12,211 47,549 74 35,480 53,340 89,56
2,134 4,916 4,425 1,475 7,902 8,554 1,979 8,435 3,711	\$ \$	44,804 93,513 254,281 392,598 2,899 138,868 130,042 271,809 280,158	\$ - \$ - \$	30,100 62,825 18,666 111,591 1,948 93,296 20,416 115,660 188,221	\$ = \$ = \$	11,44* 23,89; 12,21(47,54) 74* 35,48(53,34(89,56) 71,58(6,61(
4,916 4,425 1,475 7,902 8,554 1,979 8,435 3,711 4,756)	\$ \$	93,513 254,281 392,598 2,899 138,868 130,042 271,809 280,158 74,527	= \$ \$	18,666 111,591 1,948 93,296 20,416 115,660 188,221	\$ = \$ = \$ = \$ = \$ = \$	23,893 12,211 47,549 74 35,480 53,340 89,56 71,580
7,902 8,554 1,979 8,435 3,711	\$ \$	254,281 392,596 2,899 138,868 130,042 271,809 280,158	= \$ \$	18,666 111,591 1,948 93,296 20,416 115,660 188,221 22,571	\$ \$	12,218 47,549 74 35,488 53,3448 89,56 71,586
1,475 7,902 8,554 1,979 6,435 3,711	\$ \$	392,598 2,899 138,868 130,042 271,809 280,158	= \$ \$	111,591 1,948 93,296 20,416 115,660 188,221 22,571	\$ \$	47,54 74 35,48 53,34 89,56 71,58
1,475 7,902 8,554 1,979 6,435 3,711	\$ \$	392,598 2,899 138,868 130,042 271,809 280,158	= \$ \$	111,591 1,948 93,296 20,416 115,660 188,221 22,571	\$ \$	47,54 74 35,48 53,34 89,56 71,58
7,902 8,554 1,979 8,435 3,711	\$ \$	2,899 138,868 130,042 271,809 280,158 74,527	\$ - \$ \$	1,948 93,296 20,416 115,660 188,221 22,571	\$ \$	74 35,48 53,34 89,56 71,58
7,902 8,554 1,979 8,435 3,711	\$ \$	2,899 138,868 130,042 271,809 280,158 74,527	\$ - \$ \$	1,948 93,296 20,416 115,660 188,221 22,571	\$ \$	35,48 53,34 89,56 71,58 6,61
8,554 1,979 8,435 3,711 4,756)	\$ \$	138,868 130,042 271,809 280,158	= \$	93,296 20,416 115,660 188,221 22,571	\$ = \$ = \$	35,48 53,34 89,56 71,58 6,61
1,979 8,435 3,711 4,756)	\$	271,809 280,158 74,527	= \$ = \$	20,416 115,660 188,221 22,571	\$	53,34 89,56 71,58 6,61
8,435 3,711 4,756)	\$	271,809 280,158 74,527	= \$ = \$	115,660 188,221 22,571	\$	89,56 71,58 6,61
8,435 3,711 4,756)	\$	271,809 280,158 74,527	= \$ = \$	115,660 188,221 22,571	\$	89,56 71,58 6,61
3,711 4,756)	\$	280,158 74 ,527	= \$ -	188,221 22,571	\$	71,58 6,61
4,756)		74 ,527	-	22,571		6,61
	\$		•			
				210,132	: ~ =	
9,951	\$	142,163	\$	137,197	\$	55,10
9,951)		(142,163))_	(137,197)		(55,10
	\$		\$		\$ _	
6.52%		13.24%	,	32.61%		17.34
	\$	34,097	\$	14,933	\$	(6,31
						(4,23 (21,34
)			(10,12
6.960)	\$	120.789		(4.069)	 s	(42,01
	*		= *	(.,,	= * =	,
1,235	\$	3,052,555	\$	2,050,792	\$	779,90
7,782	\$	2,449,672	\$	1,645,758	\$	625,87
5,113	\$	1,942,455	\$	1,304,995	\$	496,28
		4 070 005	\$	420 709	\$	317,75
2 7	2,396 22,177) 71,443) 36,960) 21,235 77,782 95,113	22,177) 71,443) 36,960) \$ 21,235 \$ 77,782 \$ 95,113 \$	2,396 95,662 22,177) 31,673 71,443) (40,643) 36,960) \$ 120,789 21,235 \$ 3,052,555 77,782 \$ 2,449,672 95,113 \$ 1,942,455	2,396 95,662 22,177) 31,673 71,443) (40,643) 36,960) \$ 120,789 \$ 21,235 \$ 3,052,555 \$ 2,449,672 \$ 95,113 \$ 1,942,455 \$	2,396 95,662 11,837 22,177 31,673 (12,662) 71,443) (40,643) (18,177) 36,960) \$ 120,789 \$ (4.069) 21,235 \$ 3,052,555 \$ 2,050,792 77,782 \$ 2,449,672 \$ 1,645,758 95,113 \$ 1,942,455 \$ 1,304,995	2,396 95,662 11,837 22,177 31,673 (12,662) 71,443) (40,643) (18,177) 36,960) \$ 120,789 \$ (4.069) \$ 21,235 \$ 3,052,555 \$ 2,050,792 \$ 77,782 \$ 2,449,672 \$ 1,645,758 \$ 95,113 \$ 1,942,455 \$ 1,304,995 \$

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Hopkinton Housing Authority		Sudbury Housing Authority		Wilmington Housing Authority	_	Acton Housing Authority
Net Pension Liability								
Beginning net pension liability/(asset)	\$	537,329	\$	490,188	\$	382,144	\$	907,630
Ending net pension liability/(asset)	\$	517,677	\$	465,613	\$	370,673	\$	861,176
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	9,468	\$	8,516	\$	6,779	\$	15,751
Changes of assumptions		19,762		17,774		14,150		32,874
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		4,801		10,840		12,102		27,910
Total Deferred Outflows of Resources	\$	34,031	\$	37,130	s	33,031	\$	76,535
	- =						. =	
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	613	\$	551	\$	439	\$	1,019
Net difference between projected and actual								
investment earnings on pension plan investments		29,346		26,395		21,013		48,819
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		13,069		6,428		466		57,546
Total Deferred Inflows of Resources	\$_	43,028	\$	33,374	\$	21,918	\$_	107,384
Pension Expense								
Proportionate share of plan pension expense	\$	59,204	\$	53,250	\$	42,392	\$	98,489
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		(5,789)		21,075		9,404		(22,108)
	-			74,325	_	51,796	_	76,381
Total Employer Pension Expense	Φ =	55,415	Þ	74,323	Þ	51,790	Ф =	70,361
Contributions								
Statutory required contribution	\$	40,023	\$	4 3,152	\$	32,574	\$	66,700
Contribution in relation to statutory required contribution	_	(40,023)		(43,152)		(32,574)	-	(66,700)
Contribution deficiency/(excess)	\$ _	-	\$		\$		\$ _	
Contributions as a percentage of covered payroll		49.59%		40.38%		22.35%		15.98%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2022	œ.	(5,181)	æ	12,274	\$	8,460	\$	(28,564)
June 30, 2022	Φ	5,989	Φ	2,020	Φ	5,782	Φ	15,635
June 30, 2024		(4,359)		(5,781)		(499)		(6,313)
June 30, 2025. Total Deferred Outflows/(Inflows) Recognized in	-	(5,446)		(4,757)		(2,630)	-	(11,607)
Future Pension Expense.	\$ =	(8,997)	\$	3,756	\$	11,113	\$ _	(30,849)
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	645,081	\$	580,204	\$	461,898	\$	1,073,118
Current discount rate (7.30%)	\$	517,677	\$	465,613	\$	370,673	\$	861,176
1% increase (8.30%)	\$	410,489	\$	369,205	\$	293,923	\$	682,865
Covered Payroll	\$	80,704	\$	106,86 1	\$	145,743	\$	417,322
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Burlington Housing Authority		Ayer Housing Authority		Holliston Housing Authority	_	Littleton Housing Authority
Net Pension Liability								
Beginning net pension liability/(asset)	\$	345,712	\$	879,177	\$	175,571	\$	621,840
Ending net pension liability/(asset)	\$	327,467	\$	858,485	\$	168,599	\$	607,838
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	5,989	\$	15,70 1	\$	3,084	\$	11,117
Changes of assumptions		12,50 1		32,772		6,436		23,203
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		121,361		23,323		11,777		60,583
	-							
Total Deferred Outflows of Resources	\$ =	139,851	\$	71,796	\$	21,297	\$ =	94,903
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	388	\$	1,016	\$	200	\$	719
Net difference between projected and actual investment earnings on pension plan investments		18,564		48,666		9,558		34,457
Changes in proportion and differences between								
employer contributions and proportionate								
share of contributions	-	14,732		216,044		13,692	-	7,047
Total Deferred Inflows of Resources	\$ =	33,684	\$	265,726	\$.	23,450	\$ =	42,223
Pension Expense Proportionate share of plan pension expense	\$	37,451	\$	98,181	\$	19,282	\$	69,517
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		30,738		25,658		(10,022)		26,128
Total Employer Pension Expense	\$	68,189	· s	123,839	\$	9,260	- -\$i	95,645
	Ψ=		٠ ۳		Ϋ.		Ψ=	
Contributions								
Statutory required contribution	\$	14,349	\$	62,116	\$	15,782	\$	43,356
Contribution in relation to statutory required contribution	_	(14,349)		(62,116)		(15,782)	-	(43,356)
Contribution deficiency/(excess)	\$ _	-	\$		\$		\$ _	
Contributions as a percentage of covered payroll		6.61%		51.07%		18.71%		105.50%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2022	œ.	44,268	\$	(402.227)	•	(7,948)	ď.	22,464
June 30, 2022.	Ф	43,838	Ф	(192,327) 5,828	Þ	5,958	Ф	21,400
June 30, 2024		24,785		226		1,168		14,241
June 30, 2025.	-	(6,724)		(7,657)		(1,331)	-	(5,425)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ _	106,167	\$	(193,930)	\$	(2,153)	\$ _	52,680
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	408,059	\$	1,069,765	\$	210,093	\$	757,432
Current discount rate (7.30%)	\$	327,467	\$	858,485	\$	168,599	\$	607,838
1% increase (8.30%)	\$	259,663	\$	680,731	\$	133,690	\$	481,982
Covered Payroll	\$	217,060	\$	121,622	\$	84,340	\$	41,096
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	_	Westford Housing Authority		Shirley Water District		Tyngsborough Housing Authority		Pepperell Housing Authority
Net Pension Liability								
Beginning net pension liability/(asset)	\$	570,710	\$	484,781	\$	528,855	\$	251,415
Ending net pension liability/(asset)	\$	537,128	\$	453,772	\$	516,453	\$	247,338
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	9,824	\$	8,299	\$	9,446	\$	4,524
Changes of assumptions		20,504		17,322		19,715		9,442
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		7,328		34,386		13,309		34,014
Total Deferred Outflows of Resources	_					42,470		
Total Deletted Oditions of Nessources	Ψ =	37,000	= Ψ	00,007	Ÿ	42,470	Ψ =	47,000
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	636	\$	537	\$	611	\$	293
Net difference between projected and actual								
investment earnings on pension plan investments		30,449		25,724		29,277		14,021
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		8,626		26,984		13,439		1,837
	_				_			
Total Deferred Inflows of Resources	\$ =	39,711	. 5	53,245	\$	43,327	\$ =	16,151
Pension Expense Proportionate share of plan pension expense	\$	61,429	\$	51,897	\$	59,063	\$	28,288
Net amortization of deferred amounts from changes								
in proportion and differences between employer								
contributions and proportionate share of contributions	-	6,509	-	(5,788)		5,519		19,979
Total Employer Pension Expense	\$ =	67,938	\$	46,109	\$	64,582	\$	48,267
Contributions								
Statutory required contribution.	\$	50,725	\$	24,607		44,565	\$	18,33 1
Contribution in relation to statutory required contribution	_	(50,725)		(24,607)		(44,565)		(18,331)
Contribution deficiency/(excess)	\$_	-	\$		\$		\$	
Contributions as a percentage of covered payroll		21.57%		10.91%		24.72%		16.95%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense								
June 30, 2022 June 30, 2023	\$	8,727 2,076	\$	5,085 11,713	\$	6,7 4 0 639	\$	13,889 11,567
June 30, 2024.		(6,580)		(590)		(5,078)		8,139
June 30, 2025.	_	(6,278)		(9,446)		(3,158)		(1,766)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$_	(2.055)	\$	6,762	\$	(857)	\$	31,829
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	669,319	\$	565,449	\$	643,556	\$	308,210
Current discount rate (7.30%)	\$	537,128	\$	453,772	\$	516,453	\$	247,338
1% increase (8.30%)	\$	425,913	\$	359,816	\$	409,519	\$	196,125
Covered Payroll	\$	235,134	\$	225,565	\$	180,2 4 6	\$	108,132
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

		Groton Housing Authority		Tyngsborough Water District		North Reading Housing Authority		West Groton Water
Net Pension Liability Beginning net pension liability/(asset)	\$	-	\$	481,728	\$	214,226	\$	36,784
Ending net pension liability/(asset)	\$	-	\$	440,581	\$	212,881	\$	18,060
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	-	\$	8,058	\$	3,894	\$	330
Changes of assumptions		-		16,819		8,126		689
Changes in proportion and differences between employer contributions and proportionate share of contributions		13,074		17,2 11 _		34,757		5,727
Total Deferred Outflows of Resources	\$:	13,074	\$	42,088	\$	46,777	\$	6,746
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	-	\$	521	\$	252	\$	21
Net difference between projected and actual investment earnings on pension plan investments		-		24,976		12,068		1,024
Changes in proportion and differences between employer contributions and proportionate share of contributions		4,284		19,950		496		14,465
Total Deferred Inflows of Resources	\$.	4,284	\$	45,447	\$	12,816	\$	15,510
Pension Expense Proportionate share of plan pension expense	\$	-	\$	50,386	\$	24,346	\$	2,067
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		867		(839)		20,657		(1,678)
Total Employer Pension Expense	\$.	867	\$	49,547	\$	45,003	\$	389
Contributions Statutory required contribution	\$	2,867	\$	40,250	\$	17,708	\$	2,737
Contribution in relation to statutory required contribution		(2,867)		(40,250)		(17,708)		(2,737)
Contribution deficiency/(excess)	\$.	-	\$		\$		\$	
Contributions as a percentage of covered payroll		0.00%		19.07%		18.72%		2.11%
<u>Deferred Outflows/(Inflows) Recognized In</u> <u>Future Pension Expense</u> June 30, 2022.	e	546	\$	2 105	\$	12.972	\$	(63)
June 30, 2022 June 30, 2023 June 30, 2024 June 30, 2025		4,832 2,839 573	Þ	3,195 8,210 (6,800) (7,964)	•	12,873 13,639 8,178 (729)	•	(63) (1,469) (3,936) (3,296)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	8,790	\$	(3,359)	\$	33,961	\$	(8,764)
Discount Rate Sensitivity 1% decrease (6.30%)	\$	-	\$	549,011	\$	265,273	\$	22,505
Current discount rate (7.30%)	\$	-	\$	440,581	\$	212,881	\$	18,060
1% increase (8.30%)	\$	=	\$	349,356	\$	168,803	\$	14,321
Covered Payroll	\$	-	\$	211,109	\$	94,616	\$	129,814
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2020

	Ayer-Shirley Regional School District		Northern Middlesex Region Emergency Communications Center	al	Totals
Net Pension Liability Beginning net pension liability/(asset)	\$ 4,713,693	\$	-	\$	1,600,056,015
Ending net pension liability/(asset)	\$ 4,239,976	\$	(14,725)	\$	1,531,093,126
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$ 77.548	\$	(266)	\$	28,003,125
Changes of assumptions	161,856	•	(565)	•	58,447,504
Changes in proportion and differences between employer contributions and proportionate					
share of contributions	211,719				22,923,004
Total Deferred Outflows of Resources	\$ 451,123	\$	(831)	\$	109,373,633
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$ 5,018	\$	(20)	\$	1,811,877
Net difference between projected and actual investment earnings on pension plan investments	240,358		(836)		86,795,430
Changes in proportion and differences between employer contributions and proportionate share of contributions	442,391		10,452		22,923,004
Total Deferred Inflows of Resources		\$		\$	111,530,311
Pension Expense Proportionate share of plan pension expense		\$	(1,689)	\$	175,461,325
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	(171,523)		(2,609)		
Total Employer Pension Expense	\$ 313,387	\$	(4,298)	\$	175,461,325
Contributions Statutory required contribution	\$ 498,116	\$	-	\$	135,472,822
Contribution in relation to statutory required contribution	(498,116)				(138,290,237)
Contribution deficiency/(excess)	\$ 	\$		\$	(2,817,415)
Contributions as a percentage of covered payroll	13.58%		0.00%		26.95%
Deferred Outflows/(Inflows) Recognized in					
Future Pension Expense June 30, 2022 June 30, 2023 June 30, 2024 June 30, 2024 June 30, 2025	(48,034) 30,394 (149,980) (69,024)	\$	(2,726) (2,744) (2,485) (2,472)	\$	11,702,352 13,634,748 (13,273,716) (14,220,062)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ 	\$	(10,427)	\$	(2,156,678)
Discount Rate Sensitivity 1% decrease (6.30%)	\$ 5,283,467	\$	(18,351)	\$	1,907,906,916
Current discount rate (7.30%)	\$ 4,239,976	\$	(14,725)	\$	1,531,093,126
1% increase (8.30%)	3,362,067	\$	(11,675)	\$	1,214,072,425
Covered Payroll	\$ 3,668,688	\$	-	\$	513,201,283
See notes to schedule of employer allocations and schedule of pension amounts by employer.					(Concluded)

Middlesex County Retirement System

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NOTE A - Schedule of Employer Allocations

Governmental Accounting Standards Board (GASB) Statement #68 requires employers participating in a costsharing pension plan to recognize pension liabilities as employees provide services to the government and earn their pension benefits. Employers participating in cost-sharing plans are required to recognize their proportionate share of the plan's collective pension amounts for all benefits provided through the plan including the net pension liability, deferred outflows of resources, deferred inflows of resources, pension expense, and contributions.

GASB Statement #68 requires the allocation of the collective pension amounts be consistent with the manner in which contributions to the plan are determined. As permissible under GASB Statement #68, The Schedule of Employer Allocations is used to demonstrate the allocation of Middlesex County Retirement System's collective pension amounts.

Massachusetts General Law (MGL) Chapter 32 Section 22 Paragraph 7c dictates that Massachusetts cost sharing defined benefit pension plans allocate the annual required pension fund appropriation to employer units based on their proportionate share of the aggregate of the annual rates of regular compensation of all members in service of the system. The Public Employee Retirement Administration Commission (PERAC) approves each system's proportionate share of the annual required contribution. PERAC can accept alternative allocation methodologies and as such the MCRS has elected to use an actuarial based allocation methodology. Accordingly, each member unit's proportionate share of the total pension liability has been calculated based on each member unit's actual current employees, retirees and inactive participants. Each member's share of the MCRS's net position at year end is calculated by starting with the balance carried forward from the prior year. Each member unit is then credited with the actual required contribution received during the year along with any excess contributions received. Each member unit's share is reduced by the actual payment made to their specific retirees. Net investment income is allocated based on each member's money-weighted rate of return. All other shared expenses are allocated based on the proportionate share of the total pension liability. The difference between the total pension liability and the net position is reported as the net pension liability.

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County and Middlesex Hospital be transferred to the Commonwealth. The legislation required that County and Hospital retirees and beneficiaries remain with the County Retirement System. The Commonwealth provided a mechanism, in the legislation, that fully funded the actuarially determined liability of those retirees. At December 31, 2018, the remaining liabilities for Middlesex County and the Middlesex Hospital retirees and beneficiaries were actuarially determined and are separately identified in the MCRS's funding schedule. No assets have been allocated to cover the remaining liability and therefore the liability has been allocated to the remaining member units.

The current employees, retirees, beneficiaries and inactive participants of the MCRS have been identified and their total pension liability has been actuarially determined. For transparency purposes, the MCRS has historically paid a contribution as an employer to itself. However, with the implementation of GASB 67 & 68 the net pension liability is allocated to each member unit.

When a member unit accepts an Early Retirement Incentive Program (E.R.I. or ERIP), PERAC completes an analysis of the costs and liabilities attributable to the additional benefits payable in accordance with the ERIP. The accrued liability for the members who accept the ERIP as retirees including the ERIP less the accrued liability for the members as active employees excluding the ERIP represents the increase in accrued liability due to the ERIP. The net increase is amortized for each member unit accepting the ERIP and is separately identified in the MCRS's funding schedule. The 2003 ERIP amortization is straight line ending in fiscal 2020. The 2010 ERIP amortization is straight line ending in fiscal 2022.

Middlesex County Retirement System

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NOTE B - Schedule of Pension Amounts by Employer

The Schedule of Pension Amounts by Employer presents the net pension liability, the various categories of deferred outflows of resources and deferred inflows of resources, contributions and pension expense for all participating employers including differences between expected and actual economic experience; differences between projected and actual investment earnings, net; and changes of assumptions.

The following assumption changes were reflected in the January 1, 2020 actuarial valuation.

Changes in Assumptions

• The net investment return assumption was lowered from 7.50% to 7.30%.

Changes in Plan Provisions

 As permitted by Section 19 of Chapter 188 of the Acts of 2010, the Cost of Living Adjustment base was increased from \$14,000 to \$16,000 as of July 1, 2019.

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Middlesex County Retirement System

Audit of Specific Elements, Accounts and Items of Financial Statements

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2019

MIDDLESEX COUNTY RETIREMENT SYSTEM

FINANCIAL STATEMENTS

YEAR ENDED DECEMBER 31, 2019

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Financial Section

Middlesex County Retirement System

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Financial Section

Powers & Sullivan, LLC

Certified Public Accountants



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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

Report on the Financial Statements

We have audited the accompanying financial statements of Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2019, and the related notes to the financial statements, which collectively comprise the Middlesex County Retirement System's financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

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

Auditor's Responsibility

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

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

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

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Middlesex County Retirement System as of December 31, 2019, and the results of its operations and changes in its financial position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

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

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated August 20, 2020, on our consideration of the Middlesex County Retirement System's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, grant agreements and other matters. The purpose of that report is 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 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 Middlesex County Retirement System's internal control over financial reporting and compliance.

Restriction on Use

This report is intended solely for the information and use of the Middlesex County Retirement System, the Public Employee Retirement Administration Commission and all member units and is not intended to be and should not be used by anyone other than these specified parties.

August 20, 2020

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Management's Discussion and Analysis

As management of the Middlesex County Retirement System, we offer readers of these financial statements this narrative overview and analysis of the financial activities for the year ended December 31, 2019. The System complies with financial reporting requirements issued by the Governmental Accounting Standards Board (GASB).

The GASB is the authoritative standard setting body that provides guidance on how to prepare financial statements in conformity with generally accepted accounting principles (GAAP). Users of these financial statements rely on the GASB to establish consistent reporting standards for all governments in the United States. This consistent application is the only way users can assess the financial condition of a public retirement system compared to others.

Financial Highlights

- The System's assets exceeded its liabilities at the close of the most recent year by \$1.6 billion (net position).
- The System's net position increased by \$215.5 million for the year ended December 31, 2019.
- Total investment income was \$215.6 million; investment expenses were \$7.3 million; and net investment income was \$208.3 million.
- Total contributions were \$189 million, primarily consisting of \$129.7 million from employers, \$48.4 from members, \$6.1 million in transfers from other systems and \$4.8 million in other contributions.
- Retirement benefits, refunds, and transfers of member deductions to other systems amounted to \$178.5 million.
- Depreciation, administrative and building expenses were \$3.3 million.
- The total pension liability is \$3.2 billion as of December 31, 2019, while the net pension liability is \$1.6 billion
- The Plan fiduciary net position as a percentage of the total pension liability is 49.45%.

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the System fiduciary financial statements. These fiduciary financial statements comprise of four components: 1) management's discussion and analysis, 2) fiduciary financial statements, 3) notes to the financial statements and 4) required supplementary information.

Fiduciary Financial Statements

The *statement of net position* presents information on all assets and deferred outflows less deferred inflows and liabilities with the difference reported as *net position*. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position is improving or deteriorating.

The statement of changes in fiduciary net position presents information showing how the system's net position changed during the most recent year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, additions and deductions are reported in this statement for some items that will only result in cash flows in future periods.

Notes to the financial statements

The notes provide additional information that is essential to a full understanding of the data provided in the fiduciary financial statements.

Middlesex County Retirement System

Management's Discussion and Analysis

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Schedule of Changes in the Net Pension Liability and Related Ratios; the Schedule of Contributions; and the Schedule of Investment Returns be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context.

Financial Analysis

As noted earlier, net position may serve over time as a useful indicator of the System's financial position. The System's assets exceeded liabilities by \$1.6 billion at the close of 2019.

The assets accumulated are held to provide pension benefits for qualified retirees along with active and inactive employees of the member units. At year-end, the system's net position include investments of \$1.5 billion, cash of \$40.1 million and current accounts receivable of \$8.1 million. The system also had capital assets, net of accumulated depreciation of \$4.7 million at year-end primarily consisting of land, an office building, and building improvements.

In 2019, the System's contributions were \$189 million while deductions were \$181.8 million which resulted in a current surplus of \$7.2 million. In 2018, the System's contributions were \$176.2 million while deductions were \$173.4 million which resulted in a prior year surplus of \$2.8 million. Therefore, for these two years the System was able to sustain operations independent of investment income.

The primary change in net position over the prior year relates to each year's investment performance. Net investment income was \$208.3 million in 2019, and net investment loss was \$31.1 million in 2018. The annual money weighted rate of return was 16.21% and -2.52% in 2019, and 2018, respectively. The system's investment policy is designed to achieve a long-term rate of return of 7.30% and fluctuation in annual investment returns is expected.

The following tables present summarized financial information for the past two years.

	2019	2018
Assets:		
Cash\$	40,093,110	\$ 39,515,665
Investments	1,512,849,318	1,298,037,245
Receivables	8,110,976	7,678,260
Capital assets, net of accumulated depreciation	4,722,962	5,041,775
Total assets	1,565,776,366	1,350,272,945
Liabilities:		
Accounts payable	142,242	141,480
Other	105,862	91,700
Total liabilities	248,104	233,180
Net Position Restricted for Pensions\$	1,565,528,262	\$ 1,350,039,765

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Middlesex County Retirement System

Management's Discussion and Analysis

	2019	2018
Additions:		
Contributions:		
Member contributions\$	48,445,698	\$ 45,984,957
Employer contributions	129,763,555	120,683,218
Other contributions	10,764,996	9,513,101
Total contributions	188,974,249	176,181,276
Net investment income (loss):		
Total investment income (loss)	215,642,272	(24,002,304)
Less, investment expenses	(7,319,761)	(7,072,407)
Net in a strong of income (least)	200 222 544	(24.074.744)
Net investment income (loss)	208,322,511	(31,074,711)
Total additions	397,296,760	145,106,565
Deductions:		
Administration	2,754,384	2,645,568
Retirement benefits, refunds and transfers	178,455,859	170,144,282
Building operations and maintenance	279,208	309,357
Depreciation	318,812	318,812
Total deductions	181,808,263	173,418,019
Net increase (decrease) in fiduciary net position	215,488,497	(28,311,454)
Fiduciary net position at beginning of year	1,350,039,765	1,378,351,219
Fiduciary net position at end of year\$	1,565,528,262	\$ 1,350,039,765

Requests for Information

This financial report is designed to provide a general overview of the System's finances for all those with an interest in the System's finances. Questions concerning any of the information provided in this report or requests for additional financial information should be addressed to the System's Chief Administrative Officer, 25 Linnell Circle, Billerica, Massachusetts 01865.

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STATEMENT OF FIDUCIARY NET POSITION

DECEMBER 31, 2019

Assets	
Cash and cash equivalents	\$ 40,093,110
Investments:	
Investments in Pension Reserve Investment Trust	1,507,621,397
Other Investments	5,227,921
Total investments	1,512,849,318
Receivables, net of allowance for uncollectibles:	0.540.700
Member deductions	2,518,769
Member contributions	35,558
Employer pension appropriation	830,947
Reimbursements from other systems	3,896,021
Member make-up payments and redeposits	208,849
Other accounts receivable	620,832
TAID	0.440.070
Total Receivables	8,110,976
Capital assets, net of accumulated depreciation	4,722,962
Total Assets	1,565,776,366
Liabilities	
Accounts payable	142,242
Other liabilities.	105,862
Total Liabilities	248,104
Net Position Restricted for Pensions	\$ 1,565,528,262

See notes to financial statements.

Middlesex County Retirement System

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STATEMENT OF CHANGES IN FIDUCIARY NET POSITION

YEAR ENDED DECEMBER 31, 2019

Additions:	
Contributions:	
Employer pension appropriation\$	129,685,755
Member contributions	48,445,698
Transfers from other systems	6,071,001
3(8)(c) contributions from other systems	3,821,057
Workers' compensation settlements	77,800
Members' makeup payments and redeposits	725,233
Interest not refunded.	147,705
Total contributions.	188,974,249
Net investment income:	
Investment income (loss)	215,642,272
Less: investment expense	(7,319,761)
Net investment income (loss)	208,322,511
Total additions	397,296,760
Deductions:	
Administration	2,754,384
Building operations and maintenance	279,208
Retirement benefits and refunds	161,550,304
Transfers to other systems	5,611,885
3(8)(c) transfer to other systems	11,293,670
Depreciation	318,812
Total deductions	181,808,263
Net increase (decrease) in fiduciary net position	215,488,497
Fiduciary net position at beginning of year	1,350,039,765
Fiduciary net position at end of year\$	1,565,528,262

See notes to financial statements.

Middlesex County Retirement System

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NOTE 1 - PLAN DESCRIPTION

The Middlesex County Retirement System is a multiple-employer, cost-sharing, contributory defined benefit pension plan covering all employees of the governmental member units deemed eligible by the Middlesex County Retirement Board (the Board), with the exception of school department employees who serve in a teaching capacity. The pensions of such school employees are administered by the Commonwealth of Massachusetts' Teachers Retirement System. Membership in the System is mandatory immediately upon the commencement of employment for all permanent employees working a minimum of 20 hours per week and who are paid annual compensation of no less than \$5,000. As of January 1, 2020, the System had 71 participating employers.

The System is a member of the Massachusetts Contributory Retirement System and is governed by Chapter 32 of the Massachusetts General Laws. Membership in the Plan is mandatory immediately upon the commencement of employment for all permanent, full-time employees.

Massachusetts contributory retirement system benefits are, with certain exceptions, uniform from system to system. The System provides for retirement allowance benefits up to a maximum of 80% of a member's highest three-year average annual rate of regular compensation for those hired prior to April 2, 2012, and the highest five-year average for members hired after that date. Benefit payments are based upon a member's age, length of creditable service, level of compensation, and group classification.

Members become vested after ten years of creditable service. A superannuation retirement allowance may be received upon the completion of 20 years of service or upon reaching the age of 55 with 10 years of service for those hired prior to April 2, 2012. For those hired on or after April 2, 2012, a superannuation allowance may be received upon reaching the age of 60 with 10 years of service. Normal retirement for most employees occurs at age 65 for those hired prior to April 2, 2012, and at age 67 for those hired after April 2, 2012 (except for certain hazardous duty and public safety positions, whose normal retirement is at age 55).

A retirement allowance consists of two parts: an annuity and a pension. A member's accumulated total deductions and the interest they generate constitute the annuity. The differential between the total retirement benefit and the annuity is the pension.

Active members contribute between 5% and 11% of their gross regular compensation. The percentage rate is keyed to the date upon which an employee's membership commences. These deductions are deposited in the Annuity Savings Fund and earn interest at a rate determined by the Public Employee Retirement Administration Commission's (PERAC) actuary. When a member's retirement becomes effective, his/her deductions and related interest are transferred to the Annuity Reserve Fund. Any cost-of-living adjustments granted between 1981 and 1997 and any increase in other benefits imposed by the Commonwealth of Massachusetts' state law during those years are borne by the Commonwealth and are deposited into the Pension Fund. Cost-of-living adjustments granted after 1997 must be approved by the System and all costs are borne by the System.

The pension portion of any retirement benefit is paid from the Pension Fund. The governmental unit employing the member must annually appropriate and contribute the amount of current-year pension assessment.

Administrative expenses are paid from investment income.

Members who become permanently and totally disabled for further duty may be eligible to receive a disability retirement allowance. The amount of benefits to be received in such cases is dependent on several factors, including whether or not the disability is work related, the member's age, years of creditable service, level of compensation, veterans' status and group classification.

Middlesex County Retirement System

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Survivor benefits are extended to eligible beneficiaries of members whose death occurs prior to or following retirement

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements of the Middlesex County Retirement System have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The Governmental Accounting Standards Board (GASB) is the recognized standard-setting body for establishing governmental accounting and financial reporting principles.

MCRS is a special-purpose government engaged only in fiduciary activities. Accordingly, the financial statements are reported using the flow of economic resources measurement focus and use the accrual basis of accounting. Under this method, additions are recorded when earned and deductions are recorded when the liabilities are incurred.

Cash and Investments

Cash and cash equivalents are 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 carried at fair value. The fair values were determined by the closing price for those securities traded on national stock exchanges and at the average bid-and-asked quotation for those securities traded in the over-the-counter market. The fair value of private equities are based on management's valuation of estimates and assumptions from information and representations provided by the respective general partners, in the absence of readily ascertainable market values. Real estate assets are reported at fair value utilizing an income approach to valuation along with independent appraisals and estimates by management.

Fair Value Measurements

The System reports required types of financial instruments in accordance with the fair value standards. These standards require an entity to maximize the use of observable inputs (such as quoted prices in active markets) and minimize the use of unobservable inputs (such as appraisals or valuation techniques) to determine fair value. Fair value standards also require the government to classify these financial instruments into a three-level hierarchy, based on the priority of inputs to the valuation technique or in accordance with net asset value practical expedient rules, which allow for either Level 2 or Level 3 depending on lock up and notice periods associated with the underlying funds.

Instruments measured and reported at fair value are classified and disclosed in one of the following categories:

Level 1 – Quoted prices are available in active markets for identical instruments as of the reporting date. Instruments, which are generally included in this category, include actively traded equity and debt securities, U.S. government obligations, and mutual funds with quoted market prices in active markets.

Level 2 – Pricing inputs are other than quoted in active markets, which are either directly or indirectly observable as of the reporting date, and fair value is determined through the use of models or other valuation methodologies. Certain fixed income securities, primarily corporate bonds, are classified as Level 2 because fair values are estimated using pricing models, matrix pricing, or discounted cash flows.

Level 3 – Pricing inputs are unobservable for the instrument and include situations where there is little, if any, market activity for the instrument. The inputs into the determination of fair value require significant management judgment or estimation.

Middlesex County Retirement System

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In some instances the inputs used to measure fair value may fall into different levels of the fair value hierarchy and is based on the lowest level of input that is significant to the fair value measurement.

Market price is affected by a number of factors, including the type of instrument and the characteristics specific to the instrument. Instruments with readily available active quoted prices generally will have a higher degree of market price observability and a lesser degree of judgment used in measuring fair value. It is reasonably possible that change in values of these instruments will occur in the near term and that such changes could materially affect amounts reported in these financial statements. For more information on the fair value of the System's financial instruments, see Note 5 – Cash and Investments.

Accounts Receivable

Accounts receivable consist of member deductions, pension fund appropriations, and other miscellaneous reimbursements. These receivables are considered 100% collectible and therefore do not report an allowance for uncollectibles.

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of fiduciary net position will sometimes report a separate section for deferred outflows of resources. This separate financial statement element, *deferred outflows of resources*, represents a consumption of fiduciary net position that applies to a future period(s) and so will not be recognized as an outflow of resources (deduction) until then. The MCRS did not have any items that qualify for reporting in this category.

In addition to liabilities, the statement of fiduciary net position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, *deferred inflows of resources*, represents an acquisition of net position that applies to a future period(s) and so will not be recognized as an inflow of resources (addition) until that time. The MCRS did not have any items that qualify for reporting in this category.

NOTE 3 - PLAN ADMINISTRATION

The System is administered by a five-person Board of Retirement consisting of a first member, who shall serve as Chairman/Treasurer, who shall be appointed by the other four members, a second member elected by the Advisory Council consisting of representatives from the member units, a third and fourth member who shall be elected by the members in or retired from the service of such system, and a fifth member who shall be chosen by the other four members.

Chairman	Thomas F. Gibson	Term Expires:	12/31/2020
Advisory Council Member	Brian P. Curtin	Term Expires:	12/31/2021
Elected Member	John Brown	Term Expires:	12/31/2020
Elected Member	Joseph W. Kearns	Term Expires:	12/31/2022
Appointed Member	Robert Healy	Term Expires:	12/17/2020

Board members are required to meet at least once a month. The Board must keep a record of all of its proceedings. The Board must annually submit to the appropriate authority an estimate of the expenses of

Middlesex County Retirement System

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administration and cost of operation of the System. The Board must annually file a financial statement of condition for the System with the Executive Director of PERAC.

The investment of the System's funds is the responsibility of the Board. All retirement allowances must be approved by the Retirement Board. The PERAC Actuary performs verification prior to payment, unless the System has obtained a waiver for superannuation calculations allowing them to bypass this requirement. All expenses incurred by the System must be approved by a majority vote of the Board. Payments shall be made only upon vouchers signed by three persons designated by the Board.

The following retirement board members and employees are bonded by an authorized agent representing a company licensed to do business in Massachusetts as follows:

Treasurer-Custodian:) \$10,000,000 Fiduciary Ex-Officio Member:) RLI Insurance Company

Elected Members:

Appointed Members:) \$1,000,000 Fidelity

Staff Employees:) National Union Fire Insurance

NOTE 4 - OFFICE BUILDING

The MCRS owns an office building that was purchased as an investment and for the administrative offices of the System. The building is a two story, 1986-built office building consisting of 62,307 square feet of net rentable area. The property is situated on a 4.23 acre site in Billerica, Middlesex County, Massachusetts

NOTE 5 - CASH AND INVESTMENTS

Custodial Credit Risk - Deposits

At December 31, 2019, the carrying amount of the System's deposits totaled \$38,412,396, and the bank balance totaled \$40,397,450, all of which was covered by Federal Depository Insurance.

Investments

The System's investments are as follows:

	December 31,
	2019
Investment Type	
PRIT Pooled Funds\$	1,507,621,397
Money Market Mutual Funds	1,680,714
Pooled Alternative Investments	3,421,666
Pooled Real Estate Funds	1,806,255
Total Investments\$	1,514,530,032

Approximately 99.5% of the Retirement System's investments are in Pension Reserve Investment Trust (PRIT). This investment pool was established by the Treasurer of the Commonwealth of Massachusetts, who serves as Trustee. PRIT is administered by the Pension Reserves Investment Management Board. The fair values of the

Middlesex County Retirement System

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positions in each investment Pool are the same as the value of each Pool's shares. The Administration does not have the ability to control any of the investment decisions relative to its funds in PRIT. The effective weighted duration rate for PRIT investments ranged from 0.14 to 16.03 years.

Approximately 0.3% of the System's funds are invested in pooled alternative investments and pooled real estate funds. The market values of assets in those funds are based on the quoted values obtained from each pool.

Approximately 0.1% of the System's funds are invested in money market mutual funds. The market values of assets in those funds are valued using prices quoted in active markets for those securities.

The Administration's annual money-weighted rate of return on pension plan investments was 16.21%. The money-weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested, measured monthly.

Fair Value of Investments

The retiree pension defined benefit plan holds significant amounts of investments that are measured at fair value on a recurring basis. Because investing is a key part of the plan's activities, the plan shows greater disaggregation in its disclosures. The plan chooses a tabular format for disclosing the levels within the fair value hierarchy.

The System categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles.

The System has the following recurring fair value measurements as of December 31, 2019:

		Fair Value Measurements Using			Jsing		
Investment Type	12/31/2019		Quoted Prices in Active Markets for Identical Assets (Level 1)		Significant Other Observable Inputs (Level 2)		Significant Unobservable Inputs (Level 3)
Investments by fair value level:							
Money Market Mutual Funds\$	1,680,714	\$	1,680,714	\$	-	\$	<u>-</u>
Pooled Alternative Investments Pooled Real Estate Funds	3,421,666 1,806,255		- -		- -		3,421,666 1,806,255
Total Investments by fair value level	6,908,635	\$	1,680,714	\$		\$	5,227,921
Investments measured at the net asset value (NAV):							
PRIT Investments.	1,507,621,397						
Total Investments\$	1,514,530,032						

Money market mutual funds in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Pooled alternative investments and pooled real estate funds classified in level 3 are valued using either a discounted cash flow or market comparable company's technique.

PRIT Investments are valued using the net asset value (NAV) method. This investment pool was established by

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the Treasurer of the Commonwealth of Massachusetts, who serves as Trustee. PRIT is administered by the Pension Reserves Investment Management Board (PRIM). The fair values of the positions in each investment Pool are the same as the value of each Pool's shares. The System does not have the ability to control any of the investment decisions relative to its funds in PRIT.

NOTE 6 - CAPITAL ASSETS

Capital assets are depreciated on a straight-line basis. The estimated useful lives of capital assets are as follows:

	Estimated
	Useful Life
Capital Asset Type	(in years)
Building	40
Building improvements	40
Vehicles	5
PTG Software	5

Capital asset activity for the year ended December 31, 2019, was as follows:

	Beginning Balance	Increases	Decreases		Ending Balance
Capital assets not being depreciated:				_	
Land\$	672,657 \$	\$	-	\$	672,657
Capital assets being depreciated:					
Buildings	5,417,136	_	_		5,417,136
Building improvements	1,099,492	_	_		1,099,492
Vehicles	50,516	-	(19,603)		30,913
PTG Software	729,570			_	729,570
Total capital assets being depreciated	7,296,714	<u> </u>	(19,603)		7,277,111
Less accumulated depreciation for:					
Buildings	(2,171,210)	(135,428)	_		(2,306,638)
Building improvements	(434,651)	(27,166)	_		(461,817)
Vehicles	(29,907)	(10,304)	19,603		(20,608)
PTG Software	(291,828)	(145,915)		_	(437,743)
Total accumulated depreciation	(2,927,596)	(318,813)	19,603	_	(3,226,806)
Total capital assets being depreciated, net	4,369,118	(318,813)			4,050,305
Total capital assets, net\$	5,041,775 \$	(318,813) \$		\$	4,722,962

NOTE 7 - MEMBERSHIP

The following table represents the System's membership at December 31, 2019:

	2019
Active members	9,282 3,082 381 5,862
Total	18,607

NOTE 8 – ACTUARIAL VALUATION

Components of the net pension liability as of December 31, 2019, were as follows:

Total pension liability\$	3,165,584,277
The pension plan's fiduciary net position	1,565,528,262
The net pension liability\$	1,600,056,015
The pension plan's fiduciary net position as a percentage of the total pension liability	49.45%

The total pension liability was determined by an actuarial valuation as of January 1, 2020, using the following actuarial assumptions, applied to all periods included in the measurement that was rolled back to December 31, 2019:

Valuation date	January 1, 2020
Actuarial cost method	Entry Age Normal Cost Method.
Amortization method	Prior year's total contribution increased by 6.50% for fiscal 2020 through fiscal 2027, and thereafter the remaining unfunded liability will be amortized on a 4.00% annual increasing basis; ERI liability amortized in level payments.
Remaining amortization period	17 years from July 1, 2018 for non-ERI liability, 1 year from July 1, 2018 for 2002 ERI, 2 years from July 1, 2018 for 2033 ERI, and 4 years from July 1, 2018 for 2010 ERI.
Asset valuation method	The difference between the expected return and the actual investment return on a market value basis is recognized over a five year period. Asset value is adjusted as necessary to be within 20% of the market value.
Investment rate of return/Discount rate	7.30%,net of pension plan investment expense, including inflation previously $7.50%$

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Inflation rate	3.25%
Projected salary increases	Varies by length of service with ultimate rates of 4.00% for Group 1, 4.25% for Group 2 and 4.50% for Group 4
Cost of living adjustments	3.00% of the first \$16,000 of retirement income, as of July 1, 2019.
Mortality Rates:	
Pre-Retirement	The RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017.
Healthy Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2017.
Disabled Retiree	The RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017.

Investment policy: The System's policy in regard to the allocation of invested assets is established by PRIT. Plan assets are managed on a total return basis with a long-term objective of achieving a fully funded status for the benefits provided through the pension plan.

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 System's target asset allocation as of January 1, 2020, are summarized in the following table:

Asset Class	Long-Term Expected Asset Allocation	Long-Term Expected Real Rate of Return
Domestic equity	21.00% 13.00% 5.00% 15.00% 8.00% 10.00% 4.00% 11.00% 13.00%	6.15% 6.78% 8.65% 1.11% 3.51% 4.33% 4.13% 3.19% 9.99%

Discount rate: The discount rate used to measure the total pension liability was 7.30%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rate. Based on those assumptions, the System'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.

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Sensitivity of the net position liability to changes in the discount rate. The following presents the net position liability, calculated using the discount rate of 7.30%, as well as what the net position liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.30%) or 1-percentage-point higher (8.30%) than the current rate:

	Current		
	1% Decrease	1% Increase	
	(6.30%)	(7.30%)	(8.30%)
Middlesex County Retirement System's net			
pension liability as of December 31, 2019\$	1,966,342,109 \$	1,600,056,015 \$	1,291,835,664

Contributions: Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The pension fund appropriations are allocated amongst employers based on the actuarial valuation.

NOTE 9 - DISPUTE WITH THE COMMONWEALTH AND STATE EMPLOYEES RETIREMENT SYSTEM

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County be transferred to the Commonwealth. Therefore, the MCRS was required to transfer the Annuity Savings Fund Balances of these transferred County employees to the State Employees Retirement System (SERS). This transfer, totaling approximately \$18 million, was made during calendar year 1998.

In December of 1999, the State Legislature enacted Massachusetts General Law, Chapter 34B (Abolition of County Government). This legislation, among other things, defines the components of determining the overall surplus or deficit of an abolished County upon transfer to the Commonwealth and how regional retirement systems will be affected. Sections 8 and 18 addressed how the abolished County's unfunded liabilities in regional retirement systems will be paid for. The MCRS believes, as a result of the abolishment of Middlesex County, that the Commonwealth of Massachusetts owed them \$9,501,680 for the Unfunded Liability for retirees of the former Middlesex County.

The Commonwealth and SERS did not agree with the assertion that the MCRS was owed \$9,501,680. As a result, the MCRS acted to stop 3(8)(c) reimbursements to the State Employees Retirement System and correspondingly the State System began to intercept all COLA reimbursements which were due the MCRS. In 2012 the MCRS reinstated payments for 3(8)(c) reimbursements to the SERS. The SERS and MCRS are finalizing the amount owed after accounting for the 3(8)(c) reimbursements and COLA reimbursements which were withheld; however, a final payment to resolve the issue has yet to be made.

The net amount of these transactions is not considered significant and has not been reported in these financial statements.

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NOTE 10 - IMPLEMENTATION OF GASB PRONOUNCEMENTS

In May of 2020, the GASB issued Statement #95, *Postponement of the Effective Dates of Certain Authoritative Guidance.* The objective of this Statement is to provide temporary relief to governments and other stakeholders in light of the COVID-19 pandemic. This Statement postponed the required implementation of many of the upcoming Statements for one year or longer.

There were no GASB pronouncements required to be implemented in 2019 that impacted the System's financial statements.

None of the issued GASB statements that are required to be implemented in future years are anticipated to impact the System's financial statements.

NOTE 11 - SUBSEQUENT EVENTS

Management has evaluated subsequent events through August 20, 2020, which is the date the financial statements were available to be issued.

Required Supplementary Information

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

	December 31, 2014	December 31, 2015		December 31, 2016	December 31, 2017	December 31, 2018	December 31, 2019
Total pension liability:							
Service cost	,	\$ 54,217,685	s	56,386,392	\$ 60,585,598	\$ 64,615,910	\$ 66,816,001
Interest	172,094,226	179,703,272		187,359,946	200,298,121	208,614,148	216,905,943
Changes in benefit terms	-	-		-	-	-	29,156,339
Differences between expected and actual experience	-	-		7,976,453	(9,059,393)	-	46,671,873
Changes in assumptions	-	-		96,500,754	97,195,824	-	65,013,900
Benefit payments	(125,082,678)	(134,295,504)		(143,428,636)	(150,780,931)	(161,259,804)	(168,486,003)
Net change in total pension liability	99,143,937	99,625,453		204,794,909	198,239,219	111,970,254	256,078,053
Total pension liability - beginning	2,195,732,452	2,294,876,389		2,394,501,842	2,599,296,751	2,797,535,970	2,909,506,224
Total pension liability - ending (a)	2,294,876,389	\$ 2,394,501,842	\$	2,599,296,751	\$ 2,797,535,970	\$ 2,909,506,224	\$ 3,165,584,277
Plan fiduciary net position:							
Employer pension appropriation	93,368,685	\$ 99,792,641	\$	107,032,211	\$ 115,377,205	\$ 120,614,676	\$ 129,685,755
Member contributions	39,048,869	40,340,741		42,015,296	44,177,815	45,984,957	48,445,698
Other contributions	6,405,881	8,668,378		12,337,414	10,405,773	9,581,643	10,842,796
Net investment income (loss)	74,904,315	7,732,128		74,917,546	189,343,574	(31,074,711)	208,322,511
Administrative expenses	(2,996,390)	(2,824,803)		(3,062,521)	(2,619,464)	(2,645,568)	(2,754,384)
Building operations and maintenance	(381,899)	(302,771)		(235,667)	(306,177)	(309,357)	(279,208)
Retirement benefits and refunds	(125,082,678)	(134,295,504)		(143,428,636)	(150,780,931)	(161,259,804)	(168,486,003)
Other retirement deductions	(5,556,930)	(8,025,993)		(11,475,752)	(9,358,262)	(8,884,478)	(9.969,856)
Depreciation.	(162,594)	(162,594)		(162,594)	(308,508)	(318,812)	(318,812)
Net increase (decrease) in fiduciary net position	79,547,259	10,922,223		77,937,297	195,931,025	(28,311,454)	215,488,497
Fiduciary net position - beginning of year	1,014,013,415	1,093,560,674		1,104,482,897	1,182,420,194	1,378,351,219	1,350,039,765
Fiduciary net position - end of year (b)	1,093,560,674	\$ 1,104,482,897	s	1,182,420,194	\$ 1,378,351,219	\$ 1,350,039,765	\$ 1,565,528,262
Net pension liability - ending (a)-(b)	1,201,315,715	\$ 1,290,018,945	s	1,416,876,557	\$ 1,419,184,751	\$ 1,559,466,459	\$ 1,600,056,015
Plan fiduciary net position as a percentage of the total pension liability	47.65%	46.13%		45.49%	49.27%	46.40%	49.45%
Covered payroll	415,752,810	\$ 432,382,921	s	439,644,322	\$ 451,777,105	\$ 471,115,185	\$ 492,109,775
Net pension liability as a percentage of							
covered payroll	288.95%	298.35%		322.28%	314.13%	331.02%	325.14%

Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

SCHEDULE OF CONTRIBUTIONS

Year	Actuarially determined contribution	Contributions in relation to the actuarially determined contribution	Contribution deficiency (excess)	Covered payroll	Contributions as a percentage of covered payroll
December 31, 2019 \$	127,151,838 \$	(129,685,754) \$	(2,533,916) \$	492,109,775	26.35%
December 31, 2018	119,298,291	(120,614,676)	(1,316,385)	471,115,185	25.60%
December 31, 2017	112,017,087	(115,426,815)	(3,409,728)	451,777,105	25.55%
December 31, 2016	105,246,797	(107,067,707)	(1,820,910)	439,644,322	24.35%
December 31, 2015	98,792,642	(99,820,481)	(1,027,839)	432,382,921	23.09%
December 31, 2014	92,826,743	(93,400,946)	(574,203)	415,752,810	22.47%

Note: this schedule is intended to present information for 10 years.

Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

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SCHEDULE OF INVESTMENT RETURNS

Annual money-weighted rate of return,

Year	rate of return, net of investment expense
December 31, 2019	16.21%
December 31, 2018	-2.52%
December 31, 2017	17.25%
December 31, 2016	7.35%
December 31, 2015	0.61%
December 31, 2014	7.54%

Note: this schedule is intended to present information for 10 years. Until a 10-year trend is compiled, information is presented for those years for which information is available.

See notes to required supplementary information.

NOTE A - CHANGES IN THE NET PENSION LIABILITY AND RELATED RATIOS

The Schedule of Changes in the Net Pension Liability and Related Ratios includes the detailed changes in the system's total pension liability, changes in the system's net position, and the ending net pension liability. It also demonstrates the plan's net position as a percentage of the total pension liability and the net pension liability as a percentage of covered payroll.

NOTE B - CONTRIBUTIONS

Governmental employers are required to pay an annual appropriation as established by PERAC. The total appropriation includes the amounts to pay the pension portion of each member's retirement allowance, an amount to amortize the actuarially determined unfunded liability to zero in accordance with the system's funding schedule, and additional appropriations in accordance with adopted early retirement incentive programs. The total appropriations are payable on July 1 and January 1. Employers may choose to pay the entire appropriation in July at a discounted rate. Accordingly, actual employer contributions may be less than the "total appropriation". The pension fund appropriations are allocated amongst employers based on the actuarial valuation results. In addition, an employer may contribute more than the amount required.

NOTE C - MONEY WEIGHTED RATE OF RETURN

The money weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense. A money weighted rate of return expresses investment performance, net of pension plan investment expense, adjusted for the changing amounts actually invested. Inputs to the money weighted rate of return calculation are determined monthly.

NOTE D - CHANGES IN ASSUMPTIONS AND PLAN PROVISIONS

The following changes were reflected in the January 1, 2020 actuarial valuation.

Changes in Assumptions

• The net investment return assumption was lowered from 7.50% to 7.30%.

Changes in Plan Provisions

 As permitted by Section 19 of Chapter 188 of the Acts of 2010, the Cost of Living Adjustment base was increased from \$14,000 to \$16,000 as of July 1, 2019.

Audit of Specific Elements, Accounts and Items of Financial Statements

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Certified Public Accountants



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Independent Auditor's Report

To the Honorable Middlesex County Retirement Board Middlesex County Retirement System Billerica, Massachusetts

We have audited the accompanying schedule of employer allocations of the Middlesex County Retirement System (MCRS) as of and for the year ended December 31, 2019, and the related notes. We have also audited the total for all entities of the rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total pension expense and contributions included in the accompanying schedule of pension amounts by employer of the MCRS Pension Plan as of and for the year ended December 31, 2019, and the related notes.

Management's Responsibility for the Schedules

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

Auditor's Responsibility

Our responsibility is to express opinions on the schedule of employer allocations and the specified row totals included in the schedule of pension amounts by employer based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the schedule of employer allocations and specified row totals included in the schedule of pension amounts by employer are free from material misstatement.

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

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

Opinions

In our opinion, the schedules referred to above present fairly, in all material respects, the employer allocations and total for all rows titled net pension liability, total deferred outflows of resources, total deferred inflows of resources, total pension expense and contributions for the total of all participating entities for the Middlesex County Retirement System as of and for the year ended December 31, 2019, in accordance with accounting principles generally accepted in the United States of America.

Other Matter

We have audited, in accordance with auditing standards generally accepted in the United States of America, the financial statements of the Middlesex County Retirement System as of and for the year ended December 31, 2019, and our report thereon, dated August 20, 2020, expressed an unmodified opinion on those financial statements.

Restriction on Use

This report is intended solely for the information and use of the Middlesex County Retirement System management, the Middlesex County Retirement System employers and their auditors and is not intended to be and should not be used by anyone other than these specified parties.

August 20, 2020

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SCHEDULE OF EMPLOYER ALLOCATIONS

FOR THE YEAR ENDED DECEMBER 31, 2019

Employer	Share of Net Pension Liability	Percent of Total Net Pension Liability
Middlesex County Retirement Board\$		0.000000%
Middlesex County	-	0.000000%
Middlesex Hospital.	-	0.000000%
Town of Acton	54,966,604	3.435292%
Town of Ashby.	1,941,210	0.121321%
Town of Ashland	37,703,972	2.356416%
Town of Ayer	20,395,526	1.274676%
Town of Bedford	54,291,514	3.393101%
Town of Billerica	157,213,941 12,546,753	9.825527% 0.784145%
Town of Burlington	137,604,549	8.599983%
Town of Carlisle	11.101.958	0.693848%
Town of Chainsie	114,671,152	7.166696%
Town of Dracut	68,887,607	4.305325%
Town of Dunstable	3,317,391	0.207330%
Town of Groton	25,513,416	1.594533%
Town of Holliston	26,676,612	1.667230%
Town of Hopkinton	26,084,382	1.630217%
Town of Hudson.	69,381,303	4.336180%
Town of Lincoln	27.767.333	1.735398%
Town of Littleton.	26,056,611	1.628481%
Town of North Reading.	52,178,434	3.261038%
Town of Pepperell.	18,312,861	1.144514%
Town of Sherborn	10,450,215	0.653116%
Town of Shirley.	9,325,501	0.582823%
Town of Stow.	11,909,143	0.744295%
Town of Sudbury.	64,186,721	4.011530%
Town of Tewksbury	107.519.124	6.719710%
Town of Townsend	8,637,189	0.539805%
Town of Tyngsborough	25,022,982	1.563882%
Town of Wayland	59,191,196	3.699320%
Town of Westford	59,489,841	3.717985%
Town of Weston	67,631,236 91,654,915	4.226804% 5.728232%
Town of Wilmington.	31,360,065	1.059935%
Acton-Boxborough Regional School District	3,732,674	0.233284%
Bedford Housing Authority	332,568	0.020785%
Billerica Housing Authority	1,647,762	0.102982%
Chelmsford Housing Authority	2,275,176	0.142194%
Chelmsford Water District	343,766	0.021485%
Dracut Housing Authority	2,317,408	0.144833%
Dracut Water Supply	3,356,809	0.209793%
East Chelmsford Water District	395,631 712,131	0.024726% 0.044507%
Greater Lowell Regional Vocational Technical School District	18,372,432	1.148237%
Groton-Dunstable Regional School District	13,046,678	0.815389%
Hudson Housing Authority	704,593	0.044036%
Lincoln-Sudbury Regional School District	9,126,061	0.570359%
Nashoba Valley Technical High School District	3,735,397	0.233454%
North Chelmsford Water District.	1,074,652	0.067163%
North Middlesex Regional School District	13,400,780	0.837519%
Shawsheen Valley Regional Vocational School	8,870,284	0.554373%
South Middlesex Regional Vocational Technical School	7,027,195	0.439184% 0.160726%
Sudbury Water District	2,571,703	0.160726%
Tewksbury Housing Authority	1,723,517 675,758	0.042233%
Hopkinton Housing Authority	537,329	0.033582%
Sudbury Housing Authority	490,188	0.030636%
Wilmington Housing Authority	382,144	0.023883%
Acton Housing Authority	907,630	0.056725%
Burlington Housing Authority	345,712	0.021606%
Ayer Housing Authority	879,177	0.054947%
Holliston Housing Authority	175,571	0.010973%
Littleton Housing Authority.	621,840 570,710	0.038864%
Westford Housing Authority	570,710 484,781	0.030298%
Tyngsborough Housing Authority	528,855	0.033052%
Pepperell Housing Authority	251,415	0.015713%
Groton Housing Authority		0.000000%
Tyngsborough Water District	481,728	0.030107%
North Reading Housing Authority	214,226	0.013389%
West Groton Water	36,784	0.002299%
Ayer-Shirley Regional School District	4,713,693	0.294595%
Total\$	1,600,056,015	100.000%

See notes to schedule of employer allocations and schedule of pension amounts by employer.

Middlesex County Retirement System

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Employer Allocations

FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Middlesex County Retirement Board	Middlesex County	Middlesex Hospital	_	Town of Acton
Net Pension Liability Beginning net pension liability/(asset)	\$	-	\$ -	\$ -	\$	53,545,751
Ending net pension liability/(asset)	\$	-	\$ -	\$ -	\$	54,966,604
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	_	\$ _	\$ _	\$	1,337,455
Changes of assumptions		-	-	-		3,785,335
Changes in proportion and differences between employer contributions and proportionate share of contributions		-		-		1,201,177
Total Deferred Outflows of Resources	\$ =	-	\$ 	\$ 	\$ =	6,323,967
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	-	\$ -	\$ -	\$	124,487
Net difference between projected and actual investment earnings on pension plan investments		-	-	-		1,426,379
Changes in proportion and differences between employer contributions and proportionate share of contributions	_	-	_	_	_	1,136,670
Total Deferred Inflows of Resources	\$ _		\$ 	\$ 	\$ _	2,687,536
Pension Expense Proportionate share of plan pension expense	\$	351,211	\$ -	\$ -	\$	7,905,662
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	-	-	_	_	(182,195)
Total Employer Pension Expense	\$ =	351,211	\$ 	\$ 	\$ =	7,723,467
Contributions Statutory required contribution	\$	351,211	\$ -	\$ -	\$	4,229,480
Contribution in relation to statutory required contribution	-	(351,211)			-	(4,236,342)
Contribution deficiency/(excess).	\$ =	-	\$ 	\$ 	\$ =	(6,862)
Contributions as a percentage of covered payroll		26.11%	0.00%	0.00%		29.09%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2021		-	\$ -	\$ -	\$	1,492,083
June 30, 2022 June 30, 2023 June 30, 2024		-	- - -	- - -	_	1,213,723 934,713 (4,088)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ _	=	\$ 	\$ 	\$ =	3,636,431
Discount Rate Sensitivity 1% decrease (6.30%)	\$	-	\$ -	\$ -	\$	67,549,603
Current discount rate (7.30%)	\$	=	\$ -	\$ -	\$	54,966,604
1% increase (8.30%)		-	\$ -	\$ -	\$	44,378,333
Covered Payroll	\$	1,345,329	\$ =	\$ =	\$	14,564,884
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Town of Ashby		Town of Ashland	Town of Ayer		Town of Bedford
Net Pension Liability Beginning net pension liability/(asset)	\$	2,175,376	\$	36,199,958	\$ 20,317,285	\$	55,208,123
Ending net pension liability/(asset)	\$	1,941,210	\$	37,703,972	\$ 20,395,526	\$	54,291,514
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	. \$	47,234	\$	917,418	\$ 496,267	\$	1,321,029
Changes of assumptions		133,684		2,596,525	1,404,560		3,738,844
Changes in proportion and differences between employer contributions and proportionate share of contributions.		331,267		1,487,824	672,369		390,107
Total Deferred Outflows of Resources	_						
	\$ =	512,185	\$	5,001,767	\$ 2,573,196	\$	5,449,980
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	4,396	\$	85,391	\$ 4 6,191	\$	122,958
Net difference between projected and actual investment earnings on pension plan investments		50,374		978,415	529,262		1,408,861
Changes in proportion and differences between employer contributions and proportionate share of contributions.		275,943			721,875		2,281,555
Total Deferred Inflows of Resources	\$_	330,713	\$	1,063,806	\$ 1,297,328	\$.	3,813,374
Pension Expense							
Proportionate share of plan pension expense	\$	279,198	\$	5,422,836	\$ 2,933,420	\$	7,808,566
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		41,070		912,073	(90,868)		(762,273)
Total Employer Pension Expense	\$ =	320,268	\$	6,334,909	\$ 2,842,552	\$	7,046,293
Contributions Statutory required contribution	\$	237,579	\$	3,054,672	\$ 1,687,582	\$	4,469,908
Contribution in relation to statutory required contribution	_	(237,579)		(3,086,828)	(1,687,582)		(4,470,165)
Contribution deficiency/(excess)	\$ =		\$	(32,156)	\$ 	\$	(257)
Contributions as a percentage of covered payroll		21.34%		21.29%	23.32%		22.79%
Deferred Outflows/(Inflows) Recognized in							
Future Pension Expense			_			_	
June 30, 2021		78,474 102,402	\$	1,925,048 977,590	\$ 504,435 477,440	\$	921,444 432,124
June 30, 2023		34,026		907,208	352,715		645,057
June 30, 2024		(33,430)		128,115	(58,722)		(362,019)
Total Deferred Outflows/(Inflows) Recognized in	-	(,,			(,/		(,,
Future Pension Expense	\$ =	181,472	\$	3,937,961	\$ 1,275,868	\$.	1,636,606
Discount Rate Sensitivity 1% decrease (6.30%)	\$	2,385,593	\$	46,335,195	\$ 25,064,486	\$	66,719,971
Current discount rate (7.30%)	\$	1,941,210	\$	37,703,972	\$ 20,395,526	\$	54,291,514
1% increase (8.30%)	\$	1,567,273	\$	30,441,019	\$ 16,466,716	\$	43,833,287
Covered Payroll	\$	1,113,135	\$	14,500,500	\$ 7,236,067	\$	19,611,792
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Town of Billerica		Town of Boxborough		Town of Burlington	Town of Carlisle
Net Pension Liability Beginning net pension liability/(asset)	\$	150,770,372	\$	11,266,225	\$	127,441,167	\$ 11,157,139
Ending net pension liability/(asset)	\$	157,213,9 41	\$	12,546,753	\$	137,604,549	\$ 11,101,958
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	. \$	3,825,352	\$	305,289	\$	3,348,213	\$ 270,134
Changes of assumptions		10,826,707		864,046		9,476,287	764,548
Changes in proportion and differences between employer contributions and proportionate share of contributions.		2,472,890		1,000,048		5,600,583	613,663
Total Deferred Outflows of Resources			\$	2,169,383	\$	18,425,083	\$ 1,648,345
Deferred Inflows of Resources Differences between expected and actual experience	\$	356,055	\$	28,415	\$	311.644	\$ 25,143
Net difference between projected and actual investment earnings on pension plan investments		4,079,690	•	325,587	•	3,570,828	288,095
Changes in proportion and differences between employer contributions and proportionate share of contributions.		4,147,868		102,818		2,188,101	445 ,502
Total Deferred Inflows of Resources	\$	8,583,613	\$	456,820	\$	6,070,573	\$ 758,740
Pension Expense Proportionate share of plan pension expense	\$	22,611,554	\$	1,804,557	\$	19,791,200	\$ 1,596,757
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(994,227)		407,180		710,895	154,825
Total Employer Pension Expense	\$	21,617,327	\$	2,211,737	\$	20,502,095	\$ 1,751,582
Contributions Statutory required contribution	\$	11,921,516	\$	9 4 3,152	\$	10,023,321	\$ 991,823
Contribution in relation to statutory required contribution				(943,152)		(10,023,321)	(991,823)
Contribution deficiency/(excess)		32.22%		27.79%	\$	20.248/	\$ 17 140/
Contributions as a percentage of covered payroll Deferred Outflows/(Inflows) Recognized in Future Pension Expense		32.22%		27.79%		28.31%	17.1 4 %
June 30, 2021 June 30, 2022 June 30, 2023 June 30, 2024		4,273,499 1,465,619 2,427,112 375,106	\$	775,140 395,572 376,445 165,406	\$	5,117,452 3,145,891 3,035,635 1,055,532	\$ 416,985 207,138 300,298 (34,816)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.	\$	8,541,336	\$	1,712,563	\$	12,354,510	\$ 889,605
Discount Rate Sensitivity 1% decrease (6.30%)	\$	193,203,481	\$	15,418,966	\$	169,105,092	\$ 13,643,427
Current discount rate (7.30%)	\$	157,213,941	\$	12,546,753	\$	137,604,549	\$ 11,101,958
1% increase (8.30%)	\$	126,929,664	\$	10,129,860	\$	111,097,650	\$ 8,963,377
Covered Payroll	\$	37,001,063	\$	3,393,712	\$	35,400,619	\$ 5,787,456
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Town of Chelmsford		Town of Dracut		Town of Dunstable	_	Town of Groton
Net Pension Liability Beginning net pension liability/(asset)	\$	110,995,199	\$	65,601,775	\$	2,958,745	\$	23,290,688
Ending net pension liability/(asset).		114,671,152	\$	68,887,607	\$	3,317,391	\$	25,513,416
	*	111,011,102	•	00,007,007	•	0,017,001	•	20,010,110
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience §	\$	2,790,195	\$	1,676,183	\$	80,719	\$	620,794
Changes of assumptions		7,896,954		4,744,020		228,456		1,757,009
Changes in proportion and differences between employer contributions and proportionate share of contributions		1,872,541		1,940,809		416,355		1,421,500
Total Deferred Outflows of Resources	\$ =	12,559,690	\$	8,361,012	\$	725,530	\$ _	3,799,303
Deferred Inflows of Resources								
Differences between expected and actual experience \$	\$	259,704	\$	156,014	\$	7,513	\$	57,782
Net difference between projected and actual investment earnings on pension plan investments		2,975,708		1,787,630		86,086		662,071
Changes in proportion and differences between employer contributions and proportionate share of contributions.		2,182,213		708,170		78,903		599,117
	_						-	
Total Deferred Inflows of Resources	\$ =	5,417,625	\$	2,651,814	\$	172,502	\$ =	1,318,970
Pension Expense Proportionate share of plan pension expense	\$	16,492,767	\$	9,907,873	\$	477,129	\$	3,669,509
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(494,360)		458,182		89,762		101,673
Total Employer Pension Expense	\$ =	15,998,407	\$	10,366,055	\$	566,891	\$ _	3,771,182
Contributions Chat days are sized and tribution	•	0.070.040	m.	E 240 622	•	274 244	•	4.072.052
Statutory required contribution	Ф	8,872,242	Ф	5,348,633	\$	274,244	\$	1,973,053
Contribution in relation to statutory required contribution	_	(9,272,242)		(5,348,633)		(275,072)	-	(1,973,053
Contribution deficiency/(excess)	\$ =	(400,000)	\$		\$	(828)	\$ =	
Contributions as a percentage of covered payroll		33.21%		32.01%		19.04%		24.75%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense		0.040.440		0.550.450		470 704		004.070
June 30, 2021	Φ	3,340,143 2,014,750	\$	2,579,458 1,547,431	\$	178,781 191,209	\$	921,879 552,548
June 30, 2022		1,581,451		1,310,223		130,573		726,736
June 30, 2024		205,721		272,086		52,465		279,170
Total Deferred Outflows/(Inflows) Recognized in	_	203,721		212,000		52,405	-	213,110
Future Pension Expense	\$ _	7,142,065	\$	5,709,198	\$	553,028	\$ _	2,480,333
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	140,921,763	\$	84,657,413	\$	4,076,811	\$	31,353,967
Current discount rate (7.30%)	\$	114,671,152	\$	68,887,607	\$	3,317,391	\$	25,513,416
1% increase (8.30%)	\$	92,581,936	\$	55,617,720	\$	2,678,359	\$	20,598,742
Covered Payroll	\$	27,918,845	\$	16,709,878	\$	1,444,438	\$	7,971,673
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

_	Town of Hopkinton	Town of Hudson	Town of Lincoln
) \$	25,369,330	69,719,052 \$	27,722,484
2 \$	26,084,382	69,381,303 \$	27,767,333
9 \$	634,689	1,688,196 \$	675,639
9	1,796,329	4,778,019	1,912,228
1	1,846,714	547,946	250,027
2 \$	4,277,732	7,014,161 \$	2,837,894
5 \$	59,075	157,133 \$	62,887
3	676,888	1,800,440	720,560
3	270,816	1,589,249	821,479
9 \$	1,006,779	3,546,822 \$	1,604,926
9 \$	3,751,629	9,978,880 \$	3,993,682
<u>1</u>	815,351	(164,006)	(193,557)
\$	4,566,980	9,814,874 \$	3,800,125
3 \$	2,335,018	5,798,334 \$	2,274,023
<u>4)</u>	(2,341,404)	(5,804,347)	(2,274,023
<u>3)</u> \$	(6,386)	(6,013) \$	
%	14.37%	26.77%	21.56%
1 \$	4 000 054	1,913,022 \$	005.050
1 1	1,308,351 896,684 994,351 71,567	1,913,022 \$ 929,986 919,447 (295,116)	605,959 276,095 446,601 (95,687)
3_ \$	3,270,953	3,467,339 \$	1,232,968
9 \$	32,055,639	85,264,126 \$	34,123,853
2 \$	26,084,382	69,381,303 \$	27,767,333
2 \$	21,059,722	56,016,315 \$	22,418,485
3 \$	16,296,923	21,683,348 \$	10,549,034

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Town of Littleton		Town of North Reading		Town of Pepperell		Town of Sherborn
Net Pension Liability								
Beginning net pension liability/(asset)	\$	25,332,249	\$	52,331,338	\$	17,953,081	\$	11,725,506
Ending net pension liability/(asset)	\$	26,056,611	\$	52,178,434	\$	18,312,861	\$	10,450,215
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	634,013	\$	1,269,613	\$	445,591	\$	254,276
Changes of assumptions		1,794,417		3,593,325		1,261,135		719,665
Changes in proportion and differences between								
employer contributions and proportionate share of contributions.		2,836,447		167,040		446,020		317,310
				,	•		•	
Total Deferred Outflows of Resources	\$ _	5,264,877	\$	5,029,978	\$	2,152,746	\$	1,291,251
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	59,012	\$	118,172	\$	41,474	\$	23,667
Net difference between projected and actual investment earnings on pension plan investments		676,167		1,354,026		475,217		271,182
Changes in proportion and differences between								
employer contributions and proportionate								
share of contributions		921,507		1,731,036		261,895		1,286,104
Total Deferred Inflows of Resources	\$	1,656,686	\$	3,203,234	\$	778,586	\$	1,580,953
Pension Expense Proportionate share of plan pension expense	\$	3,747,635	\$	7,504,649	\$	2,633,877	\$	1,503,019
Net amortization of deferred amounts from changes in proportion and differences between employer								
contributions and proportionate share of contributions		894,825		(626,051)		381,916		(281,130)
Total Employer Pension Expense	\$	4,642,460	\$	6,878,598	\$	3,015,793	\$	1,221,889
Contributions								
Statutory required contribution	\$	2,206,947	\$	4,161,014	\$	1,454,092	\$	1,018,037
Contribution in relation to statutory required contribution		(3,086,111)		(4,161,014)		(1,455,491)		(1,018,037)
Contribution deficiency/(excess)	\$	(879,164)	\$		\$	(1,399)	\$	
Contributions as a percentage of covered payroll		23.53%		30.25%		29.99%		23.23%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2021	\$	1,494,286	\$	1,061,788	\$	889,463	\$	16,233
June 30, 2022		881,183	•	488,305	•	210,603	Ť	(58,114)
June 30, 2023		1,009,987 222,735		521,335 (244,684)		286,963 (12,869)		(13,027) (234,794)
Total Deferred Outflows/(Inflows) Recognized in	•	222,133		(244,004)		(12,003)	•	(254,754)
Future Pension Expense	\$ _	3,608,191	\$	1,826,744	\$	1,374,160	\$	(289,702)
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	32,021,511	\$	64,123,163	\$	22,505,056	\$	12,842,487
Current discount rate (7.30%)	\$	26,056,611	\$	52,178,434	\$	18,312,861	\$	10,450,215
1% increase (8.30%)	\$	21,037,301	\$	42,127,251	\$	14,785,237	\$	8,437,180
Covered Payroll	\$	13,118,37 1	\$	13,756,949	\$	4,853,532	\$	4,382,868
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Town of Shirley	 Town of Stow		Town of Sudbury	Town of Tewksbury
Net Pension Liability Beginning net pension liability/(asset)	\$	9,113,056	\$ 11,645,337	\$	63,931,576	\$ 104,461,551
Ending net pension liability/(asset)	\$	9,325,501	\$ 11,909,143	\$	64,186,721	\$ 107,519,124
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	. \$	226,909	\$ 289,775	\$	1,561,800	\$ 2,616,171
Changes of assumptions		642,211	820,136		4,420,288	7,404,421
Changes in proportion and differences between employer contributions and proportionate share of contributions.		130,529	138,173		829,093	1,803,116
Total Deferred Outflows of Resources	-	,	\$ 1,248,084	\$	6,811,181	\$ 11,823,708
Deferred inflows of Resources	=			•		
Differences between expected and actual experience	. \$	21,120	\$ 26,971	\$	145,368	\$ 243,506
Net difference between projected and actual investment earnings on pension plan investments		241,996	309,041		1,665,641	2,790,113
Changes in proportion and differences between employer contributions and proportionate share of contributions.		461,149	 76,929		2,111,917	2,027,650
Total Deferred Inflows of Resources	\$ _	724,265	\$ 412,941	\$	3,922,926	\$ 5,061,269
Pension Expense Proportionate share of plan pension expense	\$	1,341,255	\$ 1,712,852	\$	9,231,760	\$ 15,464,115
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	(262,490)	 67,330		(466,045)	(206,362)
Total Employer Pension Expense	\$ =	1,078,765	\$ 1,780,182	\$.	8,765,715	\$ 15,257,753
Contributions Statutory required contribution	\$	785,020	\$ 957,695	\$	5,026,152	\$ 8,545,236
Contribution in relation to statutory required contribution	-	(785,020)	 (957,695)		(5,026,152)	(8,553,198)
Contribution deficiency/(excess)	\$ =	-	\$ 	\$.		\$ (7,962)
Contributions as a percentage of covered payroll		39.11%	27.06%		28.13%	36.79%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense						
June 30, 2021		32,089 72,978	\$ 420,012 194,011	\$	1,633,379 858,571	\$ 3,426,677 1,902,851
June 30, 2023		162,871	221,915		636,481	1,337,797
June 30, 2024.	_	7,446	 (795)		(240,176)	95,114
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ _	275,384	\$ 835,143	\$	2,888,255	\$ 6,762,439
Discount Rate Sensitivity						
1% decrease (6.30%)	\$	11,460,302	\$ 14,635,393	\$	78,880,396	\$ 132,132,487
Current discount rate (7.30%)		9,325,501	\$ 11,909,143	\$	64,186,721	\$ 107,519,124
1% increase (8.30%)	\$	7,529,12 1	\$ 9,615,073	\$	51,822,370	\$ 86,807,610
Covered Payroll	\$	2,007,108	\$ 3,539,435	\$	17,867,775	\$ 23,249,584
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	-	Town of Townsend	Town of Tyngsborough	Town of Wayland		Town of Westford
Net Pension Liability Beginning net pension liability/(asset)	\$	9,256,011	\$ 23,277,997	\$ 59,255,947	\$	59,376,424
Ending net pension liability/(asset)	\$	8,637,189	\$ 25,022,982	\$ 59,191,196	\$	59,489,841
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	210,161	\$ 608,863	\$ 1,440,249	\$	1,447,515
Changes of assumptions		594,809	1,723,235	4,076,266		4,096,833
Changes in proportion and differences between employer contributions and proportionate share of contributions.		580,163	1,624,260	253,730		2,155,101
Total Deferred Outflows of Resources	\$ _	1,385,133	\$ 3,956,358	\$ 5,770,245	\$	7,699,449
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	. \$	19,561	\$ 56,671	\$ 13 4 ,054	\$	134,731
Net difference between projected and actual investment earnings on pension plan investments		224,134	649,344	1,536,007		1,543,757
Changes in proportion and differences between employer contributions and proportionate share of contributions.	_	992,365	717,689	2,297,638		1,463,064
Total Deferred Inflows of Resources	\$ _	1,236,060	\$ 1,423,704	\$ 3,967,699	\$	3,141,552
Pension Expense Proportionate share of plan pension expense	\$	1,242,258	\$ 3,598,971	\$ 8,513,271	\$	8,556,224
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	_	12,398	543,313	(1,024,928)		666,524
Total Employer Pension Expense	\$ =	1,254,656	\$ 4,142,284	\$ 7,488,343	\$	9,222,748
Contributions Statutory required contribution	\$	854,966	\$ 2,014,919	\$ 4 ,862,852	\$	5,152,765
Contribution in relation to statutory required contribution	-	(854,966)	(2,018,021)	(4,863,333)		(5,154,547)
Contribution deficiency/(excess)	\$ =		\$ (3,102)	\$ (481)	\$.	(1,782)
Contributions as a percentage of covered payroll		23.95%	23.11%	24.25%		19.92%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense June 30, 2021 June 30, 2022 June 30, 2023 June 30, 2024 Total Deferred Outflows/(Inflows) Recognized in		219,985 (71,213) 113,772 (113,471)	\$ 1,223,434 377,685 718,993 212,542	\$ 791,218 416,360 824,469 (229,501)	\$	2,209,540 1,137,700 1,356,041 (145,384)
Future Pension Expense	\$ =	149,073	\$ 2,532,654	\$ 1,802,546	\$.	4,557,897
Discount Rate Sensitivity 1% decrease (6.30%)	\$	10,61 4,421	\$ 30,751,263	\$ 72,741,292	\$	73,108,303
Current discount rate (7.30%)	\$	8,637,189	\$ 25,022,982	\$ 59,191,196	\$	59,489,841
1% increase (8.30%)	\$	6,973,399	\$ 20,202,781	\$ 47,789,138	\$	48,030,255
Covered Payroll	\$	3,570,490	\$ 8,730,626	\$ 20,058,574	\$	25,881,068
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Town of Weston	Town of Wilmington	Acton- Boxborough Regional School District		Acton Water Supply
Net Pension Liability Beginning net pension liability/(asset)	\$	66,869,588	\$ 90,145,064	\$ 29,957,174	\$	3,740,627
Ending net pension liability/(asset)	\$	67,631,236	\$ 91,654,915	\$ 31,360,065	\$	3,732,674
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	1,645,613	\$ 2,230,160	\$ 763,058	\$	90,824
Changes of assumptions		4,657,499	6,311,915	2,159,645		257,055
Changes in proportion and differences between employer contributions and proportionate share of contributions.			1,233,552	1,024,054	_	80,339
Total Deferred Outflows of Resources	\$.	6,303,112	\$ 9,775,627	\$ 3,946,757	\$ _	428,218
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	153,169	\$ 207,577	\$ 71,023	\$	8,454
Net difference between projected and actual investment earnings on pension plan investments		1,755,025	2,378,438	813,791		96,863
Changes in proportion and differences between employer contributions and proportionate share of contributions		2,209,404	1,359,953	141,912		205,041
Total Deferred Inflows of Resources	\$	4,117,598	\$ 3,945,968	\$ 1,026,726	\$ _	310,358
Pension Expense Proportionate share of plan pension expense	\$	9,727,174	\$ 13,182,419	\$ 4,510,412	\$	536,858
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(1,066,473) 8,660,701	(78,801) 13,103,618	\$ 477,365 4,987,777	\$	(16,667) 520,191
Contributions Statutory required contribution	\$	5,287,887	\$ 7,080,174	\$ 2,615,376	\$	243,164
Contribution in relation to statutory required contribution		(5,287,887)	(8,088,259)	(2,615,376)		(243,164)
Contribution deficiency/(excess)	\$.	-	\$ (1,008,085)	\$ 	\$	
Contributions as a percentage of covered payroll		25.69%	34.36%	17.61%		19.84%
<u>Deferred Outflows/(Inflows) Recognized in</u> Future Pension Expense						
June 30, 2021 June 30, 2022 June 30, 2023 June 30, 2024		1,125,437 361,300 865,255 (166,478)	\$ 2,923,985 1,517,309 1,344,099 44,266	\$ 1,390,012 651,181 735,506 143,332	\$	101,838 16,801 27,092 (27,871)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense			\$ 5,829,659	\$ 2,920,031	\$	117,860
Discount Rate Sensitivity 1% decrease (6.30%)	\$	83,113,432	\$ 112,636,631	\$ 38,539,036	\$	4,587,161
Current discount rate (7.30%)	\$	67,631,236	\$ 91,654,915	\$ 31,360,065	\$	3,732,674
1% increase (8.30%)	\$	54,603,365	\$ 73,999,339	\$ 25,319,145	\$	3,013,645
Covered Payroll	\$	20,581,451	\$ 23,538,426	\$ 14,855,796	\$	1,225,561
See notes to schedule of employer allocations and schedule of pension amounts by employer.						(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Bedford Housing Authority		Billerica Housing Authority		Chelmsford Housing Authority		Chelmsford Water District
Net Pension Liability								
Beginning net pension liability/(asset)	\$	341,646	\$	1,441,037	\$	2,441,133	\$	708,793
Ending net pension liability/(asset)	\$	332,568	\$	1,647,762	\$	2,275,176	\$	343,766
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	8,092	\$	40,094	\$	55,360	\$	8,365
Changes of assumptions		22,903		113,475		156,682		23,674
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		13,638		152,286		532,561		794,334
Total Deferred Outflows of Resources	\$	44,633	\$	305,855	\$	744,603	\$	826,373
	- =							
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	753	\$	3,732	\$	5,153	\$	779
Net difference between projected and actual								
investment earnings on pension plan investments		8,630		42,759		59,041		8,921
Changes in proportion and differences between employer contributions and proportionate								
share of contributions	_	13,959		55,943		175,437		611,103
Total Deferred Inflows of Resources	\$ _	23,342	\$	102,434	\$	239,631	\$	620,803
Pension Expense								
Proportionate share of plan pension expense	\$	47,832	\$	236,992	\$	327,231	\$	49,443
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		5,658		38,724		182,613		167,292
	-			275,716	•	509,844		216,735
Total Employer Pension Expense	Ф =	55,490	. Ф	2/3,/10	Þ.		Φ.	210,733
Contributions								
Statutory required contribution	\$	32,373	\$	107,339	\$	225,881	\$	63,546
Contribution in relation to statutory required contribution	_	(32,373)		(107,339)		(323,132)		(63,546)
Contribution deficiency/(excess)	\$ =	-	\$		\$	(97,251)	\$	
Contributions as a percentage of covered payroll		19.26%		26.92%		12.37%		4.52%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2021	œ.	14,254	\$	92,751	\$	239,790	\$	121,793
June 30, 2022		4,644	Ф	41,997	Þ	214,569	Ф	59,342
June 30, 2023		4,232		43,355		61,449		83,960
June 30, 2024	-	(1,839)		25,318		(10,836)		(59,525)
Future Pension Expense.	\$ _	21,291	\$	203,421	\$	504,972	\$	205,570
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	408,700	\$	2,024,969	\$	2,796,011	\$	422,461
Current discount rate (7.30%)	\$	332,568	\$	1,647,762	\$	2,275,176	\$	343,766
1% increase (8.30%)	\$	268,505	\$	1,330,352	\$	1,836,907	\$	277,546
Covered Payroll	\$	168,089	\$	398,705	\$	2,612,882	\$	1,405,409
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Dracut Housing Authority		Dracut Water Supply		East Chelmsford Water District	 East Middlesex Mosquito Control
Net Pension Liability Beginning net pension liability/(asset)	\$	2,173,260	\$	3,288,228	\$	381,924	\$ 662,694
Ending net pension liability/(asset)	\$	2,317,408	\$	3,356,809	\$	395,631	\$ 712,131
Deferred Outflows of Resources		50.007	•	04.070		2.007	47.000
Differences between expected and actual experience Changes of assumptions		56,387 159,59 1	\$	81,678 231,170	Þ	9,627 27,246	\$ 17,328 4 9,0 4 2
•		109,091		231,170		21,240	49,042
Changes in proportion and differences between employer contributions and proportionate share of contributions		114,604		171,415		24,255	 82,980
Total Deferred Outflows of Resources	\$	330,582	\$	484,263	\$	61,128	\$ 149,350
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	. \$	5,248	\$	7,602	\$	896	\$ 1,613
Net difference between projected and actual investment earnings on pension plan investments		60,137		87,109		10,267	18,480
Changes in proportion and differences between employer contributions and proportionate share of contributions.		127,540		175,593		1,818	 39,158
Total Deferred Inflows of Resources	\$	192,925	\$	270,304	\$	12,981	\$ 59,251
Pension Expense Proportionate share of plan pension expense	\$	333,305	\$	482,798	\$	56,902	\$ 102,424
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(26,567)		(6,442)		11,847	 24,318
Total Employer Pension Expense	\$	306,738	\$	476,356	\$	68,749	\$ 126,742
Contributions Statutory required contribution	\$	150,496	\$	229,578	\$	33,752	\$ 48,048
Contribution in relation to statutory required contribution		(150,496)		(229,578)		(33,752)	 (48,048)
Contribution deficiency/(excess)	\$		\$		\$		\$ -
Contributions as a percentage of covered payroll		36.78%		32.38%		15.68%	13.23%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u>							
June 30, 2021		60,299	\$	110,802	\$	20,236	\$ 34,916
June 30, 2022 June 30, 2023		41,580 26,498		88,688 23,801		12,920 13,7 4 5	18,356 32,694
June 30, 2024		9,280		(9,332)		1,246	4,133
Total Deferred Outflows/(Inflows) Recognized in			•	(0,002)			.,
Future Pension Expense	\$	137,657	\$	213,959	\$	48,147	\$ 90,099
Discount Rate Sensitivity 1% decrease (6.30%)	\$	2,847,911	\$	4,125,252	\$	486,199	\$ 875,153
Current discount rate (7.30%)	\$	2,317,408	\$	3,356,809	\$	395,631	\$ 712,131
1% increase (8.30%).	\$	1,871,003	\$	2,710,184	\$	319,420	\$ 574,953
Covered Payroll	\$	409,209	\$	709,022	\$	215,299	\$ 363,040
See notes to schedule of employer allocations and schedule of pension amounts by employer.							(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	Greater Lowell Regional Vocation Technical School District	Groton- Dunstable Regional School District	Hudson Housing Authority	Lincoln- Sudbury Regional School District
Net Pension Liability Beginning net pension liability/(asset)	\$ 16,800,249	\$ 12,305,499	\$ 1,223,133	\$ 9,231,680
Ending net pension liability/(asset)	\$ 18,372,432	\$ 13,046,678	\$ 704,593	\$ 9,126,061
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$ 447,041	\$ 317,454	\$ 17,1 44	\$ 222,057
Changes of assumptions	1,265,238	898,474	48,523	628,476
Changes in proportion and differences between employer contributions and proportionate	1 000 045	000 400	00.077	400.000
share of contributions	1,039,315	862,403	38,077	102,068
Total Deferred Outflows of Resources	\$ 2,751,594	\$ 2,078,331	\$ 103,744	\$ 952,601
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$ 41,609	\$ 29,548	\$ 1,596	\$ 20,668
Net difference between projected and actual investment earnings on pension plan investments	476,763	338,560	18,284	236,821
Changes in proportion and differences between employer contributions and proportionate share of contributions.	682,815	55,874	528,413	472,168
Total Deferred Inflows of Resources	\$ 1,201,187	\$ 423,982	\$ 548,293	\$ 729,657
Pension Expense Proportionate share of plan pension expense	\$ 2,642,445	\$ 1,876,460	\$ 101,339	\$ 1,312,571
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions	(76,011)	455,058	(172,625)	(177,490)
Total Employer Pension Expense	\$ 2,566,434	\$ 2,331,518	\$ (71,286)	\$ 1,135,081
Contributions Statutory required contribution	\$ 1,215,091	\$ 1,022,579	\$ 91,276	\$ 704,071
Contribution in relation to statutory required contribution	(1,215,091)	(1,022,579)	(91,276)	(704,071)
Contribution deficiency/(excess)	\$ 	\$ 	\$ 	\$
Contributions as a percentage of covered payroll	28.26%	26.23%	25.54%	24.38%
Deferred Outflows/(Inflows) Recognized in				
Future Pension Expense June 30, 2021 June 30, 2022 June 30, 2023	529,355 471,779 394,468	\$ 780,455 421,681 377,490	\$ (141,926) (131,773) (82,144)	\$ 127,38 1 90,538 66,673
June 30, 2024	154,805	74,723	(88,706)	(61,648)
Future Pension Expense	\$ 1,550,407	\$ 1,654,349	\$ (444,549)	\$ 222,944
Discount Rate Sensitivity 1% decrease (6.30%)	\$ 22,578,264	\$ 16,033,334	\$ 865,889	\$ 11,215,206
Current discount rate (7.30%)	\$ 18,372,432	\$ 13,046,678	\$ 704,593	\$ 9,126,061
1% increase (8.30%)	\$ 14,833,333	\$ 10,533,484	\$ 568,867	\$ 7,368,099
Covered Payroll	\$ 4,300,319	\$ 3,898,859	\$ 357,369	\$ 2,887,889
See notes to schedule of employer allocations and schedule of pension amounts by employer.				(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Nashoba Valley Technical High School District		North Chelmsford Water District		North Middlesex Regional School District		Shawsheen Valley Regional Vocational Technical School
Net Pension Liability Beginning net pension liability/(asset)	\$	3,632,610	\$	1,048,622	\$	12,930,464	\$	8,565,024
Ending net pension liability/(asset)	\$	3,735,397	\$	1,074,652	\$	13,400,780	\$	8,870,284
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	90,890	\$	26,149	\$	326,070	\$	215,833
Changes of assumptions		257,242		74,007		922,859		610,862
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		97,183		116,449		181,918		122,522
Total Deferred Outflows of Resources			\$	216,605	s	1,430,847	\$	949,217
Deferred Inflows of Resources								
Differences between expected and actual experience	\$	8,460	\$	2,434	\$	30,350	\$	20,089
Net difference between projected and actual investment earnings on pension plan investments		96,933		27,887		347,749		230,183
Changes in proportion and differences between employer contributions and proportionate								
share of contributions		170,076		70,684		169,223		331,874
Total Deferred Inflows of Resources	\$	275,469	\$	101,005	S	547,322	\$	582,146
Pension Expense Proportionate share of plan pension expense	\$	537,250	\$	154,563	\$	1,927,390	\$	1,275,783
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(62,505)		17,184		(24,318)		(99,529
Total Employer Pension Expense	\$	474,745	\$	171,747	\$	1,903,072	\$	1,176,254
Contributions								
Statutory required contribution	\$	302,392	\$	67,121	\$	1,049,643	\$	675,105
Contribution in relation to statutory required contribution		(302,392)		(67,121)		(1,049,643)		(675,105
Contribution deficiency/(excess)	\$		\$		\$		\$	
Contributions as a percentage of covered payroll		31.77%		10.46%		19.87%		25.62%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2021	•	79.023	\$	39.668	s	364.820	\$	199,393
June 30, 2022		60,952	Φ	46,119	3	219,414	Φ	22,833
June 30, 2023		26,134		33,345		274,748		133,618
June 30, 2024		3,737		(3,532)		24,543		11,227
Total Deferred Outflows/(Inflows) Recognized in	•	100 040		115 200		000 505		267.074
Future Pension Expense	Ф	169,846	Ф	115,600	\$	883,525	Ф	367,071
Discount Rate Sensitivity 1% decrease (6.30%)	•	4.590.507	\$	1,320.662	s	16,468,497	\$	10,900,876
			•				Ť	•
Current discount rate (7.30%)		3,735,397	\$	1,074,652	\$	13,400,780	\$	8,870,284
1% increase (8.30%)		3,015,844	\$	867,641	\$	10,819,375	\$	7,161,593
Covered Payroll	\$	951,899	\$	641,852	\$	5,281,936	\$	2,634,703
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	Ţ	South Middlesex Regional Vocational Fechnical School	ı	Sudbury Water District		Tewksbury Housing Authority		Wayland Housing Authority
Net Pension Liability Beginning net pension liability/(asset)	\$	7,146,118	\$	2,025,843	\$	1,647,987	\$	719,713
Ending net pension liability/(asset)	\$	7,027,195	\$	2,571,703	\$	1,723,517	\$	675,758
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	170,987	\$	62,575	\$	41,937	\$	16,443
Changes of assumptions		483,935		177,103		118,692		46,537
Changes in proportion and differences between employer contributions and proportionate		54040		105.111		== 0.10		15.000
share of contributions		54,348		495,141		57,310		45,269
Total Deferred Outflows of Resources	\$	709,270	\$	734,819	\$	217,939	\$.	108,249
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	15,915	\$	5,824	\$	3,903	\$	1,530
Net difference between projected and actual investment earnings on pension plan investments		182,355		66,735		44,725		17,536
Changes in proportion and differences between employer contributions and proportionate share of contributions		509,543		206,918		22,026		58,226
Total Deferred Inflows of Resources	\$	707,813	\$	279,477	\$	70,654	\$	77,292
Pension Expense Proportionate share of plan pension expense	\$	1,010,698	\$	369,880	\$	247,888	\$	97,192
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(167,189)		89,495		24,548		15,705
Total Employer Pension Expense	\$	843,509	\$	459,375	\$	272,436	\$	112,897
Contributions	•	550.000	•	101.001	•	100.040	•	F4 070
Statutory required contribution	Ф	559,609	Ф	131,864	\$	133,342	Ф	51,279
Contribution in relation to statutory required contribution		(559,609)		(131,864)		(133,342)		(51,279)
Contribution deficiency/(excess)	\$		\$		\$		\$	-
Contributions as a percentage of covered payroll		25.74%		12.79%		33.22%		16.80%
Deferred Outflows/(Inflows) Recognized in Future Pension Expense								
June 30, 2021		50,982	\$	171,579	\$	78,520	\$	31,729
June 30, 2022		(73,506)		74,930		33,170		4,163
June 30, 2023 June 30, 2024		74,686 (50,705)		136,509 72,324		30,077 5,5 1 8		6,267 (11,202)
Total Deferred Outflows/(Inflows) Recognized in		(50,705)		12,524		3,310		(11,202
Future Pension Expense	\$	1,457	\$	455,342	\$	147,285	\$.	30,957
Discount Rate Sensitivity 1% decrease (6.30%)	\$	8,635,866	\$	3,160,419	\$	2,118,066	\$	830,453
Current discount rate (7.30%)	\$	7,027,195	\$	2,571,703	\$	1,723,517	\$	675,758
1% increase (8.30%)	\$	5,673,540	\$	2,076,313	\$	1,391,514	\$	545,586
Covered Payroll	\$	2,173,995	\$	1,031,163	\$	401,435	\$	305,259
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Hopkinton Housing Authority		Sudbury Housing Authority		Wilmington Housing Authority		Acton Housing Authority
Net Pension Liability								
Beginning net pension liability/(asset)	\$	512,474	\$	485,854	\$	365,221	\$	844,128
Ending net pension liability/(asset)	\$	537,329	\$	490,188	\$	382,144	\$	907,630
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	13,074	\$	11,927	\$	9,298	\$	22,085
Changes of assumptions		37,004		33,757		26,317		62,505
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		17,420		41,148		18,834		67,286
Total Deferred Outflows of Resources	¢ -	67,498	· ¢	86,832	•	54,449	¢ -	151,876
	Ψ =	07,100	. *		•		Ψ =	101,070
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	1,217	\$	1,110	\$	865	\$	2,056
Net difference between projected and actual								
investment earnings on pension plan investments		13,944		12,720		9,917		23,553
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		28,290		13,498		1,861		100,981
Total Deferred Inflows of Resources	-	43,451	\$	27,328	\$	12,643	\$	126,590
	-							<u> </u>
Proportionate share of plan pension expense	\$	77,282	\$	70,502	\$	54,962	\$	130,542
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		(1,903)		25,890		8,994		(14,727)
	-		•					
Total Employer Pension Expense	\$ =	75,379	. \$	96,392	\$	63,956	\$ =	115,815
Contributions								
Statutory required contribution.	\$	37,224	\$	40,316	\$	33,927	\$	60,962
Contribution in relation to statutory required contribution	_	(37,224)		(40,316)		(33,927)		(60,962)
Contribution deficiency/(excess)	\$ _	-	\$		\$		\$	
Contributions as a percentage of covered payroll		48.59%		39.57%		24.27%		15.35%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2021	œ.	11,386	ď	36,595	\$	20,352	\$	9,444
June 30, 2022	Ф	205	Ф	17,090	Þ	11,005	Ф	(16,833)
June 30, 2023		11,371		6,841		8,321		27,376
June 30, 2024	-	1,085		(1,022)		2,128	-	5,299
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$ _	24,047	\$	59,504	\$	41,806	\$	25,286
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	660,335	\$	602,402	\$	469,625	\$	1,115,405
Current discount rate (7.30%)	\$	537,329	\$	490,188	\$	382,144	\$	907,630
1% increase (8.30%)	\$	433,823	\$	395,763	\$	308,531	\$	732,792
Covered Payroll	\$	76,603	\$	101,882	\$	139,797	\$	397,270
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Burlington Housing Authority		Ayer Housing Authority		Holliston Housing Authority		Littleton Housing Authority
Net Pension Liability								
Beginning net pension liability/(asset)	\$	145,929	\$	800,823	\$	158,430	\$	487,306
Ending net pension liability/(asset)	\$	345,712	\$	879,177	\$	175,571	\$	621,840
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	8,412	\$	21,392	\$	4,272	\$	15,131
Changes of assumptions		23,808		60,545		12,091		42,824
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		183,310		292,180		18,703		99,236
Total Deferred Outflows of Resources	-				8		ς.	157,191
	Ψ =	210,000	. "		٠,	00,000	Ψ=	107,101
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	783	\$	1,991	\$	398	\$	1,408
Net difference between projected and actual								
investment earnings on pension plan investments		8,971		22,815		4,556		16,137
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		27,524		460,826		31,815		20,675
	-						_	
Total Deferred Inflows of Resources	\$ =	37,278	. 5	485,632	\$.	36,769	\$ <u>-</u>	38,220
Pension Expense Proportionate share of plan pension expense	\$	49,722	\$	126,449	\$	25,251	\$	89,438
Net amortization of deferred amounts from changes								
in proportion and differences between employer						40.000		
contributions and proportionate share of contributions	-	46,273	•	25,164		(6,999)	-	23,697
Total Employer Pension Expense	\$ _	95,995	\$	151,613	\$	18,252	\$ _	113,135
Contributions								
Statutory required contribution	\$	13,577	\$	57,680	\$	14,815	\$	40,463
Contribution in relation to statutory required contribution	_	(13,577)		(57,680)		(14,815)		(40,463)
Contribution deficiency/(excess)	\$_	-	\$		\$	-	\$	
Contributions as a percentage of covered payroll		6.53%		49.32%		18.27%	-	103.14%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense								
June 30, 2021 June 30, 2022	\$	45,067 51,050	\$	52,402 (184,962)	\$	(4,852) (6,628)	\$	4 5,0 4 7 27,672
June 30, 2023.		50,623		13,172		7,278		26,592
June 30, 2024	_	31,512		7,873		2,499		19,660
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.	\$	178,252	\$	(111,515)	\$	(1,703)	\$	118,971
Discourt Bata Considerity	-						=	
Discount Rate Sensitivity 1% decrease (6.30%)	\$	424,853	\$	1,080,439	\$	215,763	\$	764,192
Current discount rate (7.30%)	\$	345,712	\$	879,177	\$	175,571	\$	621,840
1% increase (8.30%)	\$	279,117	\$	709,820	\$	141,751	\$	502,054
Covered Payroll	\$	207,760	\$	116,945	\$	81,096	\$	39,232
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

	_	Westford Housing Authority		Shirley Water District		Tyngsborough Housing Authority		Pepperell Housing Authority
Net Pension Liability								
Beginning net pension liability/(asset)	\$	561,187	\$	406,103	\$	526,614	\$	187,001
Ending net pension liability/(asset)	\$	570,710	\$	484,781	\$	528,855	\$	251,415
Deferred Outflows of Resources								
Differences between expected and actual experience	\$	13,887	\$	11,796	\$	12,868	\$	6,117
Changes of assumptions		39,303		33,385		36,420		17,314
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		19,196		66,680		17,436		55,577
Total Deferred Outflows of Resources		72 386		111,861	e	66,724	•	79,008
Total Deterred Outrosis of Nesources	Ψ =	72,300	. Ψ	111,001	Ψ	00,724	Ψ =	10,000
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	1,293	\$	1,098	\$	1,198	\$	569
Net difference between projected and actual								
investment earnings on pension plan investments		14,810		12,580		13,724		6,524
Changes in proportion and differences between								
employer contributions and proportionate share of contributions		7,543		38,910		20,240		6,073
Total Deferred Inflows of Resources	_		s		s	35,162	\$	13,166
	Ť =		. "		•			
Proportionate share of plan pension expense	\$	82,084	\$	69,725	\$	76,064	\$	36,160
Net amortization of deferred amounts from changes								
in proportion and differences between employer contributions and proportionate share of contributions		10,227		699		965		20,305
	-			70,424	•	77,029		56,465
Total Employer Pension Expense	Þ =	92,311	. Þ	70,424	Þ		Ф =	50,405
Contributions								
Statutory required contribution	\$	4 7,397	\$	22,677	\$	41,548	\$	17,159
Contribution in relation to statutory required contribution	_	(47,397)		(22,677)		(41,548)		(17,159)
Contribution deficiency/(excess)	\$ =	-	\$		\$		\$	
Contributions as a percentage of covered payroll		20.90%		10. 4 6%		23.66%		16.58%
Deferred Outflows/(Inflows) Recognized in								
Future Pension Expense June 30, 2021	•	25,363	ď	14,363	\$	20,161	\$	27,190
June 30, 2022	Ф	15,156	Φ	14,704	Þ	9,721	Ф	15,541
June 30, 2023		8,517		21,343		3,608		13,210
June 30, 2024	_	(296)		8,863		(1,928)	-	9,901
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$_	48,740	\$	59,273	\$	31,562	\$	65,842
Discount Rate Sensitivity								
1% decrease (6.30%)	\$	701,357	\$	595,757	\$	649,921	\$	308,969
Current discount rate (7.30%)	\$	570,710	\$	484,781	\$	528,855	\$	251,415
1% increase (8.30%)	\$	460,774	\$	391,397	\$	426,981	\$	202,985
Covered Payroll	\$	226,753	\$	216,890	\$	175,579	\$	103,476
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Groton Housing Authority		Tyngsborough Water District		North Reading Housing Authority		West Groton Water
Net Pension Liability Beginning net pension liability/(asset)	\$	(9,522)	\$	463,086	\$	159,024	\$	39,007
Ending net pension liability/(asset)	\$	-	\$	481,728	\$	214,226	\$	36,784
Deferred Outflows of Resources Differences between expected and actual experience	\$	-	\$	11,721	\$	5,213	\$	895
Changes of assumptions		-		33,175		14,753		2,533
Changes in proportion and differences between employer contributions and proportionate share of contributions		17,077		27,904		51,883		11,782
Total Deferred Outflows of Resources	\$.	17,077	\$	72,800	\$	71,849	\$	15,210
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	-	\$	1,091	\$	485	\$	83
Net difference between projected and actual investment earnings on pension plan investments		-		12,50 1		5,559		955
Changes in proportion and differences between employer contributions and proportionate share of contributions		10,287		12,123		3,204		6,560
Total Deferred Inflows of Resources	\$.	10,287	\$	25,715	\$	9,248	\$	7,598
Pension Expense Proportionate share of plan pension expense	\$	-	\$	69,285	\$	30,811	\$	5,291
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		1,192		6,883		20,608		4,688
Total Employer Pension Expense	\$	1,192	\$	76,168	\$	51,419	\$	9,979
Contributions Statutory required contribution	\$	2,809	\$	37,652	\$	16,668	\$	2,545
Contribution in relation to statutory required contribution		(2,809)		(37,652)		(16,668)		(2,545)
Contribution deficiency/(excess)	\$.	-	\$		\$		\$	
Contributions as a percentage of covered payroll		0.00%		18.36%		18.39%		2.05%
<u>Deferred Outflows/(Inflows) Recognized In</u> <u>Future Pension Expense</u> June 30, 2021	•	292	\$	47.004	\$	20.004	\$	2.500
June 30, 2021 June 30, 2022 June 30, 2023 June 30, 2024		(27) 4,259 2,266	Þ	17,861 11,502 16,545 1,177	Þ	26,004 13,469 14,224 8,904	3	2,580 3,523 2,138 (629)
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense.			\$	47,085	\$	62,601	\$	7,612
Discount Rate Sensitivity 1% decrease (6.30%)	\$	-	\$	592,006	\$	263,267	\$	45,205
Current discount rate (7.30%)	\$	-	\$	481,728	\$	214,226	\$	36,784
1% increase (8.30%)	\$	-	\$	388,932	\$	172,959	\$	29,698
Covered Payroll	\$	Ē	\$	205,062	\$	90,640	\$	124,349
See notes to schedule of employer allocations and schedule of pension amounts by employer.								(continued)

Middlesex County Retirement System

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FOR THE YEAR ENDED DECEMBER 31, 2019

		Ayer-Shirley Regional School District	Totals
Net Pension Liability			
Beginning net pension liability/(asset)	\$	5,157,881	\$ 1,559,466,457
Ending net pension liability/(asset)	\$	4,713,693	\$ 1,600,056,015
<u>Deferred Outflows of Resources</u> Differences between expected and actual experience	\$	114,694	\$ 38,932,789
Changes of assumptions		324,614	110,189,599
Changes in proportion and differences between employer contributions and proportionate			
share of contributions		434,072	43,163,151
Total Deferred Outflows of Resources	\$	873,380	\$ 192,285,539
<u>Deferred Inflows of Resources</u> Differences between expected and actual experience	\$	10,675	\$ 3,623,756
Net difference between projected and actual investment earnings on pension plan investments		122,320	41,521,333
Changes in proportion and differences between employer contributions and proportionate share of contributions		C00 044	10.400.454
		688,041	43,163,151
Total Deferred Inflows of Resources	\$.	821,036	\$ 88,308,240
Pension Expense Proportionate share of plan pension expense	\$	677,954	\$ 230,481,895
Net amortization of deferred amounts from changes in proportion and differences between employer contributions and proportionate share of contributions		(103,306)	
Total Employer Pension Expense	\$	574,648	\$ 230,481,895
Contributions Statutory required contribution.	\$	467,540	\$ 127,151,838
Contribution in relation to statutory required contribution		(467,540)	(129,685,754)
Contribution deficiency/(excess)	\$		\$ (2,533,916)
Contributions as a percentage of covered payroll		13.26%	26.35%
<u>Deferred Outflows/(Inflows) Recognized in</u> <u>Future Pension Expense</u>			
June 30, 2021	\$	3,222 25,570	\$ 49,253,729 25,922,414
June 30, 2023		104,340	27,854,810
June 30, 2024		(80,788)	946,346
Total Deferred Outflows/(Inflows) Recognized in Future Pension Expense	\$	52,344	\$ 103,977,299
Discount Rate Sensitivity 1% decrease (6.30%)	\$	5,792,755	\$ 1,966,342,109
Current discount rate (7.30%)	\$	4,713,693	\$ 1,600,056,015
1% increase (8.30%)	\$	3,805,690	\$ 1,291,835,664
Covered Payroll	\$	3,526,825	\$ 492,109,775
See notes to schedule of employer allocations and schedule of pension amounts by employer.			(Concluded)

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NOTE A - Schedule of Employer Allocations

Governmental Accounting Standards Board (GASB) Statement #68 requires employers participating in a costsharing pension plan to recognize pension liabilities as employees provide services to the government and earn their pension benefits. Employers participating in cost-sharing plans are required to recognize their proportionate share of the plan's collective pension amounts for all benefits provided through the plan including the net pension liability, deferred outflows of resources, deferred inflows of resources, pension expense, and contributions.

GASB Statement #68 requires the allocation of the collective pension amounts be consistent with the manner in which contributions to the plan are determined. As permissible under GASB Statement #68, The Schedule of Employer Allocations is used to demonstrate the allocation of Middlesex County Retirement System's collective pension amounts.

Massachusetts General Law (MGL) Chapter 32 Section 22 Paragraph 7c dictates that Massachusetts cost sharing defined benefit pension plans allocate the annual required pension fund appropriation to employer units based on their proportionate share of the aggregate of the annual rates of regular compensation of all members in service of the system. The Public Employee Retirement Administration Commission (PERAC) approves each system's proportionate share of the annual required contribution. PERAC can accept alternative allocation methodologies and as such the System has elected to use an actuarial based allocation methodology. Accordingly, each member unit's proportionate share of the total pension liability has been calculated based on each member unit's actual current employees, retirees and inactive participants. Each member's share of the System's net position at year end is calculated by starting with the balance carried forward from the prior year. Each member unit is then credited with the actual required contribution received during the year along with any excess contributions received. Each member unit's share is reduced by the actual payment made to their specific retirees. Net investment income is allocated based on each member's money-weighted rate of return. All other shared expenses are allocated based on the proportionate share of the total pension liability. The difference between the total pension liability and the net position is reported as the net pension liability.

The County of Middlesex was abolished on July 11, 1997, pursuant to Chapter 48 of the Acts of 1997. This Act required that active employees of Middlesex County and Hospital be transferred to the Commonwealth. The legislation required that County and Hospital retirees and beneficiaries remain with the County Retirement System. The Commonwealth provided a mechanism, in the legislation, that fully funded the actuarially determined liability of those retirees. At December 31, 2018, the remaining liabilities for Middlesex County and the Middlesex Hospital retirees and beneficiaries were actuarially determined and are separately identified in the System's funding schedule. No assets have been allocated to cover the remaining liability and therefore the liability has been allocated to the remaining member units.

The current employees, retirees, beneficiaries and inactive participants of the Middlesex County Retirement System have been identified and their total pension liability has been actuarially determined. For transparency purposes, the System has historically paid a contribution as an employer to itself. However, with the implementation of GASB 67 & 68 the net pension liability is allocated to each member unit.

When a member unit accepts an Early Retirement Incentive Program (E.R.I. or ERIP), PERAC completes an analysis of the costs and liabilities attributable to the additional benefits payable in accordance with the ERIP. The accrued liability for the members who accept the ERIP as retirees including the ERIP less the accrued liability for the members as active employees excluding the ERIP represents the increase in accrued liability due to the ERIP. The net increase is amortized for each member unit accepting the ERIP and is separately identified in the system's funding schedule. The 2003 ERIP amortization is straight line ending in fiscal 2020. The 2010 ERIP amortization is straight line ending in fiscal 2022.

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NOTE B - Schedule of Pension Amounts by Employer

The Schedule of Pension Amounts by Employer presents the net pension liability, the various categories of deferred outflows of resources and deferred inflows of resources, contributions and pension expense for all participating employers including differences between expected and actual economic experience; differences between projected and actual investment earnings, net; and changes of assumptions.

The following assumption changes were reflected in the January 1, 2020 actuarial valuation.

Changes in Assumptions

• The net investment return assumption was lowered from 7.50% to 7.30%.

Changes in Plan Provisions

 As permitted by Section 19 of Chapter 188 of the Acts of 2010, the Cost of Living Adjustment base was increased from \$14,000 to \$16,000 as of July 1, 2019.

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