The Police and Fire Retirement System of the City of Detroit

Annual Actuarial Valuation of Component I

June 30, 2022

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February 28, 2023 - Revised

Board of Trustees
The Police and Fire Retirement System of the City of Detroit

Re: The Police and Fire Retirement System of the City of Detroit Actuarial Valuation of Component I as of June 30, 2022

Dear Board Members:

The results of the June 30, 2022 Annual Actuarial Valuation of **Component I** (Hybrid Plan) of the Police and Fire Retirement System (PFRS) of the City of Detroit are presented in this report. Component II (Legacy Plan) benefits are the subject of a separate report. This report replaces our report dated February 2, 2023 to include a restatement of the funding value of assets (set equal to market value).

The funding level and estimated costs of the Plan shown in this report are based on the actuarial assumptions disclosed in Section F. This report includes some risk metrics but does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the Retirement System only in its entirety and only with the permission of the Board. Authorized or unauthorized use of this report by parties other than the Board does not create a liability between Gabriel, Roeder, Smith & Company and the user of this report.

The purposes of the valuation are:

- To measure the System's funding progress;
- To provide a five-year funding projection. The five-year projection is to assist the Board with its duties related to Section 9.5 of the Plan; and
- To provide actuarially determined employer contribution amounts for Fiscal Year 2024 (the first year the employer will be required to make actuarially determined contributions adopted by the Board and Investment Committee). This report includes calculations based upon the Board approved funding policy shown in the Appendix.

This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

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The actuarially determined employer contribution rate is shown on the Executive Summary. Users of this report should be aware that contributions made at that rate do not guarantee benefit security.

The findings in this report are based on data and other information through June 30, 2022. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

This valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this Plan. A determination regarding whether or not the Plan sponsor is actually able to do so is outside our area of expertise, beyond the scope of the assignment and was not performed.

The valuation was based upon information furnished by the Retirement System staff, concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the Retirement System staff. More details are provided in the data section of this report.

This report was prepared using certain assumptions as described in Section F of this report entitled Methods and Assumptions. The actuarial cost method is the Entry Age Actuarial Cost Method as prescribed by Section 9.3(1) of the Combined PFRS Plan. The assumed rate of return is 6.75% for valuations through June 30, 2023 as prescribed by Section 1.18(3) of the Combined PFRS Plan. The actuarial cost method and assumed rate of investment return of 6.75% are prescribed methods and/or assumptions set by another party as discussed in Actuarial Standard of Practice No. 4. In our judgment, all of the actuarial assumptions used for the valuation are reasonable for purposes of the measurement being taken.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge, the information contained in this report is accurate and fairly presents the actuarial position of Component I of the Police and Fire Retirement System of the City of Detroit as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Jamal Adora, Judith A. Kermans, and James R. Sparks are Members of the American Academy of Actuaries (MAAA). These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein.

The signing actuaries are independent of the plan sponsor. Gabriel, Roeder, Smith & Company will be pleased to review this valuation report with the Board of Trustees and to answer any questions pertaining to the valuation.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

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James R. Sparks, ASA, FCA, MAAA

JA/JAK/JRS:rmn

Table of Contents

SECTION A

INTRODUCTION

Executive Summary
($ in Millions)

	June 30, 2022	June 30, 2021
Valuation Date	June 30, 2022	June 30, 2021
Contributions for Fiscal Year Ending	June 30, 2024	June 30, 2023
Employer Contributions		
Actuarially Determined Employer Contribution - Using Funding Value of Assets, Excluding RSF		
Amortization Period Years	15	N/A
Assuming 0.5% VPIF	11.20%	N/A
Assuming Full 1.0% VPIF	12.55%	N/A
POA Mandated	N/A	12.25%
Member Contributions		
Mandated Percentage - Active as of June 30, 2014	6.00%	6.00%
Mandated Percentage - Hired after June 30, 2014	8.00%	8.00%
Percentage Average for Fiscal Year	6.99%	7.06%
Membership		
Active Members (Excluding DROP)	2,581	2,551
DROP Members	115	111
Retirees and Beneficiaries	257	184
Post-2014 Pre-Conversion Duty Disability	91	85
Inactive, Nonretired Members	801	761
Total	3,845	3,692
Valuation Payroll *	$ 168.4	$ 158.7
Assets		
Pension Accumulation Fund	$ 196.6	$ 190.3
Employee Voluntary Contribution	2.8	1.8
Employee Mandatory Contribution	70.6	60.7
Rate Stabilization Fund (RSF)@	5.6	5.6
Total Market Value of Assets (MVA)	$ 275.6	$ 258.5
Total Funding Value of Assets (FVA)^	$ 275.6	$ 238.9
Return on Market Value of Assets	-1.54%	25.09%
Return on Funding Value of Assets	N/A	9.50%

* *Payroll shown is for non-DROP members since employer contributions are not made on behalf of DROP participants.*

@ This is the result of the excess ASF interest transfer from Component II (Legacy).

^ Funding Value of Assets reset to Market Value of Assets as of June 30, 2022.

Executive Summary (Concluded)
($ in Millions)

Valuation Date		June 30, 2022		June 30, 2021
Actuarial Information (Assuming 0.5% VPIF)				
Total Normal Cost Rate		18.19%		18.12%
Average Member Contribution Rate		6.99%		7.06%
Employer Normal Cost Rate		11.20%		11.06%
Actuarial Accrued Liability	$	263.2	$	214.9
Unfunded Actuarial Accrued Liability (MVA, Including RSF)	$	(12.4)	$	(43.6)
Funded Ratio (MVA, Including RSF)		104.71%		120.31%
Funded Ratio (MVA, Excluding RSF)		102.56%		117.68%
Unfunded Actuarial Accrued Liability (FVA, Including RSF)	$	(12.4)	$	(24.1)
Funded Ratio (FVA, Including RSF)		104.71%		111.21%
Funded Ratio (FVA, Excluding RSF)		102.56%		108.58%
Actuarial Information (Assuming a Full 1% VPIF)				
Total Normal Cost Rate		19.15%		19.04%
Average Member Contribution Rate		6.99%		7.06%
Employer Normal Cost Rate		12.16%		11.98%
Actuarial Accrued Liability	$	277.2	$	226.2
Unfunded Actuarial Accrued Liability (MVA, Including RSF)	$	1.6	$	(32.3)
Funded Ratio (MVA, Including RSF)		99.43%		114.30%
Funded Ratio (MVA, Excluding RSF)		97.39%		111.80%
Unfunded Actuarial Accrued Liability (FVA, Including RSF)	$	1.6	$	(12.8)
Funded Ratio (FVA, Including RSF)		99.43%		105.65%
Funded Ratio (FVA, Excluding RSF)		97.39%		103.15%
Risk Metrics				
Actuarial Accrued Liability Divided by Payroll (Assuming 0.5% VPIF)		1.6		1.4
Actuarial Accrued Liability Divided by Payroll (Assuming a Full 1% VPIF)		1.6		1.4
Market Value of Assets Divided by Payroll		1.6		1.6

Please see the comments of the report for important information regarding valuation results.

An estimate of the probability of future contributions being made was outside the scope of this project, not required by Actuarial Standards and; therefore, was not made.

Development of Normal Cost Rates

Valuation Date June 30	2022	2021
Normal Cost for 0.5% VPIF (COLA)		
Age & service allowances	11.22%	11.16%
Disability allowances	4.92%	4.89%
Death-in-service allowances	0.36%	0.36%
Administrative expenses^	1.07%	1.07%
Refunds	0.62%	0.64%
Total Normal Cost for 0.5% VPIF (COLA)	18.19%	18.12%
Average Member Contribution Rate@	6.99%	7.06%
Employer Normal Cost (0.5% VPIF)	**11.20%**	**11.06%**
Additional Normal Cost for Full 1.0% VPIF (COLA)#	0.96%	0.92%
Employer Normal Cost (1% VPIF)	**12.16%**	**11.98%**

@ *Member contributions expected to be paid are a weighted average of 6% for those hired before July 1, 2014 and 8% for those hired after June 30, 2014.*

^ *Beginning with the 2021 valuation, there is an explicit assumption of a 1.07% administrative expense.*

Normal Cost Rates shown are based on benefits which includes a discretionary 1% compound Cost-of-Living Adjustment (COLA) beginning one year after valuation date. Plan provisions provide criteria for when a COLA can be paid.

Actuarially Determined Employer Contribution (ADEC) for Fiscal Year Ending June 30, 2024

	($ Millions)	
	0.5% VPIF	Full (1.0%) VPIF
Actuarial Accrued Liability (AAL)	$ 263.2	$ 277.2
Funding Value of Assets (FVA)	275.6	275.6
UAAL as of June 30, 2022: AAL - FVA	(12.4)	1.6
Rate Stabilization Fund (RSF)	5.6	5.6
Amount to be financed as of June 30, 2022: UAAL + RSF	$ (6.7)	$ 7.2
Anticipated Employer Normal Cost	18.9	20.5
Anticipated POA Contribution (of 12.25%)	(20.6)	(20.6)
Interest at 6.75%	(0.5)	0.5
Amount to be financed as of June 30, 2023	$ (9.0)	$ 7.6
Estimated Employer Contributions for FY 2024		
Board Policy: 15-Year Level Percent		
UAAL Contribution	-0.47%	0.39%
$0 Minimum UAAL Contribution	0.00%	0.39%
Normal Cost Contribution	11.20%	12.16%
Total Contribution %	11.20%	12.55%
Estimated Contribution $	$ 19.4	$ 21.8

Development of Liabilities
Retirement System Totals

Valuation Assumptions (0.5% VPIF)	Total	Rate Stabilization Fund (RSF)	Excluding RSF
Present Value of Future Benefits	$ 530,429,094	$ -	$ 530,429,094
Present Value of Future Normal Costs	267,226,195	-	267,226,195
Actuarial Accrued Liability (AAL)	263,202,899	-	263,202,899
Market Value of Assets (MVA)	275,590,423	5,649,557	269,940,866
Unfunded Actuarial Accrued Liability (UAAL)	$ (12,387,524)	$ (5,649,557)	$ (6,737,967)
Additional AAL Amount for Full (1.0%) VPIF	13,972,922	-	13,972,922
UAAL with Full (1.0%) VPIF	$ 1,585,398	$ (5,649,557)	$ 7,234,955

The COLA or VPIF provided in the Plan is a discretionary 1.0% compound post retirement increase at the beginning of each plan year starting one year after retirement. However, Section 9.5 of the Plan imposes several limitations on when the COLA can be paid (or clawed back). Based on this section of the Plan, it is reasonable to assume that the average COLA a retired member will receive over their lifetime will be less than 1%. Future Plan experience, Board policy, and Plan interpretation regarding the administration of Section 9.5 may result in changes to this assumption. If the full 1% VPIF were assumed, the present value of future benefits would be $559.2 million and the actuarial accrued liability would be $277.2 million.

The funded status measure is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations. The funded status is appropriate for assessing the need for future UAAL contributions if all actuarial assumptions are met.

Contributions Comparative Schedule

Valuation Date June 30	Average Member Contribution Rate@	Employer Contributions for: Normal Cost for 0.5% VPIF (COLA)	Additional Normal Cost for Full 1.0% VPIF (COLA)	Employer Contribution in Excess of Normal Cost (1% VPIF)	Amount for UAAL**	Amount for Rate Stabilization*	Contributions Effective Plan Year	Employer Contribution Type#
2014	6.20%	10.52%	0.94%	0.79%	0.79%	0.00%	2014/15	Mandated
2014	6.36%	10.36%	0.94%	0.95%	0.95%	0.00%	2015/16	Mandated
2015	6.65%	10.07%	0.95%	1.23%	1.23%	0.00%	2016/17	Mandated
2016	6.80%	10.12%	0.94%	1.19%	1.19%	0.00%	2017/18	Mandated
2017	6.77%	10.54%	0.98%	0.73%	0.73%	0.00%	2018/19	Mandated
2018	6.80%	10.59%	0.98%	0.68%	0.68%	0.00%	2019/20	Mandated
2019	6.92%	10.87%	1.00%	0.38%	0.38%	0.00%	2020/21	Mandated
2020	7.05%	10.67%	1.01%	0.57%	0.57%	0.00%	2021/22	Mandated
2021^	7.06%	11.06%	0.92%	0.27%	TBD	TBD	2022/23	Mandated
2022	6.99%	11.20%	0.96%	0.39%	TBD	TBD	2023/24	TBD

\# *"Mandated" (Section 9.3(2)) at 12.25% of pay if specified by Plan document and POA.*
** *Showing the amount for the Full (1.0%) VPIF.*
* *Rate Stabilization Contributions are determined by the City through 2024.*
@ *Members hired before June 30, 2014 contribute 6%, members hired after June 30, 2014 contribute 8%. Therefore, as new hires replace retiring members, the employer normal cost will decrease (in the absence of changes in the Plan or assumption changes).*
^ *After changes in actuarial assumptions and/or methods.*

Comments

Comment 1 – Experience

Overall, plan experience was less favorable than assumed. On a market value basis, there was a net loss of $36.8 million as shown on the Development of Actuarial Gain or Loss in Section B. This loss is comprised of a $22.3 million investment loss and a $14.5 million liability loss. The primary components of the liability losses were:

- New active members entering the plan with prior service;
- Higher salary increases than expected; and
- Data changes (new retirees that were not valued in this Component I (Hybrid) plan last year; new active members with prior service).

Comment 2 – Rate Stabilization Fund

Funding of the Rate Stabilization Fund

In accordance with the plan document, if Transition Costs are 100% funded or more, then any excess interest transferred from the Legacy Plan is deposited into the Rate Stabilization Fund (RSF). Furthermore, it is our understanding that the amount of employer contributions credited to the RSF is at the discretion of the Employer. We have been informed that the employer has directed that none of the employer contributions for FY 2015 through FY 2022 will be credited to the RSF.

How the RSF is Used in the Valuation

The plan document does not provide specific direction regarding how the RSF is considered in the valuation. For purposes of this report, we have treated the RSF in the following manner (unless specifically stated otherwise):

- For purposes of determining a funded ratio in this report (other than with regard to the Section 9.5 testing), the Rate Stabilization Fund (RSF) has been included in the assets;
- For purposes of determining contributions starting in FY 2024, we have excluded the RSF from the assets (thereby calculating a higher contribution rate); and
- For purposes of Section 9.5 testing, the RSF is excluded from the assets.

We believe this treatment is in compliance with the plan document and the Board's Section 9.5 methods and assumptions. However, we recommend legal counsel review this treatment to confirm our understanding.

When projecting assets, we have assumed that the RSF would grow with investment return at 6.75%. However, no investment return was credited to the RSF during the year. If the Board would like us to change this assumption to reflect the current administration of crediting 0% to the RSF, please let us know and we will do so for future valuations.

Comments

Comment 3 – Actuarial Assumptions

We understand that the Board may continue to explore changes in the assumed rate of return and COLA. However, per legal counsel, we also understand that for the annual actuarial valuation the 6.75% assumed rate of return cannot be changed until the June 30, 2024 actuarial valuation, including for purposes of calculating the actuarially determined employer contribution. We anticipate the next comprehensive review of experience to cover the period from July 1, 2020 to June 30, 2025.

For this valuation, the Funding Value of Assets used to determine the Actuarially Determined Employer Contribution was reset to the Market Value of Assets as of June 30, 2022.

Comment 4 – Post Retirement COLA

This Plan has a post retirement COLA feature known as the Variable Pension Improvement Factor or VPIF of a 1% compound COLA. It can be granted only if the five-year projection shows the Plan funded status at 90% or greater at the end of the projection period based upon 6.75% future investment return. Actual versus expected VPIFs are treated as a gain or loss item for purposes of the valuation. A history of past VPIFs granted by the Board is shown in Section C.

Comment 5 – Increasing Total Member Contribution Rate

Since members hired after June 30, 2014 have a higher member contribution rate than those hired before, the employer normal cost is expected to decrease as new members enter the Plan (in the absence of other changes).

Comment 6 – Transition Cost

When the RSF is excluded from the assets, the fund is nearly 100% funded under the full (1.0%) VPIF assumption. For the Section 9.5 projections in Section C, we have assumed that 50% of excess ASF interest earnings would be transferred to Component I (consistent with assuming the Transition Cost is fully funded). Note that in the Section 9.5 projections, the Transition Cost as of June 30, 2014 is scheduled to be fully amortized by June 30, 2023 under the procedures set forth by the Board.

Comment 7 – Funding and Transfer of Assets from Component II

Mandatory employee contributions are initially set to 6.0% (8.0% if hired after June 30, 2014) of compensation but can be increased, if necessary, to maintain funding levels at 90% or above. Employer contributions are set at 12.25% of payroll through June 30, 2023. Employer contributions are actuarially determined beginning in 2024 to be the amount necessary to fund the Plan on an actuarial basis.

Comments

The Plan requires that, in the event that the rate of interest credited to the Annuity Savings Fund (ASF) of the Component II (Legacy) Plan is less than the rate earned by the Component II trust, a transfer of the difference in rates (applied to the Component II ASF balance) to the Component I trust may occur to fund the Transition Cost. If Transition Costs are fully funded, then only 50% of the difference is transferred to Component I. Transfers cease after June 30, 2023. For purposes of this valuation, future transfers were assumed not to occur.

Based on the investment performance for Fiscal Year 2021, it is likely a transfer will occur in 2023. That transfer will be reflected in the valuation once it occurs. To date, the following transfers have been made:

- $4,030,561 in Fiscal Year 2019.
- $1,618,996 in Fiscal Year 2020.

Comment 8 – DROP Members at Plan Inception

We have excluded all members reported in the Component II DROP as of June 30, 2014 from this valuation even though some were reported as active in this plan. These members were included in the (Component II) valuation.

Comment 9 – DROP Cost Neutrality

Section 12.7(1) states that the DROP shall be effective only for as long as it is cost neutral to the City. Cost neutrality for this purpose is not defined. An assessment of the cost neutrality of the DROP was outside the scope of this valuation. We suggest the Board (or other appropriate party) define "cost neutral" for this purpose and establish a schedule for periodic review of the DROP plan meeting cost neutrality. We would be happy to work with the Board (or other appropriate party) to assist with this task.

Comment 10 – Plan Option Factors

The Board adopted option factors for the Plan in 2017 but they have not been implemented. We have not been provided with a specific effective date for the new factors. However, we understand the intent is to implement the new factors with the new data system. For the sake of simplicity, we have assumed the new factors apply to all retirements after the valuation date. We will continue to work with the System in the calculation of optional forms of payment. In particular, the Board may want to consider updating the assumptions used in computing optional forms of payment in order to recognize recent changes to the assumptions used in the annual actuarial valuations.

Comments

Comment 11 – New Data System

We understand that the Retirement System is in the process of moving to a new data system and that future valuation data will be provided from that system beginning with the 2023 valuation. We also understand that data may have gone through additional cleaning/auditing as it has been entered into the new system. We anticipate that data will be more precise for valuation purposes once the new system is providing that data. Please note that changes in data may impact future valuation results and generate gains or losses.

Comment 12 – Fiscal Year 2022 Disability Payments

We understand approximately $1.7 million of Component II (Legacy) benefits were paid out of the Component I (Hybrid) fund during the 2022 Fiscal Year. Our understanding is that a transfer of $1.7 million from Component II (Legacy) to Component I (Hybrid) is scheduled to occur. Accordingly, we have included a reduction in liability of $1.7 million in this report to recognize the transfer.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch Risk** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other Demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Plan Risk Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk.

In our discussions with the Board and Investment Committee, we illustrated various investment return scenarios as part of the funding policy analysis. This type of analysis may also be considered a quantitative risk assessment. We recommend that the Board consider similar periodic analysis as appropriate under the Risk Controls of the newly approved funding policy.

The Board approved funding policy calls for illustrating the table of risk measures shown on the following pages. Please see the funding policy in the appendix for additional information. In the table on the following pages, the acronyms are as follows: FVA = Funding Value of Assets; MVA = Market Value of Assets; AAL = Actuarial Accrued liability; UAAL = Unfunded Actuarial Accrued Liability).

Funded Ratio

The funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

Rate of Return, Geometric Average, and Standard Deviation

Investment return is probably the largest single risk that most systems face. The year-by-year return and the geometric average give an indicator of the realism of the System's assumed return.

Duration of the Actuarial Accrued Liability

The duration is an approximate measure of sensitivity to changes in interest rates. The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, a duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Ratio of Unfunded Actuarial Accrued Liability to Payroll

The ratio of unfunded liability to payroll gives an indication of the plan's sensitivity to differences between assumed and actual experience related to the employer contributions. A value above approximately 300% or 400% may indicate high volatility relative to small gains and losses.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Ratio of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Ratio of Non-Investment Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, and stress tests. We can provide additional risk assessments at the Board’s request.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

	2022	2021	2020	2019
(i) Classic measures				
– Funded ratio 0.5% VPIF (COLA)				
MVA	104.7%	120.3%	102.9%	101.6%
FVA	104.7%	N/A	N/A	N/A
– Funded ratio 1.0% VPIF (COLA)				
MVA	99.4%	114.3%		
FVA	99.4%	N/A		
– UAAL amortization period	15			
– Portfolio rate of return				
MVA	-1.54%	25.09%	-0.13%	2.37%
FVA	N/A	N/A	N/A	N/A
– Geometric average portfolio rate of return[1]				
5-year				
MVA	5.93%	8.55%	1.11%	2.37%
FVA	N/A	N/A	N/A	N/A
10-year				
MVA	5.93%	8.55%	1.11%	2.37%
FVA	N/A	N/A	N/A	N/A
– Standard deviation of return[1]				
5-year				
MVA	10.85%	11.35%	1.25%	0.00%
FVA	N/A	N/A	N/A	N/A
10-year				
MVA	10.85%	11.35%	1.25%	0.00%
FVA	N/A	N/A	N/A	N/A
(ii) Duration of the Actuarial Accrued Liability				
0.5% VPIF (COLA)	22.0	22.6	24.3	24.1
1.0% VPIF (COLA)	22.4	23.0		
(iii) Total UAAL / Covered Payroll				
0.5% VPIF (COLA)				
MVA	(0.1)	(0.3)	(0.0)	(0.0)
FVA	(0.1)	N/A	N/A	N/A
1.0% VPIF (COLA)				
MVA	0.0	(0.2)		
FVA	0.0	N/A		
(iv) Total Assets / Covered Payroll				
MVA	1.6	1.6	1.2	1.1
FVA	1.6	N/A	N/A	N/A
(v) Total AAL / Covered Payroll				
0.5% VPIF (COLA)	1.6	1.4	1.2	1.0
1.0% VPIF (COLA)	1.6	1.4		
(vi) Non-Investment Cash flow / Beginning of year MVA	8.2%	13.6%	15.9%	21.6%
(vii) MVA / Benefit Payments	31.7	49.5	39.1	39.6
(viii) Solvency Liability ($ millions)[2]	$ 355.0	$ 421.2	$ 277.3	

[1]*These are developed prospectively from 2019 and consequently do not yet reflect full 5 or 10 years of experience.*
[2]*See discussion on the following pages.*

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The POA Funded Ratio is an expected return-based measurement of the pension obligations. It is based upon the POA mandated 6.75% interest rate assumption (assumption prescribed by another party). It determines an amount that will be sufficient to provide benefits if the portfolio earns the expected 6.75% return on assets and all other assumptions are met. This measure is appropriate for assessing the need for or amount of future contributions if all assumptions are met. This measure is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation; in other words, of transferring the obligation to a third party in a market value type transaction.

Funded Ratio – POA (0.5% VPIF)

		Defined Benefit	Voluntary Contribution	Total
A	Actuarial Accrued Liability	$ 260,394,717	$ 2,808,182	$ 263,202,899
B	Market Value of Assets	272,782,241	2,808,182	275,590,423
C	Unfunded Actuarial Accrued Liability (A - B)	$ (12,387,524)	$ -	$ (12,387,524)
D	Funded Ratio (B/A)	104.8%	100.0%	104.7%

Funded Ratio – POA (1% VPIF)

		Defined Benefit	Voluntary Contribution	Total
A	Actuarial Accrued Liability	$ 274,367,639	$ 2,808,182	$ 277,175,821
B	Market Value of Assets	272,782,241	2,808,182	275,590,423
C	Unfunded Actuarial Accrued Liability (A - B)	$ 1,585,398	$ -	$ 1,585,398
D	Funded Ratio (B/A)	99.4%	100.0%	99.4%

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The Solvency Liability is a market-based measurement of the pension obligations. It represents the amount the plan would need to invest in low risk securities to provide the benefits with greater certainty. For this purpose, the solvency liability is computed at 3.69% as of June 30, 2022, based on the long-term municipal bond rate ("20-Year Municipal GO AA Index" rate from the Fidelity Index as of June 30, 2022) and a 1.0% VPIF assumption. No adjustment has been made for the credit quality of the plan sponsor. This measure may not be appropriate for assessing the need for or amount of future contributions. This measure may not be appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation. For purposes of solvency liability, the actuarial cost method has been changed from entry age normal to unit credit to reflect benefits accrued as of the valuation date with the following technical details:

- Accrued benefits as of the valuation date are based on 2.0% times Average Final Compensation as of the valuation date times Credited Service as of the valuation date.
- The benefit payable under Ordinary Death Before Retirement were computed as though the member had retired the day before death, notwithstanding that the death was prior to the Normal Retirement Date, elected the Joint and 100% Option in favor of the spouse, and then died.
- Accrued benefits under Duty Disability were assumed to be payable upon becoming disabled.

Funded Ratio – Solvency (1% VPIF)

		Defined Benefit	Voluntary Contribution	Total
A	Actuarial Accrued Liability	$ 352,230,326	$ 2,808,182	$ 355,038,508
B	Market Value of Assets	272,782,241	2,808,182	275,590,423
C	Unfunded Actuarial Accrued Liability (A - B)	$ 79,448,085	$ -	$ 79,448,085
D	Funded Ratio (B/A)	77.4%	100.0%	77.6%

SECTION B

FUNDING RESULTS

Actuarial Liabilities as of June 30, 2022

Actuarial Present Value of	Total Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities (1) – (2)
Age and service allowances based on total service likely to be rendered by present active members	$323,611,119	$ 155,326,375	$168,284,744
Disability benefits likely to be paid to present active members	78,171,056	76,462,226	1,708,830
Death-in-service benefits likely to be paid on behalf of present active members	7,638,995	5,721,030	1,917,965
Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active members	30,511,394	29,716,564	794,830
Benefits attributed to voluntary member contributions	2,808,182	-	2,808,182
Benefits likely to be paid to vested inactive members	25,540,151	-	25,540,151
Benefits to be paid to members in the DROP, current retirees, beneficiaries, and future beneficiaries of current retirees	62,148,197	-	62,148,197
Total	$530,429,094	$ 267,226,195	$263,202,899
Less Market Value of Assets	275,590,423	-	275,590,423
Plus Rate Stabilization Fund	5,649,557	-	5,649,557
Equals Liabilities to be Covered by Future Contributions	$260,488,228	$ 267,226,195	$ (6,737,967)
Additional Amount for Full 1% COLA	28,752,194	14,779,272	13,972,922
Total with Full COLA	$289,240,422	$ 282,005,467	$ 7,234,955

Actuarial Balance Sheet

Assets and Present Value of Expected Future Contributions (0.5% VPIF)

Valuation Date June 30:	2022
A. Present Funding Value of Assets	
1. Net assets from System financial statements	$ 275,590,423
2. Adjustment for Valuation Assets	0
3. Funding Value of Assets	275,590,423
B. Actuarial Present Value of Expected Future Employer Contributions	
1. For Normal Costs	152,170,495
2. For Unfunded Actuarial Accrued Liability	0
3. Total	152,170,495
C. Actuarial Present Value of Expected Future Member Contributions	115,055,700
D. Total Present and Expected Future Resources	$ 542,816,618

Present Value of Expected Future Benefit Payments and Reserves

A. To DROP Members, Retirees and Beneficiaries	$ 62,148,197
B. To Vested Terminated Members	25,540,151
C. To Present Active Members	
1. Allocated to service rendered prior to valuation date – Actuarial Accrued Liability	172,706,369
2. Allocated to service likely to be rendered after valuation date	267,226,195
3. Total	439,932,564
D. Voluntary Member Contributions	2,808,182
E. Other Reserves	12,387,524
F. Total Actuarial Present Value of Expected Future Benefit Payments and Reserves	$ 542,816,618

The Actuarial Balance Sheet does not distinguish between Transition Cost and other liabilities.

Actuarial Balance Sheet

Assets and Present Value of Expected Future Contributions (1% VPIF)

Valuation Date June 30:	2022
A. Present Funding Value of Assets	
1. Net assets from System financial statements	$ 275,590,423
2. Adjustment for Valuation Assets	0
3. Funding Value of Assets	275,590,423
B. Actuarial Present Value of Expected Future Employer Contributions	
1. For Normal Costs	166,949,767
2. For Unfunded Actuarial Accrued Liability	7,234,955
3. Total	174,184,722
C. Actuarial Present Value of Expected Future Member Contributions	115,055,700
D. Total Present and Expected Future Resources	$ 564,830,845

Present Value of Expected Future Benefit Payments and Reserves

A. To DROP Members, Retirees and Beneficiaries	$ 65,374,497
B. To Vested Terminated Members	26,718,113
C. To Present Active Members	
1. Allocated to service rendered prior to valuation date – Actuarial Accrued Liability	182,275,029
2. Allocated to service likely to be rendered after valuation date	282,005,467
3. Total	464,280,496
D. Voluntary Member Contributions	2,808,182
E. Other Reserves	5,649,557
F. Total Actuarial Present Value of Expected Future Benefit Payments and Reserves	$ 564,830,845

The Actuarial Balance Sheet does not distinguish between Transition Cost and other liabilities.

Development of Actuarial Gain or Loss
(0.5% VPIF)

Market Value of Assets Basis

	Actuarial Accrued Liability (AAL) (A)	Market Value of Assets (B)	Unfunded Actuarial Accrued Liability (C) = (A) - (B)
(1) Beginning of Year (BOY)	$ 214,855,370	$ 258,494,103	$ (43,638,733)
(2) Normal Cost for Service Accruals	27,061,449	N/A	27,061,449
(3) Normal Cost for Vol. Employee Contributions	379,146	N/A	379,146
(4) Total Contributions	N/A	31,748,775	(31,748,775)
(5) Administrative Expenses	-	(1,850,154)	1,850,154
(6) Benefit Payments and Refunds	(8,690,005)	(8,690,005)	-
(7) Other	-	18,700	(18,700)
(8) Interest	15,135,570	18,164,774	(3,029,204)
(9) Expected End of Year	$ 248,741,530	$ 297,886,193	$ (49,144,663)
(10) Actual End of Year	263,202,899	275,590,423	(12,387,524)
(11) Gain or Loss (9)-(10)	$ (14,461,369)	$ 22,295,770	$ (36,757,139)
	Loss	Loss	Loss
(12) Percent of BOY AAL	(6.73%)	10.38%	(17.11%)

Additional detail on the gains and losses is shown below.

Type of Risk Area	Gain (Loss) in Period * Totals ($ in millions)	Gain (Loss) in Period * Percent of Beginning of Year Liabilities #
Data Changes	(11.4)	(5.3)%
Excess Interest Transfers	0.0	0.0 %
Risks Related to Assumptions		
Economic Risk Areas:		
Pay Increases **	(11.9)	(5.5)%
Investment Return (MVA)	(22.3)	(10.4)%
VPIF	(0.0)	0.0 %
Demographic Risk Areas:		
Full and Reduced Service Retirements	(1.6)	(0.8)%
Death Benefits	0.4	0.2 %
Disability Benefits	2.1	1.0 %
Other Terminations	6.9	3.2 %
Post-Retirement Mortality	1.1	0.5 %
Total Gain or Loss During Period (MVA)	$(36.8)	(17.1)%

 # Beginning of year liabilities were $214.9 million.

** Results may be approximate due to limitations in available data.*

*** Includes effect of payroll changes due to changes in group size, new hires and rehires.*

SECTION C

FIVE-YEAR FUNDED STATUS PROJECTION

Section 9.5, Fiscal Responsibility, of the Combined PFRS Plan contains several provisions for adjusting contributions and/or benefits to be determined based on a five-year projection of the funded status of the Plan. This section calls for two different funded status projection tests:

- Section 9.5(1) test for the funded status falling below 90%.
- Section 9.5(2) test for the funded status falling below 90% and remaining below 100%.

Section 9.5(3) specifies the interest rate to be used in the projections. Other methods and assumptions used in the projections are to be adopted by the Board based on the recommendation of the Investment Committee.

Projection Method:

We have been directed by the Board to use the following methods and assumptions:

- Projections based on valuation assumptions except for those noted below.
- VPIF assumption is ½%.
- Transition Cost is netted out of the Actuarial Accrued Liability.
- The Transition Cost is based on a nine-year level dollar amortization of the initial Transition Cost amount which is calculated using a ½% VPIF.
- Projected assets exclude the projected value of the Rate Stabilization Fund.
- All future Employer contributions go to the Pension Accumulation Fund (PAF).
- The June 30, 2015 valuation generates the first test.
- There is a two-year delay between the valuation date and the VPIF determination date.
- The market value is projected using a 6.75% rate of return.
- Potential future arbitrage on the voluntary contribution reserve fund was not modeled. This assumption will be revisited if the voluntary contribution reserve fund becomes material.
- Each item in Section 9.5(2) will be added in the order listed until a threshold is reached.
- Projected contributions include an expected asset transfer from the Component II Annuity Savings Fund (ASF), equal to 1.50% of the projected ASF balances. This represents the difference between the assumed rate of return of 6.75% and the maximum interest rate that can be credited to the ASF accounts of 5.25%.
- 6% of payroll member contributions for members hired as of June 30, 2014. 8% for members hired after June 30, 2014.
- Employer contributions equal to the Actuarially Determined Employer Contributions.
- Component II ASF balances were assumed to be withdrawn as a level dollar amount over the next 10 years.
- Voluntary contributions and interest are not reflected.

Transition Cost

Under the current actuarial cost methods, members with past vesting service generate an initial liability as of June 30, 2014. This is the "Transition Cost" described in Section G-2(f) of the Combined PFRS Plan. A separate funding source was established for the Transition Cost through 2023. The projections on the following page net the Transition Cost from the Actuarial Accrued Liability to determine projected funded status. Projected Transition Cost is based on the nine-year level dollar amortization of the initial Transition Cost amount. The initial Transition Cost amount is based on a ½% VPIF. An amortization schedule of the Transition Cost follows. Note, under this method any future gains or losses related to the Transition Cost are accounted for in the Actuarial Accrued Liability net of Transition Cost as they occur.

Transition Cost Amortization Schedule
for Projections on the Next Page

Financing Transition Cost
Calculated Using a Level Dollar Amortization (mid-year payments)
and an Investment Return Assumption of 6.75% Compounded Annually
9-Year Closed Amortization

Valuation Date June 30	Fiscal Year June 30	Transition Cost at Beginning of Fiscal Year	Annual Contributions During Fiscal Year Dollars	Transition Cost at End of Fiscal Year
2014	2015	$ 31,931,597	$ 4,693,263	$ 29,237,905
2015	2016	29,237,905	4,693,263	26,362,389
2016	2017	26,362,389	4,693,263	23,292,776
2017	2018	23,292,776	4,693,263	20,015,963
2018	2019	20,015,963	4,693,263	16,517,966
2019	2020	16,517,966	4,693,263	12,783,854
2020	2021	12,783,854	4,693,263	8,797,689
2021	2022	8,797,689	4,693,263	4,542,459
2022	**2023**	**4,542,459**	**4,693,263**	**0**

To the extent that actual funding of the Transition Cost differs from this schedule, gains and losses will accumulate in the Plan's unfunded actuarial accrued liability.

Projected Funded Status

5-Year Projection Assuming 6.75% Investment Return in all Future Years - 0.5% VPIF

		A	B	C = (A - B)	D	E = (D/C)
Valuation Date June 30	**Fiscal Year June 30**	**Total AAL (Net of Vol. Cont.)**	**Transition Cost at Fiscal Year**	**Net AAL**	**Assets (Net of Vol. Cont. & RSF)**	**Net Funded Ratio**
2022	2023	$ 260,394,717	$ 4,542,459	$255,852,258	$ 267,132,684	104%
2023	2024	301,544,340	-	301,544,340	310,762,290	103%
2024	2025	342,922,911	-	342,922,911	355,707,016	104%
2025	2026	386,257,852	-	386,257,852	403,175,384	104%
2026	2027	431,410,428	-	431,410,428	453,072,621	105%
2027	2028	478,559,763	-	478,559,763	505,614,606	**106%**

5-Year Projection Assuming 6.75% Investment Return in all Future Years - 1% VPIF

		A	B	C = (A - B)	D	E = (D/C)
Valuation Date June 30	**Fiscal Year June 30**	**Total AAL (Net of Vol. Cont.)**	**Transition Cost at Fiscal Year**	**Net AAL**	**Assets (Net of Vol. Cont. & RSF)**	**Net Funded Ratio**
2022	2023	$ 274,367,639	$ 4,542,459	$269,825,180	$ 267,132,684	99%
2023	2024	318,130,603	-	318,130,603	310,762,290	98%
2024	2025	362,349,019	-	362,349,019	355,707,016	98%
2025	2026	408,767,103	-	408,767,103	403,175,384	99%
2026	2027	457,264,092	-	457,264,092	453,072,621	99%
2027	2028	508,038,338	-	508,038,338	505,614,606	**100%**

Comment 1: Based on this projection, the Funded Status is above 90% by the end of the five-year projection.

Comment 2: For the Section 9.5 projections in this section, we have assumed that 50% of excess ASF interest earnings would be transferred to Component I (consistent with assuming the Transition Cost is fully funded).

Comment 3: The current 12.25% employer contribution rate is assumed to continue through FY 2023. For FY 2024 and thereafter, the employer contributions as a percentage of future active member payroll are assumed to equal the Actuarially Determined Employer Contribution rate calculated in this report (12.55% of payroll).

History of VPIF Granted to Retirees

Plan Year Beginning July 1 of	Actual	Assumed
(1)	(2)	(3)
2014	N/A	N/A
2015	N/A	N/A
2016	0.0%	0.5%
2017	1.0%	0.5%
2018	1.0%	0.5%
2019	1.0%	0.5%
2020	1.0%	0.5%
2021	1.0%	0.5%
2022	1.0%	0.5%
Average VPIF:		
Last five years:	1.0%	0.5%
Last three years:	1.0%	0.5%

Section 9.5 in its entirety is shown below:

Sec 9.5. Fiscal Responsibility: Benefit Reductions and Increased Funding Obligations

(1) To safeguard the long-term actuarial and financial integrity of the Retirement System, in the event the funding level of Component I of the Retirement System projected over a five-year period falls below ninety percent (90%), the Trustee may not award the variable Pension Improvement Factor (Escalator) described in Section 6.2 to any individual beginning with the Plan Year following the Plan Year in which such determination is made and continuing until the funding level is restored to not less than ninety percent (90%).

(2) In the event the funding level of the Retirement System projected over a five-year period falls below ninety percent (90%), the following remedial action shall be required in the order set forth below, beginning with the Plan Year following the Plan Year in which such determination is made and continuing until the funding level is projected to be one hundred percent (100%) on a market value basis within the next five years:

(a) The remedial action required in Section 9.5(1) shall be implemented or continued;
(b) All amounts credited to the Rate Stabilization Fund shall be transferred to the Pension Accumulation Fund for the purposes of funding benefits payable under the Retirement System;
(c) Mandatory Employee Contributions for active and new employees shall be increased by one percent (1%) for up to the next following five Plan Years;
(d) Mandatory Employee Contributions for active and new employees shall be increased by an additional one percent (1%) per year;
(e) Mandatory Employee Contributions for active and new employees shall be increased by an additional one percent (1%) per year;
(f) The Retirement Allowance payable to a Retiree shall not include the variable Pension Improvement Factor (Escalator) that was most recently paid to the Retiree on the date the funding level is projected to fall below ninety percent (90%);
(g) The Retirement Allowance payable to a Retiree shall not include the variable Pension Improvement Factor (Escalator) that was most recently added to the Member’s Retirement Allowance for the Plan Year preceding the Plan Year referenced in paragraph (f) above;
(h) Mandatory Employee Contributions for active and new employees shall be increased by an additional one percent (1%) per year; and
(i) Contributions made to the Retirement System by the City shall be increased, consistent with applicable actuarial principles and the *Public Employee Retirement System Investment Act, as amended, MCL 38.1132 et seq*.

(3) For purposes of this Section 9.5, the “funding level” shall mean the ratio of the market value of the assets of Component I of the Retirement System to the actuarial accrued liability of Component I of the Retirement System. The actuarial accrued liability shall be calculated by the Plan’s Actuary utilizing an interest rate assumption of six and three-quarters percent (6.75%) and other reasonable assumptions as directed by the Board upon the recommendation of the Investment Committee. The market value of assets shall be determined on the basis of a three-year look back period of smoothed investment returns.

SECTION D

FUND ASSETS

Statement of Plan Assets
(Assets at Market or Fair Value)

Asset Class	June 30, 2022	June 30, 2021
Cash and Cash Equivalents	$ 31,339,347	$ 18,175,347
Investments at fair value	235,484,714	233,586,913
Receivables	9,443,582	11,466,113
Cash and Investments held as collateral for securities lending	11,907,246	12,781,751
Capital Asset - Net	3,425,327	1,760,384
Accounts Payable	(16,009,793)	(19,276,405)
Total Current Assets	**$ 275,590,423**	**$ 258,494,103**

Reconciliation of Plan Assets

	Fiscal Year Ending June 30, 2022					FYE June 30, 2021
	Voluntary Employee Contribution	Mandatory Employee Contribution	Pension Accumulation Fund	Rate Stabilization Fund	Total	Total
Market Value Beginning	$ 1,842,505	$ 60,706,597	$ 190,295,444	$ 5,649,557	$ 258,494,103	$ 184,053,538
Additions:						
Employer Contributions	-	-	20,055,026	-	20,055,026	19,209,594
Member Contributions	379,146	11,309,558	5,045	-	11,693,749	11,079,231
Investment Income - Net	39,167	-	(4,170,163)	-	(4,130,996)	50,627,590
Other Income	-	-	18,700	-	18,700	47,840
Transfers	610,319	-	(610,319)	-	-	-
Total	1,028,632	11,309,558	15,298,289	-	27,636,479	80,964,255
Deductions:						
Benefit Payments	-	-	7,175,873	-	7,175,873	4,530,674
Refund of Member Contributions	62,955	1,451,177	-	-	1,514,132	687,699
Administrative Expenses	-	-	1,850,154	-	1,850,154	1,305,317
Total	62,955	1,451,177	9,026,027	-	10,540,159	6,523,690
Market Value Ending	$ 2,808,182	$ 70,564,978	$ 196,567,706	$ 5,649,557	$ 275,590,423	$ 258,494,103

Funding Value of Assets

The Funding Value of Assets has been reset to the Market Value of Assets as of June 30, 2022. Accordingly, we will show the development of the Funding Value of Assets starting with next year's (June 30, 2023) valuation. The Funding Value of Assets recognizes assumed investment income fully each year. Differences between actual and assumed investment income are phased-in over a closed 3-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. The Funding Value of Assets is intended to be unbiased with respect to Market Value. At any time, it may be either greater or less than Market Value.

SECTION E

PARTICIPANT DATA

Summary of Participant Data
as of June 30, 2022

Actives

A) Count Reported on file	3,222
B) Deferreds - "AnnSt" = "F"	-
C) Non-active status	(23)
D) Agency "88"	-
E) Non-eligible class code & bargaining unit	-
F) Hired after val date	(1)
G) No date of hire on file	-
H) No salary on file	-
I) Also in retiree file (including DROP)	(617)
J) Actives excluding DROP	2,581

Retired

A) Number of records reported on data file	45,922
B) Number of records not in P/F plan	(28,770)
C) Records not currently in receipt of benefits based on reported status codes	(8,325)
D) Pre-Conversion Duty-Disability	(91)
E) Coded as Legacy records	(8,364)
F) Records coded as DROP	(115)
G) Number of records valued	257

Deferred

A) Number of records reported on data file	180
B) Retired (normal or early) or DROPed in Legacy post 6/30/14 but not in Hybrid retiree, including DROP, file. Also has non-zero contribution balance.	692
C) Deceased	-
D) Zero hybrid service	(25)
E) Less than 10 years of vesting service	(10)
F) Zero mandatory contribution balance	(23)
G) Terminated before 6/30/2014	(13)
H) Number of records to value	801

Notes:

Actives Row C: The Active data file contains a field titled “Stat.” Active members were only valued if the record for this field had a value of “1.”

Actives Row D: Agency “88” is the 36th District Court. We understand that members in that agency are not eligible to receive benefits.

Actives Row E: For both this valuation and the prior valuation, we have received a separate list of Class Codes and Bargaining Units that are not eligible to receive benefits.

Deferred Row E: Service provided in the data file is benefit service. Vesting service was determined by taking service in the Legacy inactive file.

Deferred Row F: Assumed to have refunded and forfeited Hybrid defined benefit.

Retired Row C: The Retired Life file has a field named “STATUS.” We understand that if this field is not blank or equal to zero, the member is no longer receiving a benefit and should not be valued.

Reconciliation

	Active		Term. Vested	DROP		Retirees		Post-2014 Pre-Conversion Duty Disability		Totals
	Count	**Pay**	**Count**	**Count**	**Annual Benefits**	**Count**	**Annual Benefits**	**Count**	**Annual Benefits**	**Count**
2021	**2,551**	**$ 158,718,175**	**761**	**111**	**$ 597,756**	**183**	**$ 616,523**	**86**	**$ 3,301,725**	**3,692**
Change in Pay/Pensions	N/A	11,278,342	N/A	N/A	4,552	N/A	9,804	N/A	(92,962)	
New	341	16,848,325								341
New Beneficiary						9	63,672	-	-	9
DROP	(24)	(2,022,699)	(2)	28	295,284					2
Retired	(12)	(1,000,540)	(8)	(24)	(155,304)	55	552,876	(2)	(74,150)	9
Non-Duty Disabled						11	226,188			11
Duty Disabled	(6)	(421,830)	(2)			1	53,577	9	380,016	2
Assumed Death/Removals			(4)	-	-	(2)	(13,836)	(2)	(77,658)	(8)
Vested Term	(61)	(4,150,630)	61							-
Non-Vested Terminated	(214)	(11,312,464)								(214)
Rehired	6	448,938	(5)	-	-	-	-	-	-	1
Data Adjustment	-	-	-	-	-	-	(3,676)	-	-	-
2022	**2,581**	**$ 168,385,617**	**801**	**115**	**$ 742,288**	**257**	**$ 1,505,128**	**91**	**$ 3,436,971**	**3,845**

Notable Data Changes:

4 Terminated Vested members were valued last year but will not be valued this year. We have assumed these members refunded and forfeited their defined benefit.

9 new retirees came from nowhere. We believe most of these are a result of EDROs.

Retiree count includes 11 Non-Duty Disabled members that were listed as Component II (Legacy) in the prior valuation.

The data adjustments relate to records where we could not specifically identify the activity during the year. This could be the result of duplicate social security numbers or corrected social security numbers.

Data Adjustments

As part of our review of the data received from the System, we discussed questionable or missing data with System staff and developed approximations and assumptions in order to perform the valuation. We provided System staff with a letter dated December 23, 2022 with additional information regarding data reconciliation, processing instructions, and assumptions regarding unresolved issues. Note, that letter disclosed our remaining data processing procedures and assumptions and details our reconciliation and final valuation data.

The purpose of this section in this report is to summarize any unresolved concerns about questionable data that are relevant and could have a significant effect on the valuation as disclosed in that letter. This summary also discusses any significant steps we have taken to improve the data due to identifying questionable data values or relationships, significant judgments, or assumptions we have applied to the data. The rationale for the demographic assumptions made for the data processing are 1) instructions/discussions with System staff and 2) professional judgement.

Active

These records are reported in the Microsoft Access data file in the table titled PF_Benefits_Hybrid. Information from the Legacy active file (service) is appended to this file.

We have been instructed by System Staff to use bargaining unit information to determine membership in DPLSA and DPCOA. Class code information from the 2014 valuation was used to determine which active members with Legacy service are eligible to retire under 20 & Out in the Legacy plan.

We have excluded all members reported as in the Component II DROP as of June 30, 2014 from this valuation even though some were reported in the June 30, 2022 active member data.

Deferred

These records are reported in the Access data file in the table titled PF_Benefits_Vested_Hybrid. This was combined with a separate file called “BENEFITSPCFL_HYBRID_V2_PP7_F.xlsx” which contained information for members that had retired under Component II (Legacy) and deferred their Component I (Hybrid) benefit. However, the separate file appeared to be incomplete. As a result, we used prior years data for individuals that are retired under Legacy, not in the Hybrid data, and have not refunded. Information from the Legacy inactive file (Legacy service) is appended to the Hybrid file.

Retired and Beneficiary

These records are reported in the Microsoft Access data file in the table titled Retired_Life. This file is used in conjunction with information from the Master file (class code and agency). Note, General and P/F members are both reported in this table.

Adjustment assumptions include:

- In cases where the benefit is identified to be a joint and survivor benefit and a beneficiary is not listed in the data, it was assumed that male spouses were 3 years older than females;
- Benefits for dependent children are assumed to cease at age 21; and
- For non-converted duty disability members reported in the Hybrid data:
    - Converted benefits are assumed to commence at age 65;
    - Projected Hybrid service from June 30, 2014 to age 65. This service was limited to ensure that total Legacy and Hybrid service would not be greater than 25 years; and
    - Computed AFC by using the pre-conversion benefit currently being paid divided by the appropriate pre-conversion multiplier (66 2/3% or 50%).

Post-2014 Pre-Conversion Duty Disability are members that were reported as duty disabled after June 30, 2014 and have not yet converted. In the data, they are reported as Component I (Hybrid) members. We have valued the pre-conversion benefit out of the Component I (Hybrid) plan and estimated the post-conversion benefit payable out of Component I (Hybrid) and Component II (Legacy). Post-conversion benefits were calculated by using:

- Estimated benefit service that will be attributable to each plan upon conversion. The service on the file is service accrued from date of hire to the date of retirement (disability). The date of retirement and reported service is used to:
    - Calculate Hybrid benefit service which is the amount of service accruing after 2014 to age 65. This service was limited to ensure that total Legacy and Hybrid service would not be greater than 25 years; and
    - Calculate Legacy benefit service which is frozen as of 2014.
- Estimated AFC which is determined through the current benefit:
    - 50% of AFC is payable if the member has more than 25 years of service; and
    - 66 2/3% of AFC is payable if the member has less than 25 years of service.

Active Members June 30, 2022
by Attained Age and Years of Eligibility Service

Police Members

Attained Age	Years of Service to Valuation Date 0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Totals No.	Valuation Payroll *
Under 20	8							8	$ 342,360
20-24	187	3						190	9,304,441
25-29	315	98						413	23,037,035
30-34	171	150	12					333	19,851,665
35-39	68	56	55	13	1			193	12,408,877
40-44	21	24	42	42	67			196	14,084,953
45-49	8	9	22	23	110	35		207	16,088,853
50-54	4	4	12	14	108	39		181	14,122,077
55-59	2	1	7	6	36	16	2	70	5,103,967
60-64	2	1	3	1	7	5	4	23	1,575,072
65-69					2		2	4	307,887
70-74	1							1	55,774
Totals	**787**	**346**	**153**	**99**	**331**	**95**	**8**	**1,819**	**$116,282,961**

Fire Members

Attained Age	Years of Service to Valuation Date 0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Totals No.	Valuation Payroll *
Under 20	3							3	$ 117,787
20-24	38	2						40	1,791,618
25-29	85	33						118	6,145,369
30-34	65	70	3					138	8,818,417
35-39	25	42	3	2	1			73	4,744,286
40-44	12	19	7	19	38	1		96	6,787,336
45-49	1	5	7	21	64	12		110	8,550,891
50-54		2	4	12	74	30	12	134	10,912,397
55-59			1	1	23	7	11	43	3,610,516
60-64					4		3	7	624,039
65-69									0
70-74									0
Totals	**229**	**173**	**25**	**55**	**204**	**50**	**26**	**762**	**$52,102,656**

** Excluding DROP members.*

Total Active Members June 30, 2022
by Attained Age and Years of Eligibility Service

	Years of Service to Valuation Date							Totals	
Attained Age	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll *
Under 20	11							11	$ 460,147
20-24	225	5						230	11,096,059
25-29	400	131						531	29,182,404
30-34	236	220	15					471	28,670,082
35-39	93	98	58	15	2			266	17,153,163
40-44	33	43	49	61	105	1		292	20,872,289
45-49	9	14	29	44	174	47		317	24,639,744
50-54	4	6	16	26	182	69	12	315	25,034,474
55-59	2	1	8	7	59	23	13	113	8,714,483
60-64	2	1	3	1	11	5	7	30	2,199,111
65-69					2		2	4	307,887
70-74	1							1	55,774
Totals	**1,016**	**519**	**178**	**154**	**535**	**145**	**34**	**2,581**	**$168,385,617**

Summary

	DPOA	LSA	Fire	6/30/2022 Totals
Number	1,346	473	762	2,581
% Change in active members from prior year	(5.5)%	0.4 %	16.3 %	1.2 %
Annual payroll* ($ millions)	$ 77.5	$ 38.8	$ 52.1	$ 168.4
Average pay	$ 57,556	$ 82,055	$ 68,376	$ 65,240
% Change in average pay from prior year	1.4 %	0.5 %	13.6 %	4.9 %
Average age	33.1	45.8	39.7	37.4
Average benefit service	4.2	7.8	5.8	5.3
Average eligibility service	6.6	19.4	12.7	10.7

** Excluding DROP members.*

Historical Summary of Active Member Data

Valuation	Active Members		Valuation Payroll		Average Salary		Average (in Years)		
Date	No.	% Increase	$ Amount	% Increase	$ Amount	% Increase	Age	Service	Entry Age
2014	2,608	N/A	$ 132,566,687	N/A	$ 50,831	N/A	41.0	14.2	26.8
2015	2,484	(4.8)%	131,695,469	(0.7)%	53,017	4.3%	41.0	14.2	26.8
2016	2,483	(0.0)%	128,837,649	(2.2)%	51,888	(2.1)%	40.6	13.8	26.8
2017	2,523	1.6%	141,225,328	9.6%	55,975	7.9%	39.1	12.5	26.6
2018	2,575	2.1%	146,689,948	3.9%	56,967	1.8%	38.4	12.0	26.5
2019	2,488	(3.4)%	150,041,943	2.3%	60,306	5.9%	38.0	11.7	26.3
2020	2,559	2.9%	153,055,458	2.0%	59,811	(0.8)%	37.3	11.1	26.3
2021	2,551	(0.3)%	158,718,175	3.7%	62,218	4.0%	37.0	10.6	26.4
2022	2,581	1.2%	168,385,617	6.1%	65,240	4.9%	37.4	10.7	26.7

Summary of Retiree and Inactive Data

Retirees

	Police	Fire	6/30/2022 Totals	6/30/2021 Totals
Number	164	93	257	183
Annual benefits including annuities as reported	$ 1,141,716	$ 390,083	$ 1,531,799	$ 616,523
Average benefits as reported	$ 6,962	$ 4,194	$ 5,960	$ 3,369
% Change in average benefit from prior year	73.3 %	51.0 %	76.9 %	13.4 %

Deferred Members

	Police	Fire	6/30/2022 Total	6/30/2021 Total
Number	737	64	801	761
Average AFC	$ 59,375	$ 51,502	$ 58,746	$ 56,255
Average service	3.9	3.6	3.8	3.7
Annual benefits (estimated)	$ 3,587,324	$ 253,313	$ 3,840,637	$ 3,375,737
Average benefits (estimated)	$ 4,867	$ 3,958	$ 4,795	$ 4,436
% Change in average Service	4.0%	-6.1%	3.1%	18.0%
% Change in average AFC	5.2%	-5.3%	4.4%	6.3%

DROP Members

	Police	Fire	6/30/2022 Totals	6/30/2021 Totals
Number	93	22	115	111
Annual benefits as reported	$ 542,721	$ 199,567	$ 742,288	$ 597,756
Average benefits as reported	$ 5,836	$ 9,071	$ 6,455	$ 5,385
% Change in average benefit from prior year	14.7%	41.7%	19.9%	20.1%

Post-2014 Pre-Conversion Duty Disability

	Police	Fire	6/30/2022 Totals	6/30/2021 Totals
Number	64	27	91	86
Annual benefits as reported	$ 2,438,735	$ 998,236	$ 3,436,971	$ 3,301,725
Average benefits as reported	$ 38,105	$ 36,972	$ 37,769	$ 38,392
Annual post-conversion benefits (estimated)	$ 1,523,714	$ 549,493	$ 2,073,207	$ 1,242,253
Average post-conversion benefits (estimated)	$ 23,808	$ 20,352	$ 22,782	$ 14,445
% Change in average post-converstion benefit	64.1%	48.1%	57.7%	4.1%

Comparison of Valued Benefits with Actual Payments

	Retirees and Beneficiaries	DROP*	Post-2014 Pre-Conversion Duty Disability	Total	Benefits Paid FYE 2022
Count	257	115	91	463	
Annual Benefits	$ 1,531,799	$ 556,716	$ 3,436,971	$ 5,525,486	$ 7,175,873

* *Includes reduction for 75% of benefit payable during DROP.*

Summary of Membership Data by Category
(Excluding Disability Retirees)

	June 30, 2022	June 30, 2021
Active Members (Excluding DROP)		
Number	2,581	2,551
Average age (years)	37.4	37.0
Average service (years)	10.7	10.6
Average salary	$ 65,240	$ 62,218
Total payroll supplied, annualized	$ 168,385,617	$ 158,718,175
Members in DROP		
Number	115	111
Average age (years)	56.3	55.6
Total annual benefits	$ 742,288	$ 597,756
Average annual benefit	$ 6,455	$ 5,385
Vested Inactive Members		
Number	801	761
Average age (years)	50.7	49.9
Total annual deferred benefits	$ 3,840,637	$ 3,375,737
Average annual deferred benefit	$ 4,795	$ 4,436
Service Retirees		
Number	233	179
Average age (years)	56.7	57.3
Total annual benefits	$ 1,104,352	$ 554,235
Average annual benefit	$ 4,740	$ 3,096
Beneficiaries (Including Death in Service)		
Number	11	4
Average age (years)	24.2	25.1
Total annual benefits	$ 111,639	$ 62,288
Average annual benefit	$ 10,149	$ 15,572

Summary of Membership Data by Category
(Disability Retirees)

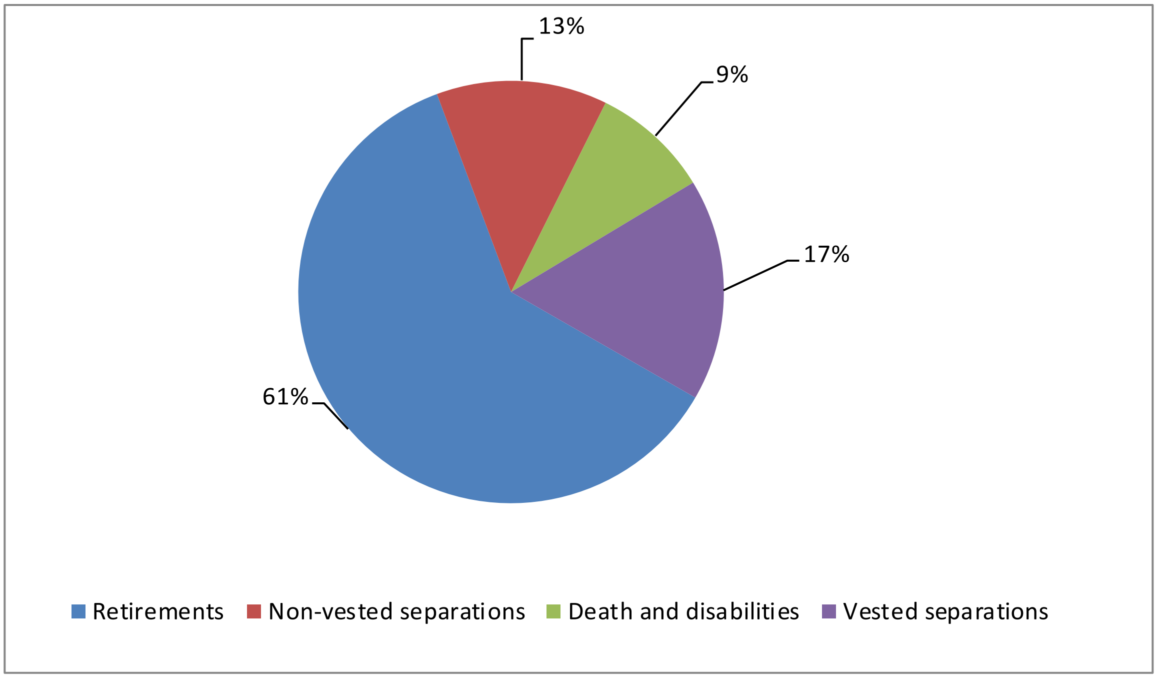
	June 30, 2022	June 30, 2021
Post-2014 Pre-Conversion Duty Disability		
Number	91	86
Average age (years)	48.7	48.2
Total annual benefits (pre-conversion)	$ 3,436,971	$ 3,301,725
Average annual benefit (pre-conversion)	$ 37,769	$ 38,392
Total annual benefits (post-conversion)	$ 2,073,207	$ 1,242,253
Average annual benefit (post-conversion)	$ 22,782	$ 14,445
Other Disability Retirees		
Number	13	-
Average age (years)	50.0	-
Total annual benefits	$ 289,137	$ -
Average annual benefit	$ 22,241	$ -

Comparative Statement of Annual Retirement Allowances Being Paid to Component I Retirees and Beneficiaries (Excluding DROP Members and Pre-Conversion Duty Disability)

	Number	Current Allowances	
June 30	Retired	Total	Average
2014	0	-	N/A
2015*	67	N/A	N/A
2016	44	$ 34,901	$ 793
2017	63	81,742	1,297
2018	89	193,240	2,171
2019	116	339,711	2,929
2020	156	454,594	2,914
2021	183	616,523	3,369
2022	257	1,505,128	5,857

**Hybrid retiree benefits were not made available in 2015*

Expected Terminations from Active Employment for Current Active Members



The chart above shows the expected future development of the present population in simplified terms. The Retirement System presently covers 2,581 active members. Eventually, 333 members are expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 2,023 members are expected to receive monthly retirement benefits either by retiring directly from active service (including DROP), or by retiring from vested deferred status. 225 members are expected to become disabled or die in service. Vested Separations may include members eligible to retire in the Component II (Legacy) plan but not yet eligible to retire in this Component I (Hybrid) plan. A detailed discussion on how members eligible to retire in Component II (Legacy) but not eligible to retire in Component I (Hybrid) are treated is included in Section F of this report.

SECTION F

METHODS AND ASSUMPTIONS

Funding Methods

The entry age actuarial cost method was used in determining liabilities and normal cost as prescribed by Section 9.3(1) of the Combined PFRS Plan. Under this method, each individual's normal cost is determined as a level percent of pay based on a replacement life normal cost. The Normal Cost for each member is based on the Component I benefits and eligibilities applicable to that member and is determined to be the level percent of payroll from hire date to the age of last decrement or DROP necessary to fund the benefits. This method is based on the objective of the Plan to separately fund Transition Cost and future accruals. The application of this method differs for funding and accounting.

Unfunded Actuarial Accrued Liabilities - Actual employer contributions through June 30, 2023 are set at 12.25% of pay. Additional funding for Transition Costs may occur as a result of Component II ASF transfers. The amortization period and method after 2023 has not yet been established by the Board.

Summary of Assumptions Used for DPFRS Actuarial Valuation

All demographic assumptions are estimates of future experience except as noted. The rationale for the assumptions is based on experience studies where noted.

ECONOMIC ASSUMPTIONS

The investment return rate used in the valuation was 6.75% per year, compounded annually (net after investment expenses). This assumption is prescribed by the Eighth Amended Plan for the Adjustment of Debts of the City of Detroit (POA).

Actuarial Assumptions
The assumptions and methods are those adopted by the Board with the exception of the discount rate. For purposes of plan funding, the discount rate is 6.75% as prescribed by Section 1.18(3) of the Combined PFRS Plan. This assumption is net of investment expenses.

Pay increase assumptions for individual active members are shown on the following pages. Part of the assumption for each age is for a merit and/or seniority increase, and the other recognizes wage inflation. **Wage inflation** is assumed to be 3.0% per year. The rationale is based on the 2015-2020 Experience Study.

Price inflation is not directly used in the valuation. For purposes of assessing the reasonableness of the assumed rate of return we assumed price inflation of 2.50% per year. The rationale is based on the 2015-2020 Experience Study.

Administrative expenses assumed to be 1.07% of payroll. The rationale is based on the 2015-2020 Experience Study.

NON-ECONOMIC ASSUMPTIONS

The mortality table used to measure healthy retired life mortality is the PubS-2010 Public Safety Retiree table for males and females with male rates multiplied by 115% and female rates multiplied by 125%. The mortality table used to measure disabled retired life mortality is the PubS-2010 Public Safety Disabled Retiree table for males and females with male rates multiplied by 114%. The mortality table used to measure pre-retirement life mortality is the PubS-2010 Public Safety Employee table for males and females with 50% of deaths assumed to be duty related. The tables are projected to be fully generational, based on the two-dimensional, sex distinct mortality improvement scale MP-2021. The rationale is based on the 2015-2020 Experience Study.

The probabilities of age/service retirement for members eligible to retire are shown on the following pages. The rationale is based on the 2015-2020 Experience Study.

The probabilities of separation from service are shown for sample ages on the following pages. The rationale is based on the 2015-2020 Experience Study.

Sample Salary Adjustment Rates

	Salary Increase Assumptions for an Individual Member		
Service	Merit & Seniority	Base (Economic)	Increase Next Year
5	6.00%	3.00%	9.00%
10	1.90%	3.00%	4.90%
15	1.00%	3.00%	4.00%
20	1.00%	3.00%	4.00%
25	1.00%	3.00%	4.00%
30	1.00%	3.00%	4.00%
35	1.00%	3.00%	4.00%

The rationale is based on the 2015-2020 Experience Study.

Single Life Retirement Values
Based on PubS-2010
115% of Male Rates / 125% of Female Rates
Using Projection Scale MP-2021

Sample Attained Ages	Future Life Expectancy (Years)	
in 2022	Males	Females
45	39.35	40.70
50	34.24	35.51
55	29.22	30.44
60	24.38	25.60
65	19.86	21.07
70	15.68	16.82
75	11.88	12.91
80	8.59	9.50

Probabilities of Service Retirement/DROP

	Percent of Eligible Active Members Retiring or Entering DROP Within Next Year	
Age	Police	Fire
35	20%	
36	20%	
37	20%	
38	20%	
39	20%	
40	20%	
41	20%	
42	20%	
43	20%	
44	20%	
45	20%	
46	20%	
47	20%	
48	20%	
49	20%	
50	30%	20%
51	30%	20%
52	30%	20%
53	30%	20%
54	30%	20%
55	30%	20%
56	30%	20%
57	30%	20%
58	30%	20%
59	30%	20%
60	30%	100%
61	30%	100%
62	30%	100%
63	30%	100%
64	30%	100%
65	100%	100%

Police members eligible for retirement under 20 & Out with at least 10 years of Component II (Legacy) benefit service are assumed to retire or enter DROP while eligible for Component II (Legacy) normal retirement. These members are assumed to have 40% probability of retiring or entering DROP during the first year of eligibility. All other members are assumed to retire or enter DROP while eligible for Component I (Hybrid) normal retirement only. This assumption was first used as of June 30, 2021 with the rationale based on the 2015-2020 Experience Study.

Probabilities of Separation

Sample Ages	Years of Service	% of Active Members Withdrawing within Next Year	
		Police	Fire
ALL	0	11.00%	5.00%
	1	9.00%	3.00%
	2	7.50%	3.00%
	3	6.25%	2.50%
	4	5.50%	2.50%
25	5 & Over	5.50%	2.50%
30		4.95%	2.50%
35		3.45%	2.50%
40		2.55%	2.50%
45		2.25%	2.50%
50		1.65%	2.50%
55		1.20%	2.50%
60		1.20%	2.50%

The rationale is based on the 2015-2020 Experience Study.

Sample Ages	% of Active Members Becoming Disabled within Next Year	
	Ordinary	Duty
25	0.05%	0.28%
30	0.05%	0.28%
35	0.08%	0.48%
40	0.11%	0.62%
45	0.16%	0.89%
50	0.21%	1.17%
55	0.21%	1.17%
60	0.21%	1.17%

The rationale is based on the 2015-2020 Experience Study.

Miscellaneous and Technical Assumptions
June 30, 2022

Annuity Savings Fund Excess Interest:	The Component I (Hybrid) Transition Cost is funded by Component II (Legacy) ASF returns in excess of 5.25%. ASF return excess ceases in 2023 and the POA mandates the use of a 6.75% return assumption until 2023. The current assumption is: • For purposes of determining valuation assets and liabilities, only include transfers that have actually occurred as of the valuation date. • For purposes of determining the Section 9.5 funded status, projecting the amount of future transfers.
Average Final Compensation (AFC):	AFC is estimated by assuming the payroll provided in the valuation will increase at the pay-increase rate. We understand that the payroll provided for the valuation is consistent with the definition of AFC.
Class Codes / Bargaining Unit:	For valuation purposes, members are categorized as DPOA, DFFA, DPLSA, or DPCOA based on bargaining units provided by the Retirement System and are primarily used in the valuation to determine deferred retirement commencement. Eligibility for the 20 & Out Legacy benefit is based on class codes taken from the 2014 data file.
Data Adjustments:	Assumptions regarding incomplete or missing data are reviewed annually with the System and adjusted as directed by the System.
Decrement Operation:	Ordinary disability and mortality decrements do not operate during the first five years of service. Disability and withdrawal do not operate during retirement eligibility.
Decrement Timing:	Decrements are assumed to occur mid-year.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Deferred Vested Benefit Commencement Age:	Members are assumed to commence benefits at the age in which they are first eligible for unreduced benefits.
Disability Load:	Duty Disability benefits were increased by 2.0% to account for the Death While Disabled provision based on an analysis of the estimated impact for a sample set of individuals.
Disability Change Age:	The duty disability benefit is assumed to change at the earlier of age 65 or the time the member would have had 25 years of credited service (including prior service). The benefit at change age was assumed to be 2.0% times final compensation times projected benefit service.

DROP Assumption: Members are assumed to retire or DROP based on assumed rates.

For Police members eligible for a maximum DROP period of 10 years, 75% of eligible members are assumed to enter the DROP and remain in the DROP for seven years.

For Police members eligible for a maximum DROP period of 15 years, 75% of eligible members are assumed to enter the DROP and remain in the DROP for nine years.

For Fire members, 60% of eligible members are assumed to enter the DROP and remain in the DROP for five years.

Employer contributions are assumed not to be made on DROP payroll. Expected benefits paid into DROP contributions are discounted at the assumed rate of return for valuation purposes. Balances for current DROP participants are held outside of system assets and are excluded from the valuation.

Members in the Component II (Legacy) DROP as of June 30, 2014 are excluded from the Component I (Hybrid) valuation.

DROP Cost Neutrality: An assessment of the cost neutrality of the DROP was outside the scope of this valuation.

Duty Disability Benefits: The Police and Fire Retirement System Combined Plan provides disability benefits for both Component I (Hybrid) and Component II (Legacy) members. Our understanding of the Component II (Legacy) freeze as it relates to duty disability benefits was that the only benefit payable from Component II (Legacy) would be the frozen accrued benefit, payable at the time of conversion to normal retirement (for members becoming disabled after 6/30/2014) and that any benefits payable during the period of disability would be paid from Component I (Hybrid).

We have valued the pre-conversion duty disability benefit in a manner consistent with the plan provision (paid out of Component I (Hybrid)). We understand that the System is in the process of moving to a new data system and expect this issue to be corrected once the new data system is in place.

For current duty disability retirees that became disabled after June 30, 2014, we have estimated the amount that will be paid by Component I (Hybrid) and Component II (Legacy) upon conversion.

For future retirees, duty disability retirement benefits prior to age 65 are assumed to be paid from Component I (Hybrid).

Eligibility Testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date of decrement.

Forfeiture Assumption:	It is assumed that 0% of members will elect to forfeit their benefit.
Form of Payment:	No adjustment has been made for alternate forms of payment elections.
Incidence of Contributions:	Employer contributions are assumed to occur quarterly.
IRC Section 401(a)(17) Limit:	All of the member salary provided falls below the current 401(a)(17) limit. The limit is assumed to grow with wage inflation.
IRC Section 401(h) Limit:	We did not test for the 401(h) limit on employer contributions for medical benefits. No employer contributions are anticipated in this valuation.
IRC Section 415 Limit:	We assumed that no benefits will be limited by IRC Section 415. The limit is assumed to grow with wage inflation.
Mandatory Retirement Age:	Currently most members of the DPFRS are subject to a mandatory retirement age of 60. We have assumed employment would end at age 60 for Fire members regardless of the length of their DROP participation at that age. We understand that the mandatory retirement age is currently not enforced for Police members and have assumed the mandatory retirement age is not in effect for Police members.
Marriage Assumption:	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits. This assumption accounts for potential dependent children/dependent parent death benefits. No other assumption is made for surviving children/dependent parents. Male spouses are assumed to be three years older than female spouses.
New Entrant Assumption:	New entrants are assumed to replace the current workforce as members separate from service under current valuation assumptions. Total payroll is expected to grow with wage inflation.
Pay Increase Timing:	End of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year starting on the valuation date.
Pop-Up Benefits:	For current retirees with a pop-up benefit, the value of the pop-up was estimated by valuing a non-pop-up option and increasing the associated liabilities by 1%.
Post-Retirement COLA / Variable Pension Improvement Factor (VPIF):	Unless stated otherwise, liabilities in this report are based on an assumed average 0.5% or 1.0% future VPIF.

Rate Stabilization Fund (RSF):	The plan document does not provide specific direction regarding how the RSF is considered in the valuation. We currently treat the RSF in the following manner (unless specifically stated otherwise): • For purposes of determining a funded ratio in the funding valuation (other than with regard to the Section 9.5 testing), the Rate Stabilization Fund (RSF) has been included in the assets; • For purposes of determining contributions starting in FY 2024, we exclude the RSF from the assets (thereby calculating a higher contribution rate); and • For purposes of Section 9.5 testing, the RSF is excluded from the assets. We believe this treatment is in compliance with the plan document and the Board's Section 9.5 methods and assumptions. When projecting assets, we have assumed that the RSF would grow at the investment rate of return.
Service Credit Accruals:	Service accruals for calculating benefits end as of June 30, 2014 for Component II (Legacy) and begin as of June 30, 2014 for Component I (Hybrid). However, service in Component I (Hybrid) and Component II (Legacy) may be used to satisfy benefit eligibility requirements in both plans.
Voluntary Employee Contribution Fund:	For purposes of determining the plans funded status, Voluntary Employee Contributions are included in both the assets and the liabilities of the plan. However, potential arbitrage resulting from the Voluntary Employee Contributions is not considered.
Workers Compensation Offset:	No Workers Compensation offsets are assumed for duty disability benefits.

SECTION G

PLAN PROVISION SUMMARY (AS APPROVED BY STAFF)

Summary of Benefit Provisions (July 1, 2022)

Plan Year

The Plan Year is the 12-month period commencing on July 1, and ending on June 30. The first plan year starts July 1, 2014.

Plan Membership

Employee means an employee of the City's Police Department who has taken an oath of office or a Firefighter providing services to the City, excluding individuals who are compensated on a contractual or fee basis, any person who is classified as a non-common law employee or an independent contractor for federal income tax and withholding, and also excluding the medical Director of the Retirement System.

The membership of the Retirement System shall consist of all employees of the Fire Department of the City of Detroit and of the Police Department of the City of Detroit who are employed as Firefighters or Police Officers according to the rules and regulations of the respective departments.

Appointed Officials of the Police Department or the Fire Department who are appointed from the membership are permitted to remain members. A Police Officer or Firefighter who is **killed or totally disabled prior to being confirmed**, shall be deemed to have been a member as of the date of his or her death. Any member who is **transferred to a civilian position** in his or her department shall continue as a member.

Service Credit

Credited Service: A member is credited with one month of Credited Service for each calendar month in which the individual performs 140 hours or more of service for the employer as a member. Credited Service is recorded from the later of July 1, 2014, or the date of employment with the City as a Police Officer or Firefighter. A member also receives 1 month of Credited Service for each month the member is eligible to receive duty disability benefits, until such time as the member has 25 years of credited service.

Prior Service: refers to service credit awarded to a member prior to July 1, 2014 under the terms of the Retirement System in effect on June 30, 2014.

Vesting Service: A member is credited with a year of vesting service for each Plan Year commencing on or after July 1, 2014 during which the member performs 1,000 or more hours of work for the employer. Prior Service, as defined above, is also Vesting Service.

Military Service: A member who enters the military while employed by the City and returns to employment with the City following military service receives service credit in the Retirement System for the military service time as though there had been no interruption of employment. In order to receive such service credit, the individual must pay contributions to the Retirement System for the military service time upon return to employment.

Summary of Benefit Provisions
(Continued)

Average Final Compensation

Compensation: Compensation is base salary, excluding bonuses, overtime, sick leave, longevity pay, unused vacation time, etc. Compensation includes deferred compensation and "picked up" employee contributions to the Retirement System. Compensation is limited by IRC Section 401(a)(17).

Average Final Compensation: The average of the compensation received during the 5 consecutive years of Credited Service (including Prior Service) immediately preceding the date of the members last termination of City employment as a Police Officer or Firefighter. If the member has less than 5 years of Credited Service (including Prior Service), the Average Final Compensation is the average of the compensation received during all years of Credited Service.

Final Compensation means the annual compensation of a member at the time of last termination of employment.

Normal Retirement

Normal Retirement Age: The Normal Retirement Age is 50 with 25 or more years of Credited Service (including prior service), with the following transition period.

Fiscal Year	Age and Elgibility Service
2015	43 and 20
2016	43 and 20
2017	44 and 21
2018	45 and 22
2019	46 and 23
2020	47 and 24
2021 and later	50 and 25

Normal Retirement Amount: The retirement allowance payable to a member who retires on or after the normal retirement age is 2.0% times Average Final Compensation times Credited Service (after June 30, 2014) measured to the nearest month.

Deferred Retirement (Vested Benefit)

Eligibility: 10 years of Vesting Service.

Benefit Commencement: Age 55.

Annual Amount: Same as Normal Retirement but based on Average Final Compensation and Credited Service at the time of termination. An actuarial reduction from age 62 is applicable if benefits are taken prior to age 62 (*waived for DPLSA and DPCOA members*).

Summary of Benefit Provisions
(Continued)

Duty Disability Retirement

Eligibility: The individual must be totally disabled for duty by reason of illness, injury, or disease resulting from performance of duty.

Amount: For the first 24 months, the member shall receive a basic benefit equal to 50% of his or her final compensation plus a supplemental benefit equal to 16-2/3% of final compensation. After 24 months, if the Board finds that the member is disabled from any occupation the member shall continue to receive both the 50% and the 16-2/3% benefit until the member would have achieved 25 years of service. The 16-2/3% benefit ceases at the time the member would have had 25 years of service, or if the member is found not to be disabled from any occupation after the 24-month review. Duty disability benefits continue to be paid until age 65, unless the member is found not to be disabled prior to that date. Upon termination of disability, or the attainment of age 65, the member's benefit is reduced to the 50% basic benefit. Earned Income in any year acts to reduce the disability benefit in the following year, to the extent that earned income combined with the disability benefit exceeds the compensation at the time of disability (after adjustment for the Variable Improvement factor). Amounts payable from Worker's Comp or similar programs are offset against the amount otherwise payable.

Non-Duty Disability Retirement

Eligibility: Total and permanent disability that is not duty related but that occurred while in the employ of the City.

Amount: If the member has less than 5 years of Credited service, accumulated contributions are refunded or, at the members option, may be payable in the form of a cash refund annuity. No other benefits are payable. Members with 5 or more years of credited service at the time of disability may receive a benefit computed as a Normal Retirement benefit, but not less than 20% of Average Final Compensation. Earned Income in any year acts to reduce the disability benefit in the following year, to the extent that earned income combined with the disability benefit (after adjustment for the Variable Improvement factor) exceeds the compensation at the time of disability. Amounts payable from Worker's Comp or similar programs are offset against the amount otherwise payable.

Accidental (Line of Duty) Death Before Retirement

Eligibility: Death resulting directly from performance of Duty in the service of the employer or as a result of illness contracted or injuries received while in the service of the employer.

Amount: Accumulated Mandatory Employee Contributions are refunded. If there is a surviving spouse, the surviving spouse receives a lifetime pension of 5/11ths of the member's final compensation. Each surviving child under age 18 receives a pension of 1/10th of final compensation payable until age 18. If there are more than two surviving children, each receives an equal share of 7/33rds of final compensation, payable to age 18 and redistributed to the remaining children upon attainment of age 18.

Summary of Benefit Provisions
(Continued)

The sum of all benefits payable shall not exceed 2/3rds of the member's Final Compensation. If there is no surviving spouse, each surviving child under age 18 receives a pension of 1/4th of the member's final compensation, subject to a maximum total of ½ of final compensation. If there is neither surviving spouse nor surviving children under the age of 18, each dependent parent, if any, shall receive a pension of 1/6th of the member's Final Compensation.

Ordinary (Other than Line of Duty) Death Before Retirement

Eligibility: 10 or more years of Vesting Service. The individual must be employed by the employer at time of death.

Amount: The Surviving Spouse shall receive a retirement allowance computed as though the member had retired the day before death, notwithstanding that the death was prior to the Normal Retirement Date, elected the Joint and 100% Option in favor of the spouse, and then died.

Refund of Mandatory Contributions

A member who ceases to be an employee for reasons other than retirement, death, or disability, may elect to receive a refund of mandatory Accumulated Contributions (without interest) in lieu of any other Component I benefit payable. In the case of a member who dies while employed by the City, or following termination of employment with the City, if no Surviving Spouse benefit is payable, the accumulated mandatory Employee Contributions (without interest) are paid to the member's estate.

Variable Pension Improvement Factor (VPIF Escalator)

Eligibility: In receipt of a retirement allowance for at least 12 months as of the first day of the plan year.

Amount: Beginning July 1, 2015 and effective the first date of each Plan year thereafter, the Board may determine that the Component I Retirement Allowance shall be increased by 1% of the then current (i.e., compounded to include prior VPIF's) retirement allowance. The VPIF Escalator may not be awarded in the event that the funding level of Component I of the Retirement System projected over a 5-year period falls below 90%.

Deferred Retirement Option Program "DROP"

Eligibility: Eligible for immediate retirement under Component I and either a non-union executive or covered by a collective bargaining agreement permitting participation in the DROP. Members electing DROP after July 1, 2014 are limited to 5 years of DROP participation. Effective October 31, 2018, DPLSA and DPCOA members are limited to 10 years of DROP participation. Effective May 9, 2019, DPOA members are limited to 10 years of DROP participation. Effective September 21, 2021, DPLSA members are limited to 15 years of DROP participation.

Amount: Upon entry into the DROP, the member ceases to accrue additional retirement benefits and must elect the optional form under which the retirement allowance will ultimately be paid. 75% of that amount, including VPIF, is paid into the DROP account.

Summary of Benefit Provisions
(Continued)

Investment: ING is currently responsible for the administration and investment of the DROP accounts. As soon as possible after July 1, 2014, the Board shall determine whether or not it is feasible for the Board to administer and invest the DROP accounts, in which case DROP assets would be commingled with Retirement System assets for investment purposes.

Earnings Credits: If the Board administers and invests the accounts, earnings credits shall be 75% of actual net Retirement System earnings rates, but neither less than 0% nor more than 7.75%.

Fees: Fees associated with maintenance of the DROP accounts outside the Retirement System shall be charged directly to DROP participants by means of deductions from their accounts.

Distribution: Upon termination of employment for any reason (including disability), the member's DROP account may be distributed in the form of a lump sum or an annuity. Any such annuity shall be subject to market rates of interest and other market related assumptions. At the same time, the member's monthly retirement allowance shall commence in the amount that would have been paid at the time the member entered the DROP, together with any applicable VPIF increases.

Death While in DROP: In the case of a member who dies during DROP participation, the DROP account balance is paid either to the named beneficiary or to the estate. Further, the DROP election is then rescinded and 100% of the retirement allowance that would have been paid but for participation in the DROP is restored. Survivor benefits are then payable in accordance with the payment option elected by the deceased member at the time the member elected to participate in the DROP.

Termination of DROP: The DROP can be terminated if it is determined that it is not cost neutral and cannot be amended to make it so.

Contributions

Members: Members who were active as of June 30, 2014 contribute 6% of Compensation. Members who are hired or rehired after that date contribute 8% of compensation. DROP participants do not make employee contributions. Member contributions are "picked up" in accordance with IRC 414(h).

Employers: 11.2% of compensation for members of the DPOA until October 3, 2014; 11.2% of Compensation of active employees who are members of the DFFA until November 6, 2014; 12.25% of Compensation of Active employees who are members of the DPCOA, DPLSA, and DPOA from and after October 3, 2014 until June 30, 2023; 12.25% of Compensation of DFFA members from and after November 6, 2014 until June 30, 2023, to be split between the Pension Accumulation Fund and the Rate Stabilization reserve. For Plan years 2024 and later, contributions shall be determined by an Actuary using reasonable and appropriate assumptions approved by the Board and the Investment Committee.

Summary of Benefit Provisions (Continued)

Voluntary Employee Contributions

Eligibility: Coverage by a collective bargaining agreement that permits the Member to make Voluntary Employee Contributions to Component I. Cannot be a current participant in the DROP.

Amount: Not less than 1% of Compensation nor more than 10% of Compensation. DPOA members can elect to have a whole % of the amount the City pays him or her for accumulated sick leave in excess of 400 hours paid to the voluntary employee account. All voluntary employee contributions are made on an after-tax basis.

Earnings Crediting: Each Plan year, accounts are credited with earnings at a rate equal to the net investment rate of return on Retirement System Assets for the second fiscal year immediately preceding the fiscal year in which earnings are to be credited. The earnings rate may not be less than 0% and may not exceed 5.25%.

Distribution: Upon termination of employment, accounts may be distributed in a lump sum, in equal monthly installments for a period not exceeding three years, or, at the option of the member, in the form of an actuarially equivalent life annuity payable in the same form as and added to the member's Retirement Allowance. The determination of actuarial equivalent for this purpose is based upon market rates of investment return and other market related assumptions. In case of a member who dies before receiving a distribution of his or her voluntary account, the value of the account is payable to the nominated beneficiary, or to the estate.

Forms of Payment

Normal Form of Payment: The normal form of payment is a straight life allowance with no death benefit, and, in particular, no residual refund of mandatory employee contributions. Until the date the first Retirement Allowance payment check is issued, any Member may elect to receive payment in either the Normal Form or in the Actuarial Equivalent of the Normal Form computed as of the effective date of retirement and payable in one of the forms described below.

Option One. Modified Cash Refund Annuity: If a Retiree who elected a Modified Cash Refund Annuity dies before payment has been received in an aggregate amount equal to, but not exceeding the Retiree's Accumulated Mandatory Employee Contributions at the time of retirement, the difference between said Accumulated Mandatory Employee Contributions and the aggregate amount of annuity payments already received, shall be paid in a single lump sum to a Beneficiary nominated by written designation duly executed by the Member and filed with the Board. If there are no such designated Beneficiaries surviving said Retiree, any such difference shall be paid to the Retiree's estate.

Option Two. Joint and One Hundred Percent Survivor Allowance: Upon the death of a Retiree who elected a Joint and One Hundred Percent Survivor Allowance, one hundred percent of the reduced Retirement Allowance shall be paid to and continued throughout the life of the Beneficiary nominated by written designation duly executed and filed with the Board prior to the date the first payment of the Retirement Allowance becomes due.

Option "A". Joint and Seventy-Five Percent Survivor Allowance: Upon the death of a Retiree who elected a Joint and Seventy-Five Percent Survivor Allowance, seventy-five percent of the reduced Retirement Allowance shall be continued throughout the life of and paid to the Beneficiary nominated by written designation duly executed by the Member and filed with the Board prior to the date the first payment of the Retirement Allowance becomes due.

Option Three. Joint and Fifty Percent Survivor Allowance: Upon the death of a Retiree who elected a Joint and Fifty Percent Survivor Allowance, fifty percent of the reduced Retirement Allowance shall be continued throughout the life of and paid to the Beneficiary nominated by written designation duly executed by the Member and filed with the Board prior to the date the first payment of the Retirement Allowance becomes due.

Option "B". Joint and Twenty-Five Percent Survivor Allowance: Upon the death of a Retiree who elected a Joint and Twenty-Five Percent Survivor Allowance, twenty-five percent of the reduced Retirement Allowance shall be paid throughout the life of the Beneficiary nominated by written designation duly executed and filed with the Board prior to the date the first payment of the Retirement Allowance becomes due.

Joint and Survivor Optional Forms of Payment: The Joint and Survivor Optional Forms of Payment provided under the Retirement System shall be made available in either the standard form or the Pop-Up Form, as follows:

> ***Standard Form:*** Under the Standard Form, the reduced Retirement Allowance shall be paid throughout the lifetime of the Retiree.
>
> ***Pop-Up Form:*** Under the Pop-Up Form, the reduced Retirement Allowance shall be paid throughout the lifetime of the Retiree and the designated Beneficiary. In the event of the death of the designated Beneficiary during the lifetime of the Retiree, the amount of the Retirement Allowance shall be changed to the amount that would have been payable had the Retiree elected the Straight Life Retirement Allowance Form of Payment.

Disposition of Residue: If under a Joint and One Hundred Percent Survivor allowance, a Joint and Seventy-Five Percent Survivor allowance, a Joint and Fifty Percent Survivor allowance, or a Joint and Twenty-Five Percent Survivor allowance as provided above, both the Retiree and the Beneficiary die before they have received, in Retirement Allowance payments, an aggregate amount equal to the Retiree's Accumulated Mandatory Employee Contributions at the time of retirement, the difference between the said Accumulated Mandatory Employee Contributions and the aggregate amount of Retirement Allowances paid to the Retiree and Beneficiary, shall be paid in a single lump sum to such person or persons nominated by written designation of the Retiree duly executed and filed with the Board. If there are no such person or persons surviving the Retiree and the Beneficiary, any such difference shall be paid to the estate of the second to die of the Retiree or Beneficiary.

Summary of Benefit Provisions (Concluded)

Rehire Before or After Retirement

A former member who is vested and is not a DROP participant and who later becomes a Police Officer or Firefighter (but not a Police Assistant) shall have his or her benefit pertaining to total Credited Service earned on and after July 1, 2014 calculated in accordance with the terms of Component I of the Retirement System in effect at the time of the last separation from service. If the former member has previously withdrawn mandatory accumulated contributions, and such withdrawn contributions are not repaid within two years of the rehire date, only the Credited Service earned on and after the rehire date shall be taken into consideration in determining the retirement allowance.

Retirement benefits for a Retiree who returns to active full-time employment other than as a Police Assistant shall be subject to the following provisions:

- A Retiree who returns to work will have the Retirement Allowance suspended upon re-employment. The variable pension improvement factor (escalator) shall not be added to the amount of the original Retirement Allowance during the Retiree's re-employment period.

- A Retiree who returns to work will be entitled to receive a second Retirement Allowance in accordance with the provisions of the Retirement System in effect during the re-employment period.

- A Retiree's Average Final Compensation for purposes of determining the second Retirement Allowance will be based upon the Compensation earned by the Retiree after the return to work.

- An individual who retires for a second time will not be allowed to change the payment option selected with respect to the original Retirement Allowance. However, the individual may select a separate payment option with respect to the second Retirement Allowance.

SECTION H

GLOSSARY

Glossary

Accrued Service	The service credited under the plan which was rendered before the date of the actuarial valuation.
Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
Actuarial Assumptions	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
Actuarially Determined Employer Contribution	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's actuarial funding policy.
Actuarial Equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV)	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
Actuarial Present Value of Future Benefits (APVFB)	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Funding Value of Assets, and related Actuarial Present Values for a plan.
Funding Value of Assets	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the Actuarially Determined Employer Contribution (ADEC).

Glossary

AFC	Average Final Compensation.
Amortization Method	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
ARF	Average Reserve Fund.
ASF	Annuity Savings Fund of the Component II (Legacy) Plan.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
COLA	Cost-of-Living Adjustment.
Contribution Budgeting Liability	An expected return-based measure of pension obligation.
DFFA	Detroit Fire Fighters Association.
DPCOA	Detroit Police Command Officers Association.
DPLSA	Detroit Police Lieutenants and Sergeants Association.
DPOA	Detroit Police Officers Association.
DROP	Deferred Retirement Option Program.
Duration	An approximate measure of sensitivity to changes in interest rates.

Glossary

Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Equivalent Single Amortization Period	For plans that do not establish separate amortization bases (separate components of the UAAL), this is the same as the Amortization Period. For plans that do establish separate amortization bases, this is the period over which the UAAL would be amortized if all amortization bases were combined upon the current UAAL payment.
Experience Gain/Loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience, e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience, i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.
Funded Ratio	The ratio of the Funding Value of Assets to the Actuarial Accrued Liability.
FVA	Funding Value of Assets.
FY	Fiscal Year.
GASB	Governmental Accounting Standards Board.
GASB Statement No. 67 and GASB Statement No. 28	These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. GASB Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while GASB Statement No. 67 sets the rules for the systems themselves.
MVA	Market Value Assets.
Normal Cost	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.

Glossary

Open Amortization Period	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.
PAF	Pension Accumulation Fund.
POA	The 8th Amended Plan for the Adjustment of the Debt of the City of Detroit.
Reserve Account	An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.
Solvency Liability	A market-based measurement of the pension obligations.
Transition Cost	Initial unfunded liability as described in Section E-16 of the Plan document.
Unfunded Actuarial Accrued Liability	The difference between the Actuarial Accrued Liability and Funding Value of Assets.
Valuation Date	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.
VPIF	Variable Pension Improvement Factor. Discussed in Section 6.2 of the Plan Document.

APPENDIX I – FUNDING POLICY

Introduction

The purpose of this Actuarial Funding Policy is to record the funding objectives and policy set by the Board of Trustees (Board) for the Police and Fire Retirement System of the City of Detroit (the System). The Board establishes this Actuarial Funding Policy to help ensure the systematic funding of future benefit payments for members of the Plan.

In 2014, the Plan for the System was written and approved by the bankruptcy court as part of the City's Plan of Adjustment (POA). At that time, the original retirement plan was split into two Retirement Plans: Component I (Hybrid) and Component II (Legacy). In accordance with the POA, employer contributions and certain assumptions cannot be changed until fiscal year 2024. This Policy is intended to recognize those items as fixed until 2024 and establish a funding policy for the period beginning in fiscal year 2024, when employer contributions must be determined on an actuarial basis. Nothing in this Policy is intended to prevent the Board from altering the Policy prior to fiscal year 2024 as conditions change or additional information becomes available to the Board.

This Policy shall be regularly reviewed by the Board.

Funding Objectives

1. Provide benefit security to members of the System:
   a. For purposes of this policy, benefit security means having adequate liquidity to pay benefits when due.
2. Establish an appropriate employer contribution based on the following objectives:
   a. Fully funding the Legacy Plan liability no later than 2054;
   b. Keeping the Hybrid Plan fully funded; and
   c. Managing employer contribution volatility.
3. Provide a reasonable margin for adverse experience to help offset risks.
4. Measure and monitor funding status, post-2024 contribution estimates and risk.
   a. Perform annual valuations; and
   b. Include post-2024 contribution estimates (based on this Policy) in annual actuarial valuations.

- The Plans will have annual actuarial valuations each June 30. Employer contributions will be determined for the fiscal year ending two years after the valuation date. For example, the actuarially determined employer contribution for the fiscal year ending June 30, 2024 will be determined by the June 30, 2022 annual actuarial valuation.
- Annual actuarial valuations may or may not also serve other purposes such as Legacy Plan restoration, Hybrid plan Section 9.5 fiscal responsibility calculations, and/or Annuity Savings Fund excess interest transfers between components. Unless otherwise stated, those purposes are not subject to this Policy.
- For all other funding purposes, annual actuarial valuations will include the following elements of the Actuarial Funding Policy:

1. Actuarial Cost Method

a. Hybrid Plan: The Entry Age actuarial cost method shall be used in determining the Actuarial Accrued Liability (AAL) and Normal Cost with the entry age based on date of hire. Since this component was created in July 2014 and granted eligibility and vesting service prior to July 2014 (for members hired before that date), this Plan had an unfunded actuarial accrued liability on the effective date, known as the Transition Cost. As of June 30, 2017, the AAL (including the Transition Cost) in the Hybrid Plan was fully funded. This Plan could become less than fully funded in the future if experience is less favorable than assumed or there are changes in assumptions or Plan provisions.

b. Legacy Plan: The Unit Credit Normal actuarial cost method shall be used in determining Actuarial Accrued Liability (AAL) and Normal Cost. Since this component is closed and accrued benefits are frozen as of June 30, 2014, this method results in no normal costs and an AAL that equals the Present Value of Accrued Benefits (PVAB) of each member.

2. Asset Smoothing Method

a. For estimating contributions prior to June 30, 2023, the Funding Value of Assets (or actuarial value of assets) will be equal to the Market Value of Assets, as mandated by the Plan of Adjustment. For determining (or estimating) employer contributions on or after fiscal year 2024, the Funding Value of Assets will be based on a method that employs smoothing of market gains and losses over a closed period. The smoothing period for recognized market gains and losses (above or below the assumed rate of return) will be a 3-year period.

b. The Funding Value of Assets shall not diverge from the Market Value of Assets by more than 15%.

c. The annual actuarial valuation will calculate results on both the smoothed value of assets and the (non-smoothed) Market Value of Assets beginning with the June 30, 2019 valuation (the Funding Value of Assets will initially be set to the Market Value of Assets as of June 30, 2018 with smoothing beginning prospectively). The post-2024 contribution estimate will always be based on the smoothed value of assets. Other results (UAAL, Funded Status, etc.) will be based on the Market Value of Assets prior to 2024 and the smoothed value of assets after 2023. Upon consultation with the Actuary, the Funding Value of Assets may be reset to the Market Value of Assets.

3. Amortization Method

a. Hybrid Plan

a) A Level Percent of Payroll amortization method shall be used to systematically eliminate (pay off) the Unfunded Actuarial Accrued Liability (UAAL) over a closed 15-year period from the later of July 1, 2023 or the applicable fiscal year after the funded status falls below 100%.

b) If funded status is above 100%, the contribution requirements for the UAAL will be $0 (thereby creating a minimum employer contribution of employer normal cost).

c) Layered amortizations will be considered by the Board post-2024.

b. Legacy Plan

a) The Level Dollar amortization method shall be used to systematically eliminate (pay off) the Unfunded Actuarial Accrued Liability (UAAL) over a closed period of 20 years from July 1, 2023 for the UAAL as of July 30, 2022 (projected to July 1, 2023), and

b) Layered amortizations that use 20-year closed periods for gains and losses occurring after June 30, 2022 (each 20-year period starts with the first payment after the applicable gain or loss occurs).

4. Funding Target and Cash Flow Projections

a. The targeted funded ratio shall be 100%.

b. The Legacy Plan annual actuarial valuation shall include projections of estimated employer contributions, expected benefit payments and estimated funded status to the later of fiscal year 2054 or 30 years after the applicable employer contribution fiscal year.

c. Section 9.5 of the Plan details the actions to be taken if the 5-year projected funded status falls below 90% (Hybrid Plan, only).

5. Risk Management

a. Assumption Changes

a) The actuarial assumptions used shall be those last adopted by the Board based on the most recent experience study and upon the advice and recommendation of the actuary. In accordance with the City Ordinance, the actuary shall conduct an experience study at least every five years. The results of the study shall be the basis for the actuarial assumption changes recommended to the Board. However, the assumed rate of return and the actuarial value of assets are mandated by the City's POA and cannot be changed prior to June 30, 2023.

b) The actuarial assumptions may be updated at any time, as advised by the actuary, if significant Plan design changes or other significant events occur.

c) The next experience study will be performed after the 2020 actuarial valuation and will include both economic (investment return, inflation, etc.) and demographic (mortality, retirement, disability, etc.) assumptions. Even though the investment rate of return may not be changed for determining employer contributions until after June 30, 2023, the Board may elect to show valuation results under an alternative reasonable assumed rate of investment return prior to 2023.

b. Risk Measures

a) Risk measures will be included in the annual actuarial valuations. Below is a list of potential measures to be included. The measures may be changed over time as deemed appropriate.

(i) Classic measures currently determined

- Funded ratio (assets / liability) on both a market value and funding value (if funding value is not equal to market).
- UAAL amortization period (years required to pay down the UAAL based on current funding rates).
- Portfolio rate of return for the year on both the market value and funding value of assets.
- 5- and 10-year geometric average portfolio rate of return on both the market value and funding value of assets (developed prospectively beginning with the 2019 valuation).
- 5- and 10-year standard deviation of return on both the market value and funding value of assets (developed prospectively beginning with the 2019 valuation).

(ii) Duration of the Actuarial Accrued Liability

- Measures the sensitivity of the liability to a 1% change in assumed rate of return. A decrease in this measure indicates a decrease in assumed rate sensitivity and vice versa.

(iii) Total UAAL / Covered Payroll

- Measures the risk associated with contribution rates relative to the impact on the ability to fund the UAAL. A decrease in this measure indicates a decrease in UAAL contribution risk and vice versa.
- Consideration will be given to using total payroll or revenue source, if available.

(iv) Total Assets / Covered Payroll

- Measures the risk associated with the potential impact of asset experience on contributions. A decrease in this measure indicates a decrease in asset risk and vice versa.
- Consideration will be given to using total payroll or revenue source, if available.

(v) Total AAL / Covered Payroll

- Measures the risk associated with the potential impact of liability experience on contributions. A decrease in this measure indicates a decrease in experience risk and vice versa. This also provides a long-term measure of the asset risk where the System has a target funded ratio of 100%.
- Consideration will be given to using total payroll or revenue source, if available.

(vi) Non-Investment Cash flow / Beginning of year assets

- Measures depletion risk, sensitivity to annual investment gains and losses risk and the maturity of the plan. For a mature open plan, this may converge to the negative of the real rate of return assumption (investment return less wage inflation). A less negative number (or a positive number) indicates a less mature plan and/or a plan that is at lower risk of fund depletion and less sensitive to annual gains and losses. A more negative number indicates a more mature plan and/or a plan that is more at risk of fund depletion and more sensitive to annual gains and losses. For a super-mature closed plan such as the Legacy plan, this may become more negative over time as liquidity needs increase.

(vii) Market Value of Assets / Benefit Payments

- Measure depletion risk. A low value estimates the number of years to depletion disregarding future contributions and investment return.

(viii) Solvency Liability

- Measures the estimated cost of accrued benefits as a result of minimizing investment risk in the portfolio.

b) Risk Control: The Board shall carefully monitor the risk measures above and shall consider steps to mitigate risk, particularly as the Legacy Plan funded ratio increases. Examples of risk mitigating techniques include, but are not limited to:

(i) Reviewing investment risk in accordance with the Board's Investment Policy

(ii) Adding provisions for adverse deviation in the actuarial assumptions

(iii) Increasing employer contributions (through a change in methods, assumptions, or amortization period)

(iv) Other

Glossary

1. **Actuarial Accrued Liability (AAL):** The difference between (i) the actuarial present value of future plan benefits; and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."
2. **Actuarial Assumptions:** Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
3. **Actuarial Cost Method:** A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."
4. **Actuarial Gain (Loss):** A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. For example, if during a given year the assets earn more than the investment return assumption, the amount of earnings above the assumption will cause an unexpected reduction in UAAL, or "actuarial gain" as of the next valuation. These include contribution gains and losses that result from actual contributions made being greater or less than the level determined under the policy.
5. **Actuary:** A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries (MAAA). The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA and ultimately to Fellowship with the designation FSA.
6. **Amortization:** Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.
7. **Unit Credit Normal Actuarial Cost Method:** A funding method that calculates the Normal Cost as the present value of the change in accrued benefits for active members.
8. **Experience Study:** An actuarial investigation of demographic and economic experiences of the system during the period studied. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities.
9. **Funding Value of Assets**: The value of current plan assets recognized for valuation purposes. Generally based on a phased-in recognition of all or a portion of market related investment return. Sometimes referred to as Actuarial Value of Assets or Smoothed value of Assets.
10. **Market Value of Assets:** The fair value of plan assets as reported in the plan's audited financial statements.
11. **Normal Cost (NC):** The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.
12. **Unfunded Actuarial Accrued Liability (UAAL):** The positive difference, if any, between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."

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February 28, 2023 - Revised

Mr. David Cetlinski, Executive Director
The Police and Fire Retirement System of the
City of Detroit
One Detroit Center
500 Woodward Avenue, Suite 3000
Detroit, Michigan 48226

Re: June 30, 2022 Police and Fire Component I Actuarial Valuation

Dear Mr. Cetlinski:

Enclosed are five copies of the report of the June 30, 2022 annual actuarial valuation of the Police and Fire Component I (Hybrid) Valuation.

Sincerely,
Gabriel, Roeder, Smith & Company

Jamal Adora, ASA, EA, MAAA

JA:rmn
Enclosures

cc: Kelly Tapper, City of Detroit Retirement Systems
Gail Oxendine, City of Detroit Retirement Systems
James R. Sparks, GRS
Judith A. Kermans, GRS

One Towne Square | Suite 800 | Southfield, Michigan 48076-3723

The Police and Fire Retirement System of the City of Detroit

Annual Actuarial Valuation of Component II

June 30, 2022

800.521.0498 | P: 248.799.9000 | www.grsconsulting.com

February 28, 2023 - Revised

Board of Trustees
The Police and Fire Retirement System
of the City of Detroit

Dear Board Members:

This report provides key results of the **Annual Actuarial Valuation** of the annuity and pension liabilities of the Police and Fire Retirement System of the City of Detroit – Component II benefits. The date of the valuation was **June 30, 2022.** This report replaces our report dated January 16, 2023 to include a restatement of the funding value of assets (set equal to market value) and to include non- substantive changes in wording suggested by your legal counsel. We hope that the revised wording will help to clarify valuation procedures regarding the Restoration Reserve Account (RRA).

In very general terms, Component II provides benefits for service rendered prior to July 1, 2014. The results provided herein relate solely to the Component II benefits. Benefits provided under Component I are the subject of a separate report.

The purpose of the valuation is to measure the funding progress and to calculate the FY 2024 actuarially determined contribution of Component II. Fiscal year 2024 is the first year (post-bankruptcy) the employer will be required to make actuarially determined contributions in accordance with the plan document. The actuarially determined contributions detailed herein are based on the Funding Policy adopted by the Board and Investment Committee and included in the appendix, plus a requested alternate based on a 30-year period.

The results of the valuation are not applicable for other purposes. In particular, the information provided in this report is not suitable for financial reporting in connection with GASB Statement No. 67. Such information was provided in a separate report. Information regarding potential benefit restoration as allowed for in the Plan of Adjustment (POA) will also be provided in a separate report at the Board's request.

The actuarially determined employer contribution is shown on page 2 and the alternate is on page 3. Users of this report should be aware that contributing these amounts do not guarantee benefit security.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

One Towne Square | Suite 800 | Southfield, Michigan 48076-3723

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: plan experience differing from that anticipated by the economic and demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

The valuation was based upon records maintained and furnished by the Retirement System staff concerning active members, retirees and beneficiaries, and financial accounts as of the valuation date. Data was checked for year-to-year consistency, but was not audited by the actuary. We are not responsible for the completeness or accuracy of the data. Certain data was not available in time to produce the results in this report and it was necessary for us to use approximations. Please see related discussion in the Comments section as well as the Data section of this report.

The assumptions used in the valuations concerning future experience are summarized in the appendix of this report. Other than the prescribed assumed rate of return, this report reflects the actuarial assumptions as adopted by the Board and the Investment Committee based on the July 1, 2015 to June 30, 2020 experience study. The assumed rate of investment return was set to 6.75% in the POA and is, therefore, a "prescribed assumption set by another party" as discussed in Actuarial Standard of Practice No. 4. We have reviewed this assumption based on the System's asset allocation and have determined it does not significantly conflict with what, in our professional judgement, would be reasonable for purposes of the measurement being taken. In our judgement, all of the other actuarial assumptions used for the valuation are also reasonable for purposes of the measurement being taken.

This report has been prepared by actuaries who have substantial experience valuing public sector retirement systems. To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board.

Jamal Adora, Judith A. Kermans, and James R. Sparks, are Members of the American Academy of Actuaries (MAAA), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The actuaries signing the report are independent of the plan sponsor.

This report does not evaluate the plan sponsor's ability or willingness to make contributions to the Retirement System. Given the funded level of this plan, plan sponsor contributions are critical if further benefit reductions are to be avoided. Please note that the employer contributions set forth in the POA have (as contemplated by the POA at its outset) defunded the Plan since Bankruptcy and are expected to continue to defund the Plan through June 30, 2023, even if all assumptions are met.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Jamal Adora, ASA, EA, MAAA

Judith A. Kermans, EA, FCA, MAAA

James R. Sparks, ASA, FCA, MAAA

JA/JAK/JRS:rmn

Table of Contents

VALUATION RESULTS

Executive Summary

($ in Millions)

	June 30, 2022	June 30, 2021
Valuation Date	June 30, 2022	June 30, 2021
Contributions For Fiscal Year Ending	June 30, 2024	June 30, 2023
Employer Contributions		
Actuarially Determined Employer Contribution:	$ 82.0	N/A
POA Mandated:	N/A	$ 18.3
Membership		
Number of:		
Active Members	1,149	1,234
DROP Members	645	728
Retirees and Beneficiaries	7,804	7,904
Inactive, Nonretired Members	389	385
Total	9,987	10,251
Assets		
Funding Value of Assets (FVA)^	$ 2,442.1	$ 2,495.0
Market Value of Assets (MVA)	$ 2,442.1	$ 2,749.1
Return on Funding Value of Assets	N/A	9.85 %
Return on Market Value of Assets	(0.99)%	27.11 %
Actuarial Information (FVA)		
Actuarial Accrued Liability (AAL)	$ 3,262.3	$ 3,374.9
Unfunded Actuarial Accrued Liability: (AAL) - (FVA)	820.2	880.0
Funded Ratio: (FVA) / (AAL)	74.86 %	73.93 %
Actuarial Information (MVA)		
Actuarial Accrued Liability (AAL)	$ 3,262.3	$ 3,374.9
Unfunded Actuarial Accrued Liability: (AAL) - (MVA)	820.2	625.9
Funded Ratio: (MVA) / (AAL)	74.86 %	81.46 %

^ *Funding Value of Assets reset to Market Value of Assets as of June 30, 2022.*

Fiscal year 2024 is the first year (post-bankruptcy) the employer will be required to make actuarially determined contributions in accordance with the plan document. The actuarially determined contributions detailed herein are based on the Funding Policy adopted by the Board and Investment Committee and included in the appendix.

Note: The AAL includes $0 for restoration and the MVA and AVA include the entire balance of the Restoration Reserve Account.

Valuation Results

Determination of FY 2024 Contribution in Accordance with Board Adopted Funding Policy

Actuarially Determined Employer Contribution (ADEC) for FY 2024
($ millions)

Actuarial Accrued Liability	$	3,262.3
Funding Value of Assets (FVA)		2,442.1
Unfunded Actuarial Accrued Liability (UAAL)[1] as of June 30, 2022	$	820.2
Anticipated POA Contribution for FY 2023		18.3
Anticipated Administrative Expenses		2.4
Interest at 6.75%[2]		55.4
Projected UAAL[1] as of June 30, 2023	$	859.7
Amortization Period Beginning in FY 2024 (years)		20
Level Dollar UAAL Contribution	$	79.6
Administrative Expense Contribution		2.4
Actuarially Determined Employer Contribution [3]	**$**	**82.0**

[1]*Unfunded Actuarial Accrued Liability in accordance with the Board adopted Funding Policy including the use of the Funding Value of Assets (FVA).*

[2]*The Funding Value of Assets is assumed to use a 6.75% rate of return. The assumption is net of investment expenses only with administrative expenses assumed to be paid through employer contributions. Contributions are assumed to be made at the end of the year.*

[3]*Total estimated employer contributions needed, including amounts paid by employer but funded from other sources under the POA, if any.*

Fiscal year 2024 is the first year (post-bankruptcy) the employer will be required to make actuarially determined contributions in accordance with the plan document. The actuarially determined contributions detailed herein are based on the Funding Policy adopted by the Board and Investment Committee and included in the appendix.

We understand the Employer has set aside some money to contribute to the Pension Plans at some point in the future. This valuation does not reflect any of those assets since they are not being held within the Retirement System trust.

Since the FY 2023 POA contribution is significantly less than an actuarially determined amount would have been, the funding ratio will continue to decline in the absence of offsetting gains between now and June 30, 2023. In fact, the anticipated POA contribution for FY 2023 is less than one-third of the interest that will accrue on the UAAL and about 6% of the annual benefit payments.

Valuation Results (Continued)

Determination of Requested Alternate FY 2024 Contribution

We have been asked to also include a 30-Year Level Dollar with FVA amortization scenario. We understand that providing this alternative scenario does not change or modify in any way the Funding Policy adopted by the Board and Investment Committee, which requires the use of a 20-year amortization period but is solely provided for reference. A determination of the FY 2024 contribution under those parameters is shown below:

Determination of Alternate FY 2024 Contributions
($ millions)

Actuarial Accrued Liability	$	3,262.3
Funding Value of Assets (FVA)		2,442.1
UAAL[1] as of June 30, 2022	$	820.2
Anticipated POA Contribution for FY 2023		18.3
Anticipated Administrative Expenses		2.4
Interest at 6.75%[2]		55.4
Projected UAAL[1] as of June 30, 2023	$	859.7
Amortization Period Beginning in FY 2024 (years)		30
Level Dollar UAAL Contribution	$	67.5
Administrative Expense Contribution		2.4
Alternate FY 2024 Employer Contribution [3]	**$**	**70.0**

[1]Unfunded Actuarial Accrued Liability in accordance with the Board Approved Funding Policy including the use of the Funding Value of Assets (FVA).

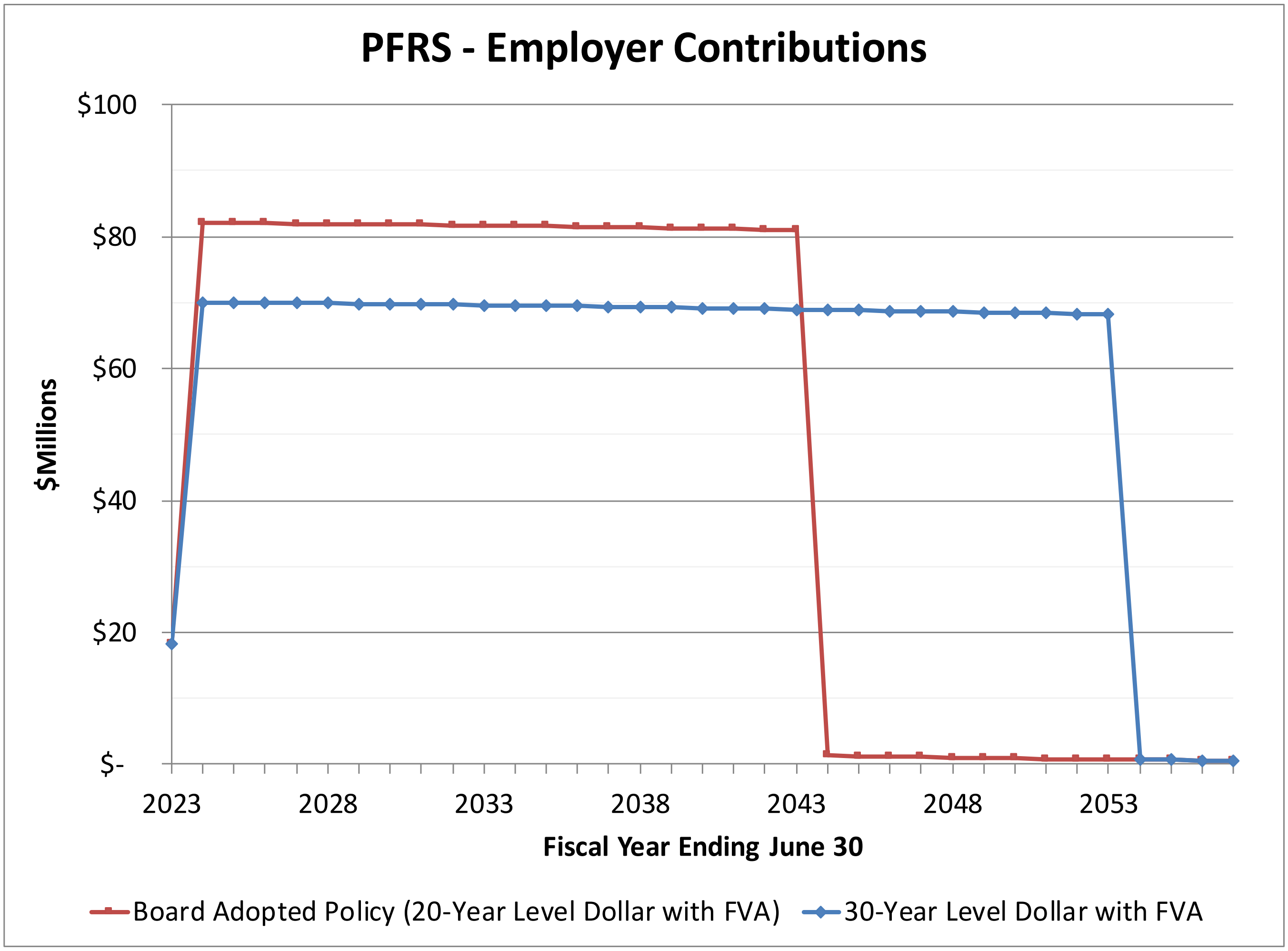
[2]The Funding Value of Assets is assumed to use a 6.75% rate of return. The assumption is net of investment expenses only with administrative expenses assumed to be paid through employer contributions. Contributions are assumed to be made at the end of the year.

[3]Total estimated employer contributions needed, including amounts paid by employer but funded from other sources under the POA, if any.

The above requested scenario amortizes the unfunded accrued liability over a 30-year period. Periods of this length result in smaller employer contributions being made when compared to the use of a shorter period, such as 20 years, under the funding policy ($82.0 m vs. $70.0 m). It may become difficult to manage the significant amount of cash needed to pay retirement benefits in this plan under a 30-year level dollar amortization method. **The use of a 30-year amortization period increases the risk of the Plan becoming insolvent (running out of money) compared to the use of a 20-year amortization period.**

The funding ratio will continue to decline in the absence of offsetting gains between now and June 30, 2023. In fact, the anticipated POA contribution for FY 2023 is less than one-third of the interest that will accrue on the UAAL and about 6% of the annual benefit payments.

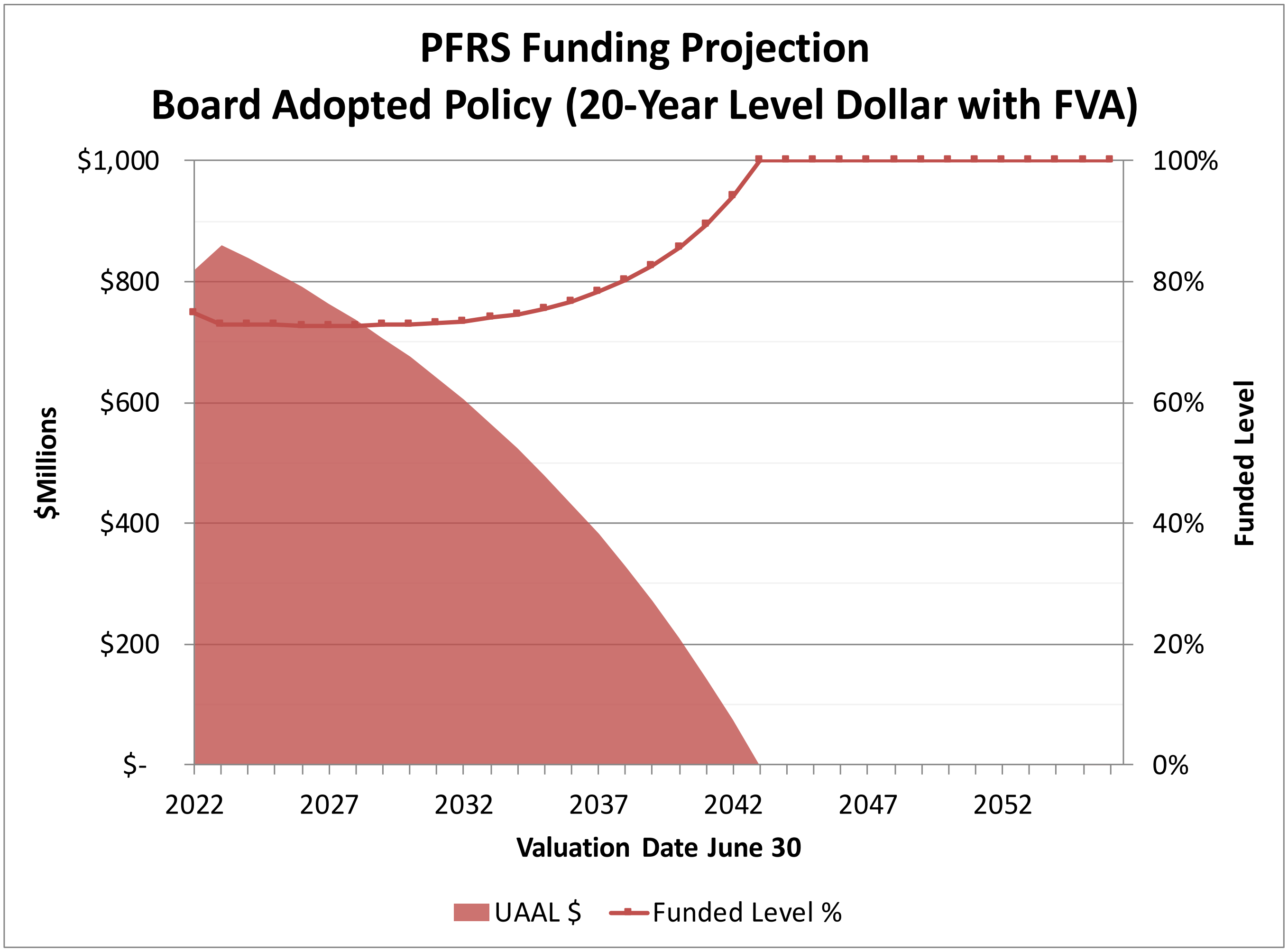
Valuation Results (Continued) – Expected Contributions Projection (Assuming all Assumptions are Met)



Notes:

- All actuarial assumptions are assumed to be met exactly each year in the projection (i.e., no future gains or losses). The rate of return on Funding Value of Assets is assumed to be 6.75%.
- Employer contributions are equal to only the administrative expenses after the end of the amortization period.

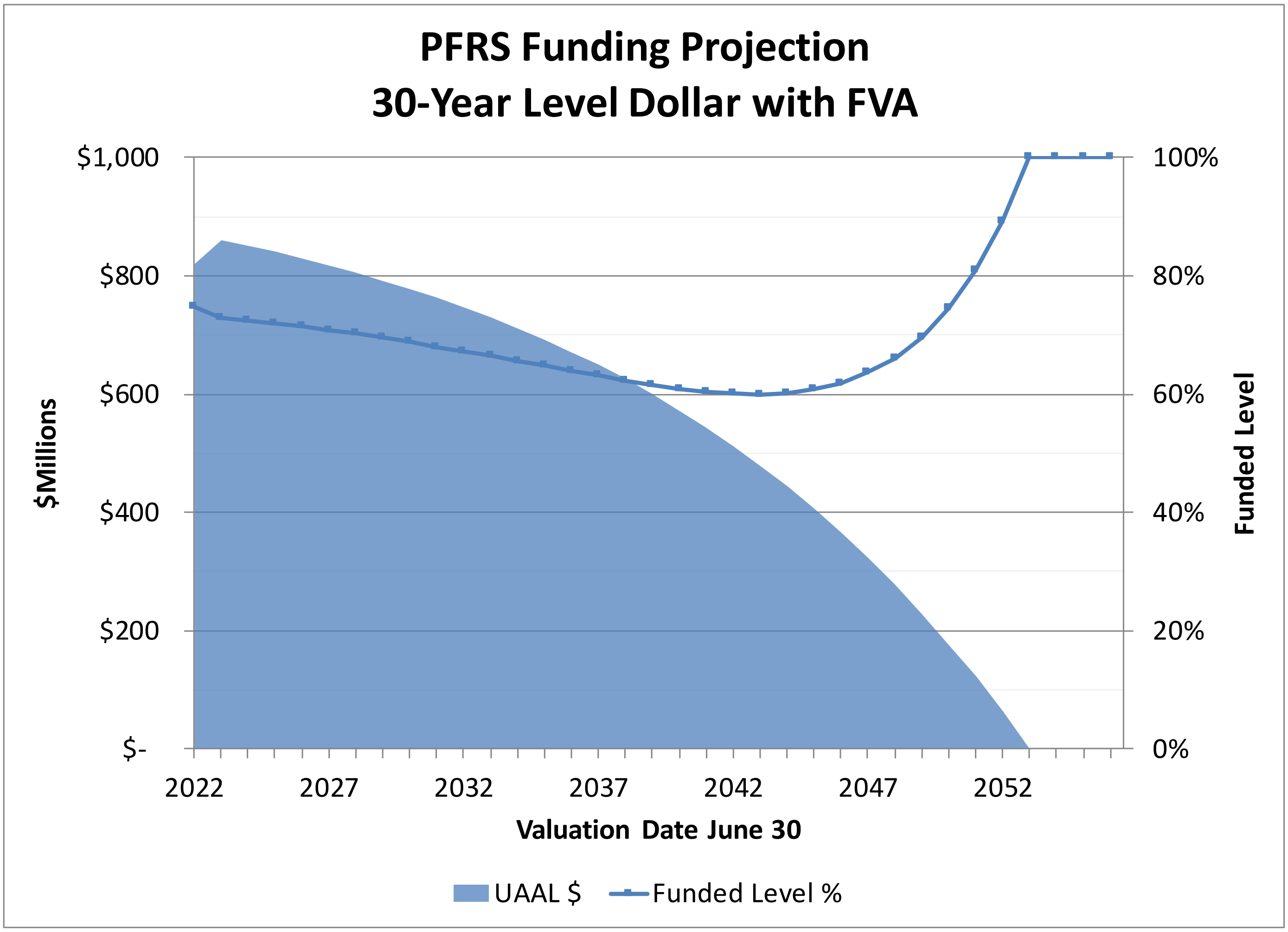
Valuation Results (Continued) - Expected Funding Progress Projection (Assuming all Assumptions are Met)



Notes:

- All actuarial assumptions are assumed to be met exactly each year in the projection (i.e., no future gains or losses). The rate of return on Funding Value of Assets is assumed to be 6.75%.

Valuation Results (Continued) - Expected Funding Progress Projection (Assuming all Assumptions are Met)



Notes:

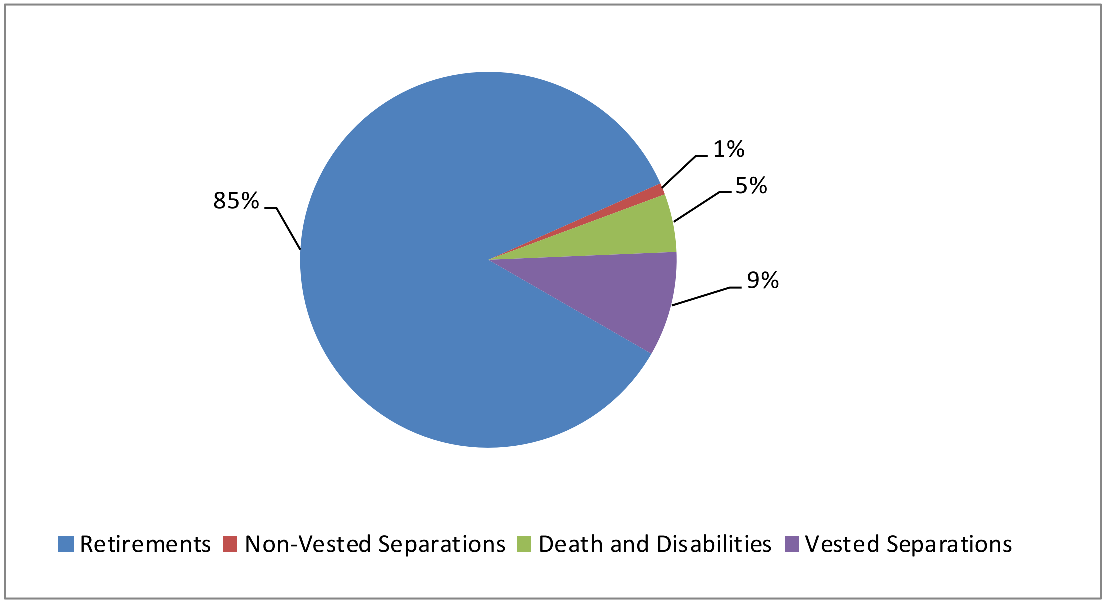
- All actuarial assumptions are assumed to be met exactly each year in the projection (i.e., no future gains or losses). The rate of return on Funding Value of Assets is assumed to be 6.75%.
- Due to the high cash-flow needs of this plan, the use of a 30-year level-dollar amortization results in the funded status of the plan decreasing from 72.9% on June 30, 2023 to 59.9% on June 30, 2043 (on an FVA basis) and increases the risk of insolvency.

Valuation Results (Concluded)

Present Value	June 30, 2022	June 30, 2021
Accrued Pension Liabilities		
Retirees and beneficiaries	$ 2,734,408,171	$ 2,785,276,714
DROP	238,230,547	281,117,526
Inactive members future deferred pensions	47,702,267	54,364,076
Active members (non-DROP)	121,145,367	120,133,591
Total accrued pension liabilities	3,141,486,352	3,240,891,907
Pension fund balances	2,321,310,199	2,615,017,354
Unfunded accrued pension liabilities	$ 820,176,153	$ 625,874,553
Accrued Annuity Liabilities		
Retirees and beneficiaries		
Future annuities	$ 2,986,057	$ 3,404,919
Reserve for outstanding refunds & contingencies	27,373,168	27,147,001
Total	$ 30,359,225	$ 30,551,920
Members annuities & future refunds	90,444,830	103,504,265
Total accrued annuity liabilities	120,804,055	134,056,185
Annuity fund balances	120,804,055	134,056,185
Unfunded accrued annuity liabilities	$ -	$ -
System Totals		
Actuarial accrued liabilities	$ 3,262,290,407	$ 3,374,948,092
Market Value of Assets	2,442,114,254	2,749,073,539
Unfunded actuarial accrued liabilities	$ 820,176,153	$ 625,874,553

Note: Total accrued pension liabilities include $0 for restoration and pension fund balances include the entire balance of the Restoration Reserve Account.

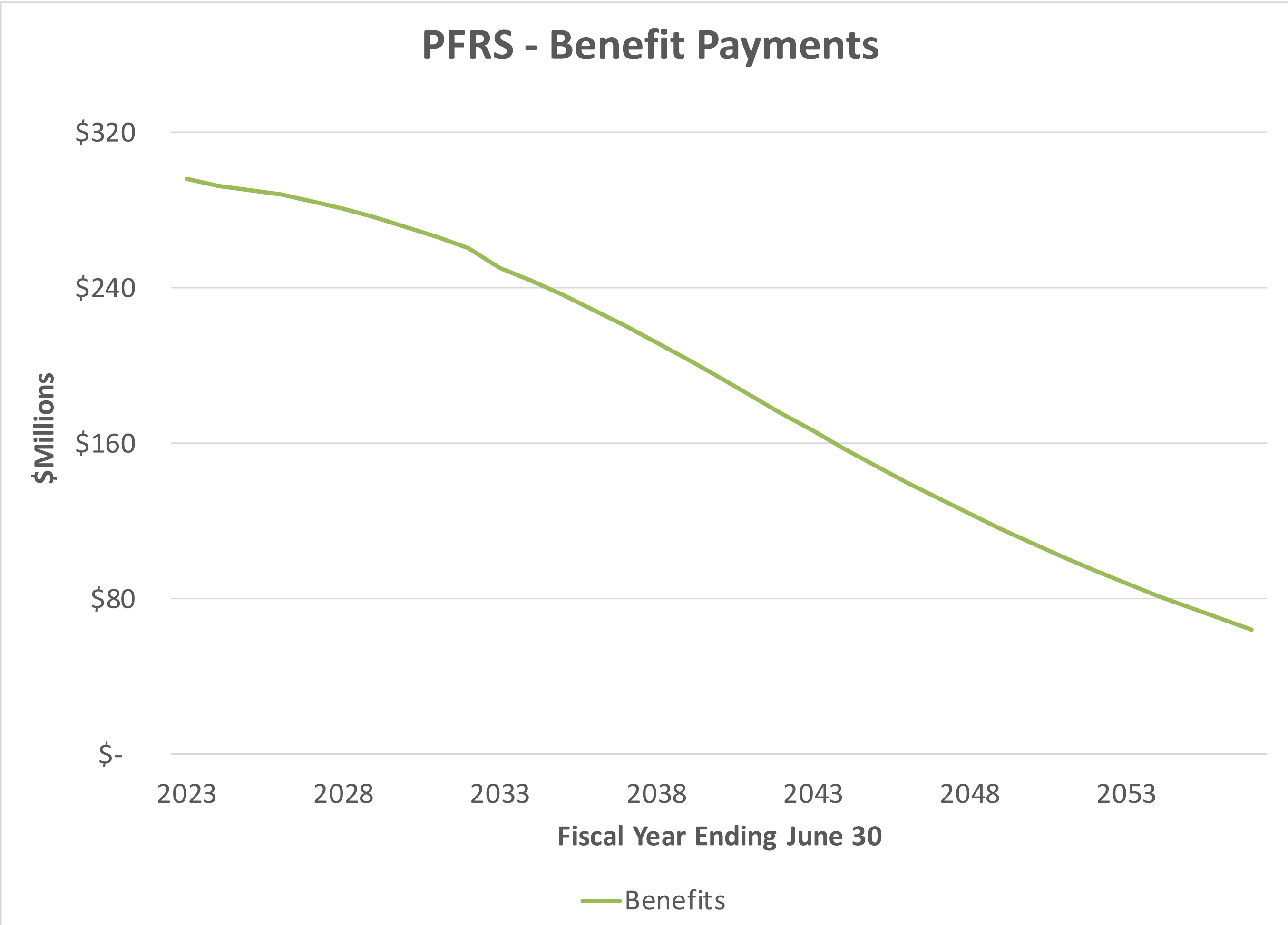
Expected Terminations from Active Employment for Current Active Members (non-DROP)



The chart above shows the expected future development of the present population in simplified terms. The Retirement System presently covers 1,149 active members (excluding 645 members currently in the DROP). Eventually, 15 members are expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 1,078 members are expected to receive monthly retirement benefits either by retiring directly from active service (including DROP), or by retiring from vested deferred status. 56 members are expected to become disabled or die in service. Vested separations may include members eligible to retire in this Component II (Legacy) plan but not yet eligible to retire in the Component I (Hybrid) plan. A detailed discussion on how members eligible to retire in Component II (Legacy) but not eligible to retire in Component I (Hybrid) are treated is included in Appendix I of this report.

Expected Benefit Payments

Shown below is a graph of projected benefit payments in the Retirement System.



The graph above shows the projection of future expected benefit payments. As shown on the prior pages, contributions are expected to be significantly less than benefit payments for many years. The assets in the plan are not sufficient to cover current retiree liabilities and the ratio of assets (Market Value) to retiree benefit payroll is 8.2. In a closed/frozen mature plan such as this one, it may become difficult to manage the significant amount of cash needed to pay retirement benefits if the amortization period is extended beyond 20 years.

Restoration of Pension Benefits

Section K-3 (Restoration of Pension Benefits) of the Combined Plan, provides that COLA benefits eliminated as part of the POA may be restored if certain conditions are met. Restored COLA benefits are paid out of the Restoration Reserve Account (RRA), the balance of which depends on the Plan's funded ratio. Accordingly, the liabilities related to potential restoration (in the valuation) are set equal to the projected value of the RRA as of June 30, 2022. The projected value reflects any assumed future transfers resulting from experience up to the valuation date. The estimate of the RRA is shown below and on the following page. Note that this estimate was performed using a 6.75% rate of investment return (net of administrative expenses).

Projection of AAL and MVA in Accordance with Section K-3(2)a

($ Millions)

	Actuarial Accrued Liability (AAL) (A)	Market Value of Assets (Net of RRA) (B)	Funded Ratio (C) = (B) / (A)
(1) Value on June 30, 2022	$ 3,262.3	$ 2,415.9	
(2) Contributions - FY 2023	N/A	18.3	
(3) Benefit Payments and Refunds - FY 2023	(296.0)	(296.0)	
(4) Interest - FY 2023	210.4	153.2	
(5) Projected Value on June 30, 2023 (1)+(2)+(3)+(4)	$ 3,176.7	$ 2,291.4	**72.1%**

** Employer contributions are assumed to occur at the end of the year. Expected benefit payments and refunds are assumed to occur mid-year.*

Calculation of Notional Credit to RRA Needed to Satisfy the Restoration Target

($ Millions)

(1) June 30, 2023 Restoration Target	78%
(2) June 30, 2023 Projected AAL	$ 3,176.7
(3) June 30, 2023 Projected Target MVA (1)x(2)	$ 2,477.8
(4) June 30, 2023 Projected MVA	2,291.4
(5) Projected MVA excess over target (4)-(3), not less than 0	$ -
(6) Discount factor to June 30, 2022	0.9368
(7) June 30, 2022 value of excess (5)x(6)	**$ -**

Restoration of Pension Benefits (Concluded)

Calculation of Notional Transfer from RRA to the PRF to Satisfy the Funding Target

		($ Millions)
(1)	June 30, 2023 Funding Target	75%
(2)	June 30, 2023 Projected AAL	$ 3,176.7
(3)	June 30, 2023 Projected Target MVA (1)x(2)	$ 2,382.5
(4)	June 30, 2023 Projected MVA	2,291.4
(5)	Projected MVA deficit over target (3)-(4), not less than 0	$ 91.1
(6)	Discount factor to June 30, 2022	0.9368
(7)	June 30, 2022 value of deficit (5)x(6)	$ 85.3
(8)	June 30, 2022 Restoration Reserve Account	26.2
(9)	Funds to Transfer from RRA to PRF (7), not more than (8)	**$ 26.2**
(10)	Remaining Funds in RRA (8)-(9)	**$ -**

The Restoration Reserve Account (RRA) was reported as having a balance of $26.2 million as of the valuation date (prior to transfers determined in this valuation). Based on our understanding of Section K.(2)e of the Combined Plan and for purposes of this valuation report, the RRA's entire balance of $26.2 million is assumed to be transferred to the Pension Reserve Fund in an effort to restore the June 30, 2023 funded ratio to 75% (the Funding Target). Therefore, the RRA and associated liability in this report has a balance of $0.

A calculation of the amount that could be restored or that could be paid based on prior restorations is outside the scope of this report. Upon request, we are happy to include that information in a separate report.

Comments, Recommendation and Conclusion

Component II History

The City of Detroit filed for bankruptcy on July 18, 2013. A final Plan of Adjustment ("POA") was confirmed on November 7, 2014 and the official exit from bankruptcy was on December 10, 2014. In connection with the POA, very significant changes were made to the benefits that the Police and Fire Retirement System provides and to the contributions that it will receive. In particular, the benefits provided by the Retirement System were divided into two separate plans, referred to as "Component I" and "Component II." The benefits provided in each component were effective July 1, 2014 and are described in detail in the Emergency Manager Order No. 44, dated December 8, 2014.

Experience

Experience was less favorable than assumed during the year ending June 30, 2022. The main source of the loss was investment experience (MVA). There were partially offsetting liability gains related to data improvements and post-retirement mortality (more deaths than assumed). The chart below shows the estimated total experience loss and the portion of the gain/loss due to investments.

Development of Actuarial Gain/Loss on a Market Value of Asset Basis

	Actuarial Accrued Liability (AAL) (A)	Market Value of Assets (B)	Unfunded Actuarial Accrued Liability (C) = (A) - (B)
(1) Beginning of Year (BOY)	$ 3,374,948,092	$ 2,749,073,539	$ 625,874,553
(2) Total Contributions	-	18,300,000	(18,300,000)
(3) Benefit Payments and Refunds	(297,137,096)	(297,137,096)	-
(4) Administrative Expenses	-	(2,482,715)	2,482,715
(5) Interest 6.75% x (1) + 6.75% x [(3) + (4)] / 2	217,780,619	175,450,295	42,330,324
(6) Expected End of Year (1)+(2)+(3)+(4)+(5)	$ 3,295,591,615	$ 2,643,204,023	$ 652,387,592
(7) Actual End of Year Before Changes	3,262,290,407	2,442,114,254	820,176,153
(8) Gain or Loss (6)-(7)	$ 33,301,208	$ 201,089,769	$ (167,788,561)
	Gain	Loss	Loss
(9) Percent of BOY AAL (8)/(1A)	0.99%	5.96%	(4.97%)
Gain or Loss Related to Excess Interest Transfers	$ 538,402	$ -	$ 538,402
Gain or Loss Unrelated to Excess Interest Transfers	$ 32,762,806	$ 201,089,769	$ (168,326,963)

Experience (Concluded)

Breakout of Actuarial Gain/Loss

Type of Risk Area	Gain or (Loss) in Period[1] Totals ($ in millions)	Percent of Beginning of Year Liabilities[2]
Other Data Improvements[3]	18.8	0.6 %
Excess Interest Transfers (Inc. FY 2020)	0.5	0.0 %
Risks Related to Assumptions		
Economic Risk Areas:		
Investment Return (MVA)	(201.1)	(6.0)%
Demographic Risk Areas:		
Full and Reduced Service Retirements	(2.1)	(0.1)%
Death Benefits	0.0	0.0 %
Disability Benefits	(0.3)	0.0 %
Other Terminations	(0.5)	0.0 %
Post-Retirement Mortality (Inc. DROP)	16.9	0.5 %
Total Gain or Loss During Period (MVA)	(167.8)	(5.0)%

[1]*Results are approximate due to limitations in data.*
[2]*Beginning of year accrued liabilities is equal to $3,374.9 million.*
[3]*Net of adjustments to modeling as a result of data changes.*

A summary of Actual (A) to Expected (E) activity is shown in the table below.

	Actives													Retiree Deaths[1]	
	Number Added During Year		Terminations During Year												
Year Ended			Normal Retirement		Disability Retirement		Died-in-Service		Withdrawal						
									Vested	Other	Total				
June 30	A	E	A	E	A	E	A	E	A	A	A	E		A	E
2019	5	0	157	363	18	12	0	1	23	8	31	18		281	247
2020	8	0	121	391	8	10	0	1	45	16	61	13		405	247
2021	33	0	90	380	5	8	0	1	56	17	73	11		274	236
2022	**45**	**0**	**61**	**114**	**3**	**8**	**0**	**1**	**42**	**24**	**66**	**21**		**389**	**282**

[1]*Includes DROP.*

Comments, Recommendation and Conclusion

Year-to-Year Reconciliation of Projected June 30, 2024 Contributions

The estimated FY 2024 contributions are very sensitive to changes in year-to-year experience. The chart below reconciles our estimate from the June 30, 2021 valuation to our estimate from this valuation (June 30, 2022).

Reconciliation of Estimated 2024 Contributions
$ Millions

Est. FY 2024 Employer Contribution from 6/30/2021 Valuation	$	92.3
Gain or Loss from Investments		(6.9)
Gain or Loss from Excess Interest Transfers (Inc. FY 2021)		(0.1)
Other Experience		(3.3)
Benefit Changes		-
Assumption Changes		-
FY 2024 Actuarially Determined Employer Contribution	$	82.0

Actuarial Assumptions

We understand that the Board may continue to explore changes in the assumed rate of return. However, per legal counsel, we also understand that for the annual actuarial valuation the 6.75% assumed rate of return cannot be changed until the June 30, 2024 valuation, including for purposes of calculating the actuarially determined contribution. We anticipate the next comprehensive review of experience to cover the period from July 1, 2020 to June 30, 2025.

For this valuation, the Funding Value of Assets used to determine the Actuarially Determined Employer Contribution was reset to the Market Value of Assets as of June 30, 2022.

Annuity Savings Fund (ASF) Interest Credits

The ASF fund is credited with the lesser of 5.25% interest and the total fund earnings. We understand that any earnings in excess of 5.25% (that otherwise would have been credited to the ASF fund if not for the 5.25% cap) will be transferred to Component I assets, to the extent needed, for funding of transition liability. For purposes of calculating future refunds of member contributions, the ASF was assumed to earn 5.25% interest in all future years. Based on the fund earnings in FY 2021 and FY 2022, we do not expect that there will be a transfer of excess ASF interest in FY 2024 but do expect a transfer in FY 2023. The anticipated excess ASF transfers in FY 2023 results in an additional liability of $9.9 million in this report. To date, the following transfers have been made:

- $4,030,561 in fiscal year 2019
- $1,618,996 in fiscal year 2020

We understand that the System has adopted a procedure for computing the ASF interest credits lagging the actual experience of the assets. We have not reviewed or audited this procedure. If the Retirement System can provide the methodology for determining the transfer, we may be able to reflect it in advance.

Estimated Excess Interest Transfers

Fiscal Year Transfer is Expected (A)	ASF Balance BOY (B)	Assumed ASF Payment (C)	ASF Balance EOY (D)	FY 2 Years Prior to Transfer: Year (E)	FY 2 Years Prior to Transfer: Estimated Return (F)	Investment Return Excess Percent (G) = (F) - 5.25%	ASF Return Excess (H) = (G) x (B)	Estimated Component I Funded Transition Cost Status (I)	Resulting Percent Transfer (J)	Assets to be Transferred Out (BOY) (K) = (H) x (J)
2023	$ 90,444,830	$ 11,556,176	$ 83,337,538	2021	27.11%	21.86%	$ 19,771,240	>100%	50%	$ 9,885,620
2024	83,337,538	11,556,176	75,857,113	2022	-0.99%	0.00%	-	>100%	50%	-

We understand this calculation will be performed by staff and may be different than shown above. The estimates above are used to approximate the effect on UAAL.

Section G-2(f) of the Combined PFRS Plan is shown below:

In any Plan Year during the period beginning on or after July 1, 2014 and ending June 30, 2023 in which the annual rate of return credited to the accounts of Members investing in the Annuity Savings Fund as provided in paragraph (a) is less than the actual rate of return net of expenses of the Retirement System's invested assets for the second Plan Year immediately preceding the Plan Year in which the annual rate of return is credited ("ASF Return Excess"), an amount equal to the value of the ASF Return Excess shall be transferred to the Pension Accumulation Fund maintained under Component I of the Combined Plan and shall be used to fund the Transition Cost relating to Component I. The Transition Cost is a measure of the liability that Component I of the Retirement System has at its inception; due to the fact that at its inception, Members in Component I of the Retirement System receive vesting and eligibility credit under Component I for service that was earned prior to July 1, 2014 and is otherwise credited to Members under Component II of the Retirement System, as such Transition Cost is calculated by the Plan Actuary. In the event there is an ASF Return Excess for a Plan Year following the Plan Year in which such transfers have fully funded the Transition Costs relating to Component I, fifty percent (50%) of such ASF Return Excess shall be transferred to the Pension Accumulation Fund maintained under Component II and the remaining fifty percent (50%) of such ASF Return Excess shall be transferred to Component I and credited to the Rate Stabilization Fund maintained under Component I. "Transition Cost" shall be determined by the Plan Actuary.

Comments, Recommendation and Conclusion

Annuity Reserve Fund (ARF)

The ARF, as reported, was $27 million higher than the related accrued liabilities for Retirees and Beneficiaries. If the Board chooses to transfer some or all of the $27 million from the ARF to the Pension Accumulation Fund (PAF) within Component II, the transfer would reduce the UAAL. Also, the Annuity Reserve Fund does not appear to have been credited with any interest during the year.

Option Factors

The Board adopted option factors for the Plan in 2017 but they have not been implemented. We have not been provided with a specific effective date for the new factors. However, we understand the intent is to implement the new factors with the new data system. For the sake of simplicity, we have assumed the new factors apply to all retirements after the valuation date. We will continue to work with the System in the calculation of optional forms of payment. In particular, the Board may want to consider updating the assumptions used in optional forms of payment in order to recognize recent changes to the assumptions used in the annual actuarial valuations.

Comments, Recommendation and Conclusion

New Data System

We understand that the Retirement System is in the process of moving to a new data system and that future valuation data will be provided from that system beginning with the 2023 valuation. We also understand that data may have gone through additional cleaning/auditing as it has been entered into the new system. We anticipate that data will be more precise for valuation purposes once the new system is providing that data. Please note that changes in data may impact future valuation results and generate gains or losses.

Fiscal Year 2022 Disability Payments

We understand approximately $1.7 million of Component II (Legacy) benefits were inadvertently paid out of the Component I (Hybrid) fund during the 2022 Fiscal Year. Our understanding is that a transfer of $1.7 million from Component II (Legacy) to Component I (Hybrid) will occur to address the issue. Accordingly, we have included an additional liability of $1.7 million in this report to recognize the transfer.

Funded Status of the Plan

The Retirement System was severely defunded because the POA mandated contributions were significantly less than what the actuarially computed contribution would have been for the 10-year period after the POA was established. We would be happy to assist the Board in determining what the funded status would be if actuarially determined contributions had been made in the 10-year period after the POA was established.

Future Results

In order to minimize the risk of insolvency, it is important that employer contributions in an amount greater than or equal to the actuarially determined amount are received, in accordance with the funding policy.

Conclusion

It is likely that the funded status will decline and the unfunded actuarial accrued liability will increase between now and June 30, 2023. On a market value basis, the funded status is projected to decline to approximately 73% as of June 30, 2023 if the market rate of return equals 6.75% and all other assumptions are met.

Recommendation

We recommend that every potential action be taken to generate contributions to the Retirement System above those provided in the POA in FY 2023. Benefit payments to retirees in the Plan were approximately $300 million compared to FY 2022 contributions of $18 million.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other Demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Plan Risk Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk.

In our discussions with the Board and Investment Committee, we illustrated various investment return scenarios as part of the funding policy analysis. This type of analysis may also be considered a quantitative risk assessment. We recommend that the Board consider similar periodic analysis as appropriate under the Risk Controls of the newly approved funding policy.

The Board approved funding policy calls for illustrating the table of risk measures shown below. Please see the funding policy in the appendix for additional information. In the table below, the acronyms are as follows: FVA = Funding Value of Assets; MVA = Market Value of Assets; AAL = Actuarial Accrued liability; UAAL = Unfunded Actuarial Accrued Liability).

	2022	2021	2020	2019
(i) Classic measures				
– Funded ratio				
MVA	74.9%	81.5%	64.9%	69.5%
FVA	74.9%	N/A	N/A	N/A
– UAAL amortization period	20	20	20	
– Portfolio rate of return				
MVA	-0.99%	27.11%	1.20%	3.54%
FVA	N/A	N/A	N/A	N/A
– Geometric average portfolio rate of return				
5-year				
MVA	7.16%	10.02%	2.36%	3.54%
FVA	N/A	N/A	N/A	N/A
10-year				
MVA	7.16%	10.02%	2.36%	3.54%
FVA	N/A	N/A	N/A	N/A
– Standard deviation of return				
5-year				
MVA	11.31%	11.70%	1.17%	0.00%
FVA	N/A	N/A	N/A	N/A
10-year				
MVA	11.31%	11.70%	1.17%	0.00%
FVA	N/A	N/A	N/A	N/A
(ii) Duration of the Actuarial Accrued Liability	8.7	8.8	9.4	9.5
(iii) Total UAAL / Covered Payroll[1]				
MVA	4.9	3.9	8.5	7.8
FVA	4.9	N/A	N/A	N/A
(iv) Total Assets / Covered Payroll[1]				
MVA	14.5	17.3	15.8	17.8
FVA	14.5	N/A	N/A	N/A
(v) Total AAL / Covered Payroll[1]	19.4	21.3	24.3	25.6
(vi) Non-Investment Cash flow / Beginning of year MVA	-10.2%	-11.7%	-10.6%	-10.2%
(vii) MVA / Benefit Payments	8.2	9.1	8.0	8.6
(viii) Solvency Liability ($ millions)[2]	$ 4,401.1	$ 5,679.0	$ 6,061.3	$ 5,748.1
Covered Payroll[1]	168,385,617	158,718,175	153,055,458	150,041,943

[1]*Payroll for this purpose is Component I payroll.*

[2]*See discussion on next page.*

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Solvency Liability

Funded Ratio - POA

		Defined Benefit	Annuity Funds	Total
A	Actuarial Accrued Liability	$ 3,141,486,352	$ 120,804,055	$ 3,262,290,407
B	Market Value of Assets	$ 2,321,310,199	$ 120,804,055	$ 2,442,114,254
C	Unfunded Actuarial Accrued Liability (A - B)	$ 820,176,153	$ -	$ 820,176,153
D	Funded Ratio (B/A)	73.9%	100.0%	74.9%
E	Prior Years Funded Ratio	80.7%	100.0%	81.5%

The POA Funded Ratio is an expected return-based measurement of the pension obligations. It is based upon the POA mandated 6.75% interest rate assumption (assumption prescribed by another party). It determines an amount that will be sufficient to provide benefits if the portfolio earns the expected 6.75% return on assets and all other assumptions are met. This measure is appropriate for assessing the need for or amount of future contributions if all assumptions are met. This measure is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation, in other words; of transferring the obligation to a third party in a market value type transaction.

Funded Ratio - Solvency

		Defined Benefit	Annuity Funds	Total
A	Actuarial Accrued Liability	$ 4,280,277,619	$ 120,804,055	$ 4,401,081,674
B	Market Value of Assets	$ 2,321,310,199	$ 120,804,055	$ 2,442,114,254
C	Unfunded Actuarial Accrued Liability (A - B)	$ 1,958,967,420	$ -	$ 1,958,967,420
D	Funded Ratio (B/A)	54.2%	100.0%	55.5%

The Solvency Liability is a market-based measurement of the pension obligations. It represents the amount the plan would need to invest in low risk securities to provide the benefits with greater certainty. For this purpose, the solvency liability is computed at 3.69% as of June 30, 2022, based on the long-term municipal bond rate ("20-Year Municipal GO AA Index" rate from the Fidelity Index as of June 30, 2022). No adjustment has been made for the credit quality of the plan sponsor. This measure may not be appropriate for assessing the need for or amount of future contributions. This measure may not be appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation.

The difference between the two measures (POA and Solvency) is one illustration of the savings the sponsor anticipates by taking on the risk in a diversified portfolio.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Funded Ratio

The funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

Rate of Return, Geometric Average, and Standard Deviation

Investment return is probably the largest single risk that most systems face. The year-by-year return and the geometric average give an indicator of the realism of the System's assumed return.

Duration of the Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, a duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Ratio of Unfunded Actuarial Accrued Liability to Payroll

The ratio of unfunded liability to payroll gives an indication of the plan's sensitivity to differences between assumed and actual experience related to the employer contributions. A value above approximately 300% or 400% may indicate high volatility relative to small gains and losses.

Ratio Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Ratio of Non-Investment Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, and stress tests. We can provide additional risk assessments at the Board's request.

Valuation Results – Comparative Statement ($ in Millions)

	Active Payroll		Actuarial Accrued Liabilities				Employer
			Computed	Valuation		Unfunded /	Contributions
June 30	Total	Average	Total	Assets[4]	Unfunded	Active Pays	% of Pays
2001	$253.3	$45,353	$3,463.2	$3,900.0	$(436.8)	-	27.22%
2002[1]	248.7	46,203	3,632.0	3,635.1	(3.1)	-	23.39%
2003	248.7	47,305	3,721.6	3,205.5	516.1	2.1	43.89%
2004	258.7	51,126	3,857.5	3,074.5	783.0	3.0	54.36%
2005[3]	250.5	52,197	3,780.4	3,757.9	22.5	0.1	25.98%
2006[3]	228.1	52,908	3,809.0	3,980.3	(171.3)	-	25.09%
2007[2, 3]	230.2	54,647	3,896.8	4,307.2	(410.4)	-	26.71%
2008[1]	232.8	57,090	4,071.1	4,316.3	(245.2)	-	26.27%
2009	231.8	57,418	4,221.3	3,945.2	276.1	1.2	35.22%
2010[1, 2]	228.8	57,322	3,767.4	3,853.3	(85.9)	-	23.02%
2011	220.5	57,773	3,808.6	3,804.8	3.8	0.0	23.14%
2012[1]	205.8	57,374	3,822.7	3,675.5	147.2	0.7	30.59%
2013[2]	186.7	57,163	3,890.1	3,545.5	344.6	1.8	44.93%
2014[1, 2]			4,007.3	3,276.2	731.1		
2015			4,053.4	3,194.8	858.6		
2016			4,001.7	2,950.5	1,051.3		
2017			3,967.9	2,922.1	1,045.8		
2018[2]			3,907.4	2,866.3	1,041.1		
2019[2]			3,843.3	2,670.8	1,172.4		
2020			3,725.3	2,417.2	1,308.1		
2021[1, 2]			3,374.9	2,749.1	625.9		
2022			3,262.3	2,442.1	820.2		

[1]After changes in actuarial assumptions and/or methods.
[2]After Plan Amendments.
[3]2005 and 2006 assets were revised following the June 30, 2006 valuation. 2007 assets were revised after the June 30, 2007 valuation.
[4]Funding Value of Assets prior to 2014. Market Value of Assets starting in 2014.

Schedule of Funding Progress

Actuarial Valuation Date	Valuation Assets[6] (a)	Actuarial Accrued Liability (AAL) -- Entry Age (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b - a) / c)
2001	$3,900,020,703	$3,463,248,393	$(436,772,310)	112.6%	$253,297,027	-
2002[1]	3,635,106,581	3,631,971,448	(3,135,133)	100.1%	248,663,133	-
2003	3,205,516,657	3,721,593,210	516,076,553	86.1%	248,681,461	207.5 %
2004	3,074,516,589	3,857,493,282	782,976,693	79.7%	258,699,581	302.7 %
2005[3, 5]	3,757,884,417	3,780,447,414	22,562,997	99.4%	250,491,872	9.0 %
2006[3]	3,980,254,576	3,808,952,741	(171,301,835)	104.5%	228,140,160	-
2007[2, 3]	4,307,194,763	3,896,814,229	(410,380,534)	110.5%	230,173,964	-
2008[1]	4,316,263,291	4,071,053,752	(245,209,539)	106.0%	232,812,606	-
2009	3,945,205,453	4,221,291,045	276,085,592	93.5%	231,795,528	119.1 %
2010[1, 2]	3,853,279,381	3,767,364,201	(85,915,180)	102.3%	228,829,999	-
2011	3,804,759,868	3,808,642,533	3,882,665	99.9%	220,461,691	1.8 %
2012[1]	3,675,459,604	3,822,676,002	147,216,398	96.1%	205,800,278	71.5 %
2013[2, 4]	3,474,538,021	3,890,143,341	415,605,320	89.3%	186,694,166	222.6 %
2014[1, 2]	3,276,203,299	4,007,323,791	731,120,492	81.8%		
2015	3,194,754,441	4,053,351,943	858,597,502	78.8%		
2016	2,950,470,450	4,001,721,957	1,051,251,507	73.7%		
2017	2,922,141,978	3,967,895,457	1,045,753,479	73.6%		
2018[2]	2,866,303,805	3,907,378,106	1,041,074,301	73.4%		
2019[2]	2,670,843,356	3,843,266,214	1,172,422,858	69.5%		
2020	2,417,248,140	3,725,317,772	1,308,069,632	64.9%		
2021[1, 2]	2,749,073,539	3,374,948,092	625,874,553	81.5%		
2022	2,442,114,254	3,262,290,407	820,176,153	74.9%		

[1] *After changes in actuarial assumptions and/or methods.*

[2] *After Plan Amendments.*

[3] *2005 and 2006 assets were revised following the June 30, 2006 valuation. 2007 assets were revised after the June 30, 2007 valuation.*

[4] *Assumes past due contributions of $71 million are made.*

[5] *After POC transfer.*

[6] *Funding Value of Assets prior to 2014. Market Value of Assets starting in 2014.*

Data Furnished for Valuation and Derivation of Funding Value of Assets

Summary of Benefit Provisions
(June 30, 2022)

Component II Frozen Benefits

All Component II benefits are frozen as of June 30, 2014 based on service and average final compensation accrued as of that date and the provisions of the Detroit Police and Fire Retirement System as it existed on June 30, 2014 and all future Cost-of-Living Adjustments ("COLA's") were reduced from 2.25% to 1.0125% per year. The benefits evaluated in this report are the frozen reduced benefits. Component II benefits are payable after separation from service, upon meeting the eligibility conditions of the plan as it existed on June 30, 2014, regardless of whether the individual is eligible to receive a Component I benefit at that time.

Our understanding of the June 30, 2014 plan provisions is provided below for completeness. The material below is a non-legal summary and is not intended to cover all potential situations that could occur. If there are discrepancies between the description below, and appropriate legal documents, the latter necessarily govern.

Age and Service Retirement

Eligibility - 25 years of service regardless of age. 20 years of service regardless of age for eligible DPOA and DFFA members. DFFA members must retire by age 60.

Annual Amount - An annuity equal to the actuarial equivalent of the member's accumulated contribution account plus a defined benefit, which, when added to the annuity will provide the following:

Pre-1969 Members - For all service earned up to April 5, 2011 for DPLSA and Fire equivalent members, and up to September 1, 2011 for DPOA and Fire equivalent members, 2.5% of AFC times the first 25 years of service, with a maximum allowance of 15/22 of a police officer's or firefighter's annual rate of compensation (actuarially reduced to reflect early payment).

For all service earned after April 5, 2011 for DPLSA and Fire equivalent members, and after September 1, 2011 for DPOA and Fire equivalent members, 2.1% of AFC times the first 25 years of service, with a maximum allowance of 15/22 of a police officer's or firefighter's annual rate of compensation.

1969 Plan Members - For all service earned up to April 5, 2011 for DPLSA and Fire equivalent members, and up to September 1, 2011 for DPOA and Fire equivalent members, 2.5% of AFC times the first 25 years of service plus 2.1% of AFC times each of the next 10 years of service.

For all service earned after April 5, 2011 for DPLSA and Fire equivalent members, and after September 1, 2011 for DPOA and Fire equivalent members, 2.1% of AFC times each year of service, up to 35 years of service.

Members may elect to receive their accumulated contribution account in a lump sum after 25 years of service (20 years of service for eligible DPOA and DFFA members). The defined benefit at retirement is then reduced by the actuarial equivalent of the amount of principal withdrawn. No reduction is made with regard to the interest portion of the withdrawal. Pre-1969 plan members may elect 1969 plan benefits at the time of retirement.

Type of Average Final Compensation (AFC) - Average of the current compensation for the ranks held in each of last 5 years (last 3 years for DPCOA, Executive Members and their Fire equivalents). Pension benefits for non-union employees may not be diminished due to a reduction in compensation because of fiscal emergency. AFC includes prior longevity distributions during the averaging period in accordance with the following schedule: 1% of compensation after 5 years of service, 2% after 11 years, 3% after 16 years and 4% after 21 years. A member may elect that upon retirement or upon death before retirement either (i) a lump sum payment equal to 85% (100% for DPOA and DPCOA members) of the amount of his or her unused accumulated sick leave bank, or (ii) to have the 3-year average of 25% of the value of the accumulated unused sick leave bank added to his or her AFC. Any member electing the AFC adjustment option will also be paid a lump sum equal to the remaining value of the sick leave bank as provided in (i) above. Lump sum payments are not paid by the Retirement System.

Deferred Retirement (Vested Benefit)

Eligibility - 10 years of service for DPOA and Fire equivalents, age 40 with 8 years of service for all others.

Annual Amount - Same as regular retirement but based on average final compensation and credited service at the time of termination.

Benefit Commencement - DPOA and Fire equivalent members hired after 6/30/1985: Unreduced benefit begins at age 62. ***All other members***: Unreduced benefit begins at the age when the member would have first been eligible for regular retirement had the member continued in City service. **All** members may elect a reduced benefit payable immediately.

Note, for valuation purposes, the frozen accrued benefit was valued in the event of a death or disability. The following death and disability provisions are provided for historical purposes only.

Duty Disability Retirement

Eligibility - No age or service requirement.

Annual Amount - A basic benefit of 50% of final compensation as of June 30, 2014 and a supplemental benefit of 16-2/3% of final compensation as of June 30, 2014 is payable for 24 months. After 24 months, members disabled from any occupation continue to receive both benefits; otherwise, only the 50% benefit is then payable. Upon attaining 25 years of service, the disability benefit is 50% of final compensation as of June 30, 2014. Members convert to regular retirement benefit at age 65. Worker's compensation payments are offset. Members who have already filed under the old duty disability plan will receive 66-2/3% of final compensation as of June 30, 2014 payable to eligibility date for regular retirement. Benefits prior to age 65 are assumed to be paid from Component I. Benefits after age 65 are assumed to be paid from Component II (this plan).

Non-Duty Disability Retirement

Eligibility - 5 years of service.

Annual Amount - Computed as a regular retirement benefit, but based on average final compensation and credited service at the time of disability. Minimum benefit is 20% of average final compensation. Benefits are assumed to be paid from Component II (this plan).

Duty Death Before Retirement

Eligibility - No age or service requirement.

Summary of Benefit Provisions
(June 30, 2022) (Concluded)

Annual Amount - Surviving spouse receives 5/11 of police officer's or firefighter's compensation and each child under age 18 receives 1/10 of such compensation with a maximum total of 7/33 of such compensation as of June 30, 2014. If there is no surviving spouse, each child receives 1/4 of such compensation with a maximum total of 1/2 of such compensation. If there is no surviving spouse or children, each dependent parent receives 1/6 of such compensation. Worker's compensation payments are offset. Benefits are assumed to be paid from Component I.

Non-Duty Death Before Retirement

Eligibility - No age or service requirement.

Annual Amount - Same as a regular retirement benefit to a surviving spouse, but reduced in accordance with a 100% joint and survivor option election. Minimum benefit is 20% of average final compensation as of June 30, 2014. Each child under 18 receives 1/7 of Police Officer's or Firefighter's compensation with a maximum total of 2/7 of such compensation. If there is no spouse or children, each dependent parent receives 1/7 of such compensation. Benefits are assumed to be paid from Component II (this plan).

Post-Retirement Cost-of-Living Adjustments

Pre-1969 Members - Allowances increase in proportion to active member compensation for the corresponding rank. These increases are not considered COLAs and are therefore not reduced under the POA.

1969 Plan Members - Police retired after July 1, 2001, certain Police classes retired after July 1, 1998 and all Fire members: For all service earned up to April 5, 2011 for DPLSA members (September 1, 2011 for DPOA members) pensions increase by 2.25% of the **current** pension amount each July 1. No cost-of-living adjustments for service earned after April 5, 2011 for DPLSA members (September 1, 2011 for DPOA members). COLA is reduced by 45% according to the POA.

Member Contributions

5% of covered compensation payable until first eligible for regular retirement. Interest on member contributions provides benefits in addition to the formula benefit.

DROP Plan

Members with 25 years (20 years for DPOA members) of service may elect to participate in the DROP. When a DROP election is made, the member ceases to accrue any further age and service retirement benefits. Seventy-five percent (75%) of the member's benefit (accrued to their DROP date) is contributed to a DROP account (a defined contribution account). At retirement the member is entitled to the balance in the DROP account and a monthly benefit equal to 100% of their benefit accrued to their DROP date, increased by any post-retirement increases that the member would have received, had the member been retired. Fire members must retire from the DROP plan at age 60. Participation in the DROP is limited to 10 years for DPLSA members electing to DROP after April 5, 2011 and prior to July 1, 2014. Members electing DROP after July 1, 2014 are limited to 5 years of DROP participation. Effective October 31, 2018, DPLSA and DPCOA members are limited to 10 years of DROP participation. Effective May 9, 2019, DPOA members are limited to 10 years of DROP participation. Effective September 21, 2021, DPLSA members are limited to 15 years of DROP participation.

Asset Information Furnished for the Valuation

Reported Assets
(Market Value)

Asset Class	Market Value June 30, 2022	Market Value June 30, 2021
Cash and Cash Equivalents	$ 37,340,899	$ 163,457,704
Investments at fair value	2,400,003,079	2,585,555,603
Receivables	57,361,527	82,679,210
Cash and Investments held as collateral for securities lending	109,712,412	141,480,225
Capital Asset - Net	3,802,915	2,647,696
Accounts Payable	(166,106,578)	(226,746,898)
Total Current Assets	**$ 2,442,114,254**	**$ 2,749,073,539**

Reserve Accounts

Funds	Fund Balances June 30, 2022	Fund Balances June 30, 2021
Annuity Savings	$ 90,444,830	$ 103,504,265
Annuity Reserve	30,359,225	30,551,920
Total Annuity Funds	$ 120,804,055	$ 134,056,185
Pension Accumulation	$ 91,382,086	$ 130,787,553
Pension Reserve	2,215,819,661	2,492,774,295
Survivor Benefit	(12,137,143)	(8,544,494)
Restoration Reserve Account	26,245,595	-
Total Pension Funds	$ 2,321,310,199	$ 2,615,017,354
Total Fund Balances	$ 2,442,114,254	$ 2,749,073,539

Asset Information Used for the Valuation

Revenues and Expenditures

	Annuity Savings Fund	Annuity Reserve Fund	Pension Survivor Benefit	Pension Accumulation Fund	Pension Reserve Fund	Restoration Reserve Account	Total
Market Value June 30, 2021	$ 103,504,265	$ 30,551,920	$ (8,544,494)	$ 130,787,553	$2,492,774,295	$ -	$2,749,073,539
Adjustment to Match June 30, 2021 Valuation	-	-	-	-	-	-	-
Balance after Reserve Adjustment	$ 103,504,265	$ 30,551,920	$ (8,544,494)	$ 130,787,553	$2,492,774,295	$ -	$2,749,073,539
Additions:							
Employer Contributions	$ -	$ -	$ -	$ 18,300,000	$ -	$ -	$ 18,300,000
Member Contributions	-	-	-	-	-	-	-
Other Income	-	-	-	786,317	-	-	786,317
Annuity Interest	1,453,797	-	-	-	-	-	1,453,797
Annuity Loan Interest	247,874	-	-	-	-	-	247,874
Investment Income - Net	-	-	-	(27,846,187)	-	(281,275)	(28,127,462)
Total	$ 1,701,671	$ -	$ -	$ (8,759,870)	$ -	$ (281,275)	$ (7,339,474)
Deductions:							
Pension and Annuity Benefits	$ -	$ 324,851	$ 3,592,649	$ -	$ 276,954,634	$ -	$ 280,872,134
Refunds and Withdrawals	16,264,962	-	-	-	-	-	16,264,962
General and Administrative Expenses	-	-	-	2,482,715	-	-	2,482,715
Other	-	-	-	-	-	-	-
Total	$ 16,264,962	$ 324,851	$ 3,592,649	$ 2,482,715	$ 276,954,634	$ -	$ 299,619,811
Transfer from Component II to Component I	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Transfer Out	$ (132,156)	$ -	$ -	$ (28,162,882)	$ -	$ -	$ (28,295,038)
Other Transfer In	$ 1,636,012	$ 132,156	$ -	$ -	$ -	$ 26,526,870	$ 28,295,038
Market Value June 30, 2022	$ 90,444,830	$ 30,359,225	$ (12,137,143)	$ 91,382,086	$2,215,819,661	$ 26,245,595	$2,442,114,254
Market Value Rate of Return	1.77%	0.00%	0.00%	(23.44)%	0.00%	(2.12)%	(0.99)%

Rates of return are dollar weighted estimates assuming mid-year cash flows with the exception of the EOY employer contributions. “Other Income” was treated as investment income.

Funding Value of Assets

The Funding Value of Assets has been reset to the Market Value of Assets as of June 30, 2022. Accordingly, we will show the development of the Funding Value of Assets starting with next year's (June 30, 2023) valuation. The Funding Value of Assets recognizes assumed investment income fully each year. Differences between actual and assumed investment income are phased-in over a closed 3-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. The Funding Value of Assets is unbiased with respect to Market Value. At any time, it may be either greater or less than Market Value.

Retirees and Beneficiaries as of June 30, 2022
Tabulated by Attained Age[1]

Attained Age	Age & Service No.	Age & Service Annual Allowances	Disability[3] No.	Disability[3] Annual Allowances	Death-in-Service No.	Death-in-Service Annual Allowances	Totals No.	Totals Annual Allowances
Under 20[2]	4	$ 156,192		$ 0	32	$ 225,516	36	$ 381,708
20-24	6	189,252					6	189,252
25-29	5	140,088		0	1	25,572	6	165,660
30-34	3	59,628	0	0			3	59,628
35-39	9	174,708	0	0	0	0	9	174,708
40-44	36	590,868	37	1,454,904	11	236,832	84	2,282,604
45-49	157	3,004,128	57	2,111,592	14	335,700	228	5,451,420
50-54	331	7,817,088	84	2,845,824	17	384,456	432	11,047,368
55-59	498	16,265,388	103	3,536,604	14	334,932	615	20,136,924
60-64	586	20,270,796	116	4,015,284	15	356,100	717	24,642,180
65-69	863	32,336,580	183	6,449,100	36	901,236	1,082	39,686,916
70-74	1,336	54,469,274	352	11,039,904	44	993,252	1,732	66,502,430
75-79	1,085	41,540,676	285	9,107,412	30	672,648	1,400	51,320,736
80-84	608	21,643,584	95	3,106,716	19	453,396	722	25,203,696
85-89	285	8,690,724	27	991,740	8	229,044	320	9,911,508
90-94	209	5,815,548	12	410,568	8	202,752	229	6,428,868
95 & Over	85	2,225,232	10	346,968	3	84,384	98	2,656,584
Totals	**6,106**	**$215,389,754**	**1,361**	**$45,416,616**	**252**	**$5,435,820**	**7,719**	**$266,242,190**

[1]Includes both pre-1969 and 1969 retirees. Allowances being paid to DROP members are not reflected. Allowances shown are amounts as reported in the data.

[2]May include records with incorrect birth dates reported.

[3]Excludes Post-2014 Pre-Conversion Duty Disability members.

Inactive Vested Members June 30, 2022

Attained Age	No.	Estimated Annual Allowances
Under 40	21	$ 177,936
40-44	83	1,398,214
45-49	112	1,983,919
50-54	96	1,756,496
55-59	46	895,424
60-64	18	438,788
65 & over	13	280,023
Totals	**389**	**$6,930,800**

Pre-1969 Retirees and Beneficiaries as of June 30, 2022
Tabulated by Attained Age

Attained Age	Age & Service[1] No.	Age & Service[1] Annual Allowances	Disability[1] No.	Disability[1] Annual Allowances	Death-in-Service No.	Death-in-Service Annual Allowances	Totals No.	Totals Annual Allowances
50-54	1	$ 15,336					1	$ 15,336
55-59	0	0					0	0
60-64	5	75,696					5	75,696
65-69	7	139,668			2	$ 56,040	9	195,708
70-74	35	906,480	1	$ 30,276	8	231,540	44	1,168,296
75-79	241	6,756,626	86	2,826,600	9	256,128	336	9,839,354
80-84	322	9,646,404	70	2,278,056	15	372,528	407	12,296,988
85-89	188	5,203,008	18	604,524	6	176,808	212	5,984,340
90-94	140	3,558,984	10	337,776	8	202,752	158	4,099,512
95 & Over	69	1,761,936	9	301,500	3	84,384	81	2,147,820
Totals	**1,008**	**$28,064,138**	**194**	**$6,378,732**	**51**	**$1,380,180**	**1,253**	**$35,823,050**

[1]*Includes survivor beneficiaries of service and disability retirees.*

DROP Participants June 30, 2022

Attained Age	No.	Estimated Annual Allowances[1]
Under 25	1	$ 14,040
25-29	0	0
30-34	0	0
35-39	0	0
40-44	31	408,756
45-49	110	1,693,656
50-54	191	3,937,056
55-59	191	5,108,474
60-64	74	2,335,500
65-69	34	1,529,820
70-74	10	460,812
75+	3	134,076
Totals	**645**	**$15,622,190**

[1]*Reflects the 75% of reported monthly benefits being paid into DROP accounts.*

Active Members as of June 30, 2022
by Attained Age and Years of Service (Excludes DROP)

Note the following active member schedules show eligibility service (total service) as of the valuation date.

Police Members

	Years of Service to Valuation Date							Totals
Attained Age	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.
20-24								
25-29		7						7
30-34	1	27	11					39
35-39	1	21	54	13	1			90
40-44		11	42	42	66			161
45-49		4	22	23	109	35		193
50-54		3	12	14	107	39		175
55-59		1	7	6	36	13	1	64
60			1		3	1	1	6
61		1	1		1	2	2	7
62				1	1	1		3
63					2			2
64			1			1		2
65					1			1
66								
67								
68								
69							1	1
Totals	**2**	**75**	**151**	**99**	**327**	**92**	**5**	**751**

Fire Members

	Years of Service to Valuation Date							Totals
Attained Age	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.
20-24								
25-29		6						6
30-34		23	3					26
35-39		13	3	2	1			19
40-44		6	7	19	38	1		71
45-49		1	4	21	64	12		102
50-54		1	2	11	73	30	12	129
55-59			1	1	23	7	9	41
60					4			4
Totals	**0**	**50**	**20**	**54**	**203**	**50**	**21**	**398**

Total Active Members as of June 30, 2022
by Attained Age and Years of Service (Excludes DROP)

Note the following active member schedules show eligibility service (total service) as of the valuation date.

Total Members

	Years of Service to Valuation Date							Totals
Attained Age	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.
20-24								
25-29		13						13
30-34	1	50	14					65
35-39	1	34	57	15	2			109
40-44		17	49	61	104	1		232
45-49		5	26	44	173	47		295
50-54		4	14	25	180	69	12	304
55-59		1	8	7	59	20	10	105
60			1		7	1	1	10
61		1	1		1	2	2	7
62				1	1	1		3
63					2			2
64			1			1		2
65					1			1
66								
67								
68								
69							1	1
Totals	**2**	**125**	**171**	**153**	**530**	**142**	**26**	**1,149**

Group Averages

	Police	Fire	Total
Age:	46.1 years	47.1 years	46.5 years
Benefit Service:	11.2 years	12.6 years	11.7 years
Eligibility Service:	19.0 years	20.6 years	19.6 years

Summary of Membership Data by Category
(Excluding Disability Retirees)

	June 30, 2022	June 30, 2021
Active Members (Excluding DROP)		
Number	1,149	1,234
Average age (years)	46.5	45.6
Average service (years)	19.6	18.7
Members in DROP		
Number	645	728
Average age (years)	54.9	54.4
Total annual benefits[1]	$ 15,622,190	$ 18,294,646
Average annual benefit[1]	$ 24,220	$ 25,130
Inactive Vested Members		
Number	389	385
Average age (years)	49.7	49.2
Total annual deferred benefits	$ 6,930,800	$ 7,484,583
Average annual deferred benefit	$ 17,817	$ 19,440
Service Retirees		
Number	4,907	4,931
Average age (years)	69.5	69.4
Total annual benefits	$ 182,340,038	$ 183,048,029
Average annual benefit	$ 37,159	$ 37,122
Beneficiaries (Including Death in Service)		
Number	1,451	1,458
Average age (years)	73.6	74.2
Total annual benefits	$ 38,485,536	$ 37,789,303
Average annual benefit	$ 26,523	$ 25,919

[1]Reflects the 75% of reported monthly benefits being paid into DROP accounts.

Summary of Membership Data by Category
(Disability Retirees)

	June 30, 2022
Pre-2014 Pre-Conversion Duty Disability	
Number	281
Average age (years)	53.1
Total annual benefits (pre-conversion)	$ 10,071,115
Average annual benefit (pre-conversion)	$ 35,840
Post-2014 Pre-Conversion Duty Disability	
Number	85
Average age (years)	49.9
Total annual benefits (post-conversion)	$ 1,816,488
Average annual benefit (post-conversion)	$ 21,370
Other Disability Retirees	
Number	1,080
Average age (years)	73.2
Total annual benefits	$ 35,345,501
Average annual benefit	$ 32,727

Post-2014 Pre-Conversion Duty Disability are members that were reported as duty disabled after June 30, 2014 and have not yet converted. In the data, they are reported as Component I (Hybrid) members. We have valued the pre-conversion benefit out of the Component I (Hybrid) plan and estimated the post-conversion benefit payable out of Component I (Hybrid) and Component II (Legacy). An additional summary of these members is shown below:

	Police	Fire	6/30/2022 Totals
Number	64	27	91
Est number with post-conv. Legacy benefit	59	26	85
Annual benefits as reported	$ 2,438,735	$ 998,236	$ 3,436,971
Average benefits as reported	$ 38,105	$ 36,972	$ 37,769
Estimated post-conversion Legacy benefits	$ 1,246,910	$ 569,578	$ 1,816,488
Estimated post-conversion Hybrid benefits	$ 1,523,714	$ 549,493	$ 2,073,207

Post-conversion benefits were calculated by using:

- Estimated benefit service that will be attributable to each plan upon conversion. The service on the file is service accrued from date of hire to the date of disability. The date of disability and reported service is used to:
  - Calculate Hybrid benefit service which is the amount of service accruing after 2014
  - Calculate Legacy benefit service which is frozen as of 2014
- Estimated AFC which is determined through the current benefit
  - 50% of AFC is payable if the member has more than 25 years of service
  - 66 2/3% of AFC is payable if the member has less than 25 years of service

Reconciliation of Reported Data
as of June 30, 2022

Active Data

A) Count reported in PF_Benefits table:	1,202
B) In PF_Benefits file but not in Hybrid file:	(3)
C) Hired after plan closed:	(3)
D) Non-active Status:	(4)
E) Agency "88":	-
F) Non-eligible class code & bargaining unit:	-
G) No hire date in Hybrid file:	-
H) Zero salary in Hybrid file:	-
I) Also in retiree file (including DROP):	(43)
J) Actives excluding DROP:	1,149

Retired Data

A) Number of records reported on data file:	45,922
B) Number of records not in P/F plan:	(28,770)
C) Records not currently in receipt of benefits based on reported status codes:	(8,325)
D) Post-2014 Pre-Conversion Duty-Disability:	(91)
E) Component I (Hybrid) Records:	(372)
F) Records in DROP:	(645)
G) Number of records valued:	7,719

Inactive Vested Data

A) Number of records reported on data file:	419
B) Deceased:	-
C) Less than 8 years of vesting service:	(30)
D) Number of records to value:	389

Active Row D: The Active data file contains a field titled “Stat.” Active members were only valued if the record for this field had a value of “1.”
Active Row E: Agency “88” is the 36th District Court. We understand that members in that agency are not eligible to receive benefits.
Active Row F: For both this valuation and the prior valuation, we have received a separate list of Class Codes and Bargaining Units that are not eligible to receive benefits.
Retired Row C: The Retired_Life file has a field named “STATUS.” We understand that if this field is not blank or equal to zero, the member is no longer receiving a benefit and should not be valued.

Reconciliation of Year-to-Year Data as of June 30, 2022

	Active	Terminated Vested	DROP		Retirees		Post-2014 Pre-Conversion Duty Disability	Totals
	Count	Count	Count	Annual Benefits	Count	Annual Benefits	Count	Count
2021	**1,234**	**385**	**728**	**$20,684,328**	**7,823**	**$268,672,308**	**81**	**10,251**
Change in Pay/Pensions	N/A	N/A	N/A	165,600	N/A	2,946,348	N/A	
Rehired (Not Vested)	28							28
Rehired (Vested)	17	(16)	-	-	(1)	(42,060)	-	-
New Beneficiary					104	2,789,856	-	104
DROP	(44)	(1)	45	1,015,296				-
Retired	(17)	(5)	(119)	(3,888,372)	172	4,740,600	-	31
Non-Duty Disabled	-				-	-	-	-
Duty Disabled	(3)				-	-	3	-
Death/Off		(7)	(6)	(194,508)	(383)	(11,564,933)	-	(396)
Vested Term	(42)	33						(9)
Non-Vested Terminated	(24)							(24)
Data Adjustment	-	-	(3)	(39,675)	4	(1,299,929)	1	2
2022	**1,149**	**389**	**645**	**$17,742,669**	**7,719**	**$266,242,190**	**85**	**9,987**

Notable Data Changes:

9 active vested terminations were not reported on the Terminated Vested file. We have assumed these members refunded and forfeited their defined benefit.

28 new retirees came from nowhere. We believe many of these are a result of new EDRO's.

7 Terminated Vested members were valued last year but will not be valued this year. We have assumed these members refunded and forfeited their defined benefit.

The data adjustments relate to records where we could not specifically identify the activity during the year. This could be the result of duplicate member IDs or corrected member IDs.

Data Approximations and Assumptions

As part of our review of the data received from the System, we discussed questionable or missing data with System staff and developed approximations and assumptions in order to perform the valuation. We provided System staff with a letter dated December 23, 2022 with additional information regarding data reconciliation, processing instructions, and assumptions regarding unresolved issues. Note, that letter disclosed our remaining data processing procedures and assumptions and details our reconciliation and final valuation data. System staff has approved the detail and final data disclosed in that letter.

The purpose of this section in this report is to summarize any unresolved concerns about questionable data that are relevant and could have a significant effect on the valuation as disclosed in that letter. This summary also discusses any significant steps we have taken to improve the data due to identifying questionable data values or relationships, significant judgments, or assumptions we have applied to the data. The rationale for the demographic assumptions made for the data processing are 1) instructions/discussions with System staff and 2) professional judgement. All data assumptions have been reviewed with and approved by staff before implementation.

Active

These records are reported in the Microsoft Access data file in the table titled PF_Benefits. Legacy specific fields (salary, Annuity Savings Fund (ASF) balance, service, and Average Final Compensation (AFC)) are taken from this file and combined with the Hybrid active file. That information is used in conjunction with information obtained from the Master tables (sick leave bank) and information carried over from prior valuations (AFC, sick leave, class code, and annual pay as of 2014).

For active members, frozen AFC amounts and frozen service as of June 30, 2014 was reported. In cases where the frozen AFC as reported in the current data file was less than 75% of the AFC as reported on the 2014 data file, the AFC as reported on the 2014 data file was used. This boundary was determined after an analysis of the raw AFC data showed that the AFC for several members was unreasonably low. The class code used to distinguish between DPLSA and DPOA was taken from the 2014 data file.

Inactive Vested

These records are reported in the Microsoft Access data file in the table titled PF_Benefits_Vested. Information from the Hybrid inactive file (Hybrid service) is appended to the Legacy file.

If the AFC was not provided, $30,000 was used for the AFC.

Component II benefit service is not directly provided on the file. The Component II (Legacy) file includes total vesting service and the Component I (Hybrid) file includes Component I benefit service. Since Component II benefit service was frozen as of June 30, 2014 for members that terminated after June 30, 2014, Component II (Legacy) benefit service was determined by subtracting service in the Component I (Hybrid) inactive file from total vesting service in the corresponding Component II (Legacy) inactive file. Members with estimated vesting service of less than 8 years were assumed to be non-vested and were not valued.

Data Approximations and Assumptions

Retired and Beneficiary

These records are reported in the Microsoft Access data file in the table titled Retired_Life. This file is used in conjunction with information from the Master file (class code and agency). Note, General and P/F members are both reported in this table.

Adjustment assumptions include:

- In cases where the benefit is identified to be a joint and survivor benefit and a beneficiary is not listed in the data, it was assumed that male spouses were 3 years older than females;
- Benefits for dependent children are assumed to cease at age 21; and
- For non-converted duty disability members:
  - Converted benefits are assumed to commence at age 65;
  - For disabilities prior to 2014, converted benefits were estimated using 25 years of service and the multiplier in effect for the member. For disabilities after 2014, converted benefits were estimated using service as of June 30, 2014 and the multiplier in effect for the member; and
  - At 25 years of service, disability benefits are assumed to equal 50% of final compensation.

These procedures are unchanged from the 2021 valuation.

Comparison of Valued Benefits with Actual Payments

	Retirees and Beneficiaries	DROP*	Post-2014 Pre-Conversion Duty Disability	Total	Benefits Paid FYE 2022
Count	7,719	645	85	8,449	
Annual Benefits ($ millions)	$266.2	$15.6	-	$281.9	$280.9

** Includes reduction for 75% of benefit payable during the DROP.*

The above comparison is intended to assess the reasonableness of the member data by comparing the annualized benefit amounts in the member data to the actual payments made during the fiscal year.

Comparative Statement of Active Members and Valuation Payroll

	No. of Members				Ratio of			
	1969	Pre-		%	Active to	Annual	Average Pay	
June 30	Plan	1969	Total	Change	Retired	Payroll	$	Change
2001	5,453	132	5,585	2 %	0.7	$ 253,297,027	$ 45,353	4.6 %
2002	5,290	92	5,382	(4)%	0.7	248,663,133	46,203	1.9 %
2003	5,181	76	5,257	(2)%	0.6	248,681,461	47,305	2.4 %
2004	5,007	53	5,060	(4)%	0.6	258,699,581	51,126	8.1 %
2005	4,768	31	4,799	(5)%	0.6	250,491,872	52,197	2.1 %
2006	4,298	14	4,312	(10)%	0.5	228,140,160	52,908	1.4 %
2007	4,204	8	4,212	(2)%	0.5	230,173,964	54,647	3.3 %
2008	4,071	7	4,078	(3)%	0.5	232,812,606	57,090	4.5 %
2009	4,030	7	4,037	(1)%	0.5	231,795,528	57,418	0.6 %
2010	3,985	7	3,992	(1)%	0.5	228,829,999	57,322	(0.2)%
2011	3,809	7	3,816	(4)%	0.5	220,461,691	57,773	0.8 %
2012	3,580	7	3,587	(6)%	0.4	205,800,278	57,374	(0.7)%
2013[1]	3,260	6	3,266	(9)%	0.4	186,694,166	57,163	(0.4)%
2014[2]	2,608	0	2,608	(20)%	0.3			
2015	2,386	0	2,386	(9)%	0.3			
2016	2,205	0	2,205	(8)%	0.3			
2017	1,914	0	1,914	(13)%	0.2			
2018	1,752	0	1,752	(8)%	0.2			
2019	1,551	0	1,551	(11)%	0.2			
2020	1,369	0	1,369	(12)%	0.2			
2021	1,234	0	1,234	(10)%	0.2			
2022	1,149	0	1,149	(7)%	0.1			

[1]*Payroll used was the greater of the payroll reported for the current and prior fiscal years.*
[2]*Post Bankruptcy.*

Prior to 2014, DROP members are included.

Comparative Statement of Annual Retirement Allowances Being Paid to Retirees and Beneficiaries (Excluding DROP Members)

	No. Retired		% of Current Allowances			Current Allowances		Allowances as a % of
June 30	Pre-69	Total	Annuities	Pensions	Escalators	Total	Average	Payroll
2001	4,394	8,166	0.6%	67.4%	32.0%	$ 180,239,652	$ 22,072	71%
2002	4,229	8,179	0.5%	68.4%	31.1%	185,658,396	22,699	75%
2003	4,104	8,277	0.5%	69.8%	29.7%	191,634,636	23,153	77%
2004	3,961	8,328	0.4%	68.5%	31.1%	203,083,524	24,386	79%
2005	3,791	8,376	0.4%	69.5%	30.1%	211,114,020	25,205	84%
2006	3,666	8,550	0.4%	70.9%	28.7%	222,357,372	26,007	97%
2007	3,501	8,498	0.3%	70.6%	29.1%	227,671,788	26,791	99%
2008	3,318	8,442	0.3%	70.0%	29.7%	234,223,368	27,745	101%
2009	3,168	8,424	0.3%	70.1%	29.6%	240,094,968	28,501	104%
2010	3,035	8,356	0.3%	70.3%	29.4%	243,688,596	29,163	106%
2011	2,861	8,379	0.2%	71.6%	28.2%	250,376,700	29,881	114%
2012	2,723	8,451	0.2%	72.2%	27.6%	258,660,084	30,607	126%
2013	2,544	8,476	0.2%	72.9%	26.9%	266,438,460	31,434	143%
2014[1]	2,362	8,395	0.2%	73.5%	26.3%	269,579,544	32,112	
2015	2,185	8,279	0.2%	74.2%	25.6%	266,597,448	32,202	
2016	2,040	8,204	0.2%	74.3%	25.5%	267,432,588	32,598	
2017	1,915	8,187	0.1%	74.3%	25.6%	270,114,360	32,993	
2018	1,795	8,151	0.1%	74.2%	25.7%	271,526,640	33,312	
2019	1,675	8,102	0.1%	73.9%	26.0%	272,882,712	33,681	
2020	1,498	7,960	0.1%	74.2%	25.7%	271,333,872	34,087	
2021	1,380	7,904	0.1%	73.9%	26.0%	268,672,308	33,992	
2022	1,253	7,804	0.1%	74.1%	25.8%	266,242,190	34,116	

[1]*Post Bankruptcy.*

Schedule of Employer Contributions

Fiscal Year Ended June 30	Reported Employer Contributions	
	From Pension Obligation Certificates (POCs)	Employer Contributions Other than from POCs
2001		$ 14,443,382
2002		8,449,645
2003		66,843,029
2004		69,475,202
2005	$ 630,829,189	51,602,596
2006[1]		57,766,542
2007		57,423,366
2008		33,934,636
2009[2]		36,151,057
2010		32,808,485
2011		81,642,112
2012[2]		49,760,229
2013		0
2014		0
2015		114,300,000
2016		37,787,744
2017		18,300,000
2018		18,300,000
2019		18,300,000
2020		18,300,000
2021		18,300,000
2022		18,300,000

[1]2006 assets were revised following the 6/30/2006 valuation.
[2]Contribution receivable.

APPENDIX I – ASSUMPTIONS AND GLOSSARY

Summary of Assumptions Used for PFRS Actuarial Valuation Assumptions Adopted by Board of Trustees After Consulting with Actuary

Assumption Review

All assumptions are estimates of future experience except as noted. If the rationale for the assumptions is based on experience studies, it is noted.

Economic Assumptions

The investment return rate used in the valuation was 6.75% per year, compounded annually (net of investment expenses). This assumption is prescribed by the Eighth Amended Plan for the Adjustment of Debts of the City of Detroit (POA).

Price inflation is not directly used in the valuation. For purposes of assessing the reasonability of the investment return assumption we assumed price inflation of 2.50% per year. A detailed rationale is included in the 2015-2020 Experience Study.

Non-Economic Assumptions

The mortality table used to measure healthy retired life mortality is the PubS-2010 Public Safety Retiree table for males and females with male rates multiplied by 115% and female rates multiplied by 125%. The mortality table used to measure disabled retired life mortality is the PubS-2010 Public Safety Disabled Retiree table for males and females with male rates multiplied by 114%. The mortality table used to measure pre-retirement life mortality is the PubS-2010 Public Safety Employee table for males and females with 50% of deaths assumed to be duty related. The tables are projected to be fully generational, based on the two-dimensional, sex distinct mortality improvement scale MP-2021. This assumption was first used as of June 30, 2021 with the rationale based on the 2015-2020 Experience Study.

The probabilities of age/service retirement for members eligible to retire are shown on the pages that follow. This assumption was first used as of June 30, 2021 with the rationale based on the 2015-2020 Experience Study.

The probabilities of separation from service (including *death-in-service*) are shown for sample ages on the pages that follow. This assumption was first used as of June 30, 2021 with the rationale based on the 2015-2020 Experience Study.

Miscellaneous and Technical Assumptions
June 30, 2022

Administrative Expenses: Estimated administrative expenses of 0.81% of expected benefit payments are included in the determination of employer contributions.

Annuity Savings Fund (ASF) Interest Credits: For purposes of calculating future refunds of member contributions, the ASF is assumed to earn 5.25% interest in all future years.

Annuity Savings Fund Excess Interest: The Component I (Hybrid) Transition Cost is funded by Component II (Legacy) ASF returns in excess of 5.25%. ASF return excess ceases in 2023 and the POA mandates the use of a 6.75% return assumption until 2023. The current assumption is:

- For purposes of determining valuation assets and liabilities, only considering transfers related to prior investment experience.
- For purposes of determining the Section 9.5 funded status, projecting the amount of future transfers.

Average Final Compensation (AFC): Frozen AFC is reported in the data provided for the annual valuation. Longevity payments are included directly in the reported frozen AFC but Sick Leave is not. We take the AFC provided to us, use the 75% of 2014 AFC check, and then add on an estimate for sick leave. The sick leave is estimated with the following formula:

[Annual pay reported in 2014 valuation] X [Capped Sick Leave Bank hours reported in 2014 valuation] / [8 hours/work day] / [260 work days/year] / [3-years in average period] X [25% added to AFC]

Where [Capped Sick Leave Bank hours reported in 2014 valuation] is the smaller of:
[Sick Leave Bank hours reported in 2014 valuation] OR
[Frozen Service] X [8 hours/work day] X [25 days/year of service]

We annually test the reported AFC against a sample set of retirees to determine if any additional adjustments should be made to the liability. No additional adjustment was made for this report.

Class Codes / Bargaining Unit: For valuation purposes, members are categorized as DPOA, DFFA or LSA based on class codes and bargaining units provided by the Retirement System and are primarily used in the valuation to determine normal retirement eligibility (20 & Out versus 25 & Out) and allowable time in the DROP. For determining retirement eligibility, the class codes used for this valuation were taken from the 2014 data file. For determining allowable time in the DROP, information as of the valuation date was used. Therefore, counts in the valuation may not represent actual membership in the respective associations.

Data Adjustments: Assumptions regarding incomplete or missing data are reviewed annually with the System and adjusted as directed by the System.

Miscellaneous and Technical Assumptions
June 30, 2022

Decrement Operation:	Ordinary disability and mortality decrements do not operate during the first five years of service. Disability and withdrawal do not operate during retirement eligibility.
Decrement Timing:	Decrements are assumed to occur mid-year.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Deferred Vested Benefit Commencement Age:	Members are assumed to commence benefits at the age in which they are first eligible for unreduced benefits.
Disability Change Age:	For active members that become duty disabled, the Component II (Legacy) plan is assumed to only be responsible for the frozen benefit which becomes payable starting at age 65.
DROP Assumption:	Members are assumed to retire or DROP based on assumed rates. For Police members eligible for a maximum DROP period of 10 years, 75% of eligible members are assumed to enter the DROP and remain in the DROP for seven years. For Police members eligible for a maximum DROP period of 15 years, 75% of eligible members are assumed to enter the DROP and remain in the DROP for nine years. For Fire members, 60% of eligible members are assumed to enter the DROP and remain in the DROP for five years. Expected benefits paid into DROP contributions are discounted at the assumed rate of return for valuation purposes. Balances for current DROP participants are held outside of system assets and are excluded from the valuation.
DROP Cost Neutrality:	An assessment of the cost neutrality of the DROP was outside the scope of this valuation.
Duty Death Benefit:	For current active members, the duty death pension benefit is assumed to be payable entirely by the Component I (Hybrid) plan. It was assumed that the Component II (Legacy) plan would only be responsible for the refund of member contributions.

Miscellaneous and Technical Assumptions
June 30, 2022

Duty Disability Benefits:	The Police and Fire Retirement System Combined Plan provides disability benefits for both Component I (Hybrid) and Component II (Legacy) members. Our understanding of the Component II (Legacy) freeze as it relates to duty disability benefits was that the only benefit payable from Component II (Legacy) would be the frozen accrued benefit, payable at the time of conversion to normal retirement (for members becoming disabled after 6/30/2014) and that any benefits payable during the period of disability would be paid from Component I (Hybrid). We have valued the pre-conversion duty disability benefit in a manner consistent with the plan provision (paid out of Component I (Hybrid)). We understand that the System is in the process of moving to a new data system and expect this issue to be corrected once the new data system is in place. For current duty disability retirees that became disabled after June 30, 2014, we have estimated the amount that will be paid by Component I (Hybrid) and Component II (Legacy) upon conversion. For future retirees, duty disability retirement benefits prior to age 65 are assumed to be paid from Component I (Hybrid).
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date of decrement.
Forfeiture Assumption:	It is assumed that 0% of members will elect to forfeit their benefit.
Form of Payment:	The actuarial equivalent basis for optional forms of payment and early retirement are based on the RP-2014 Mortality Table with Blue Collar adjustments projected 11 years, a 6.75% interest rate, 90%/10% unisex mix and a 1.0125% COLA assumption per System Policy. Annuity withdrawal factors use the same mortality and interest rate assumptions with a 0% COLA assumption. No adjustment has been made for alternate forms of payment elections. Principal balances of accumulated member contributions were converted to life annuity offsets based on plan factors for the valuation.
Incidence of Contributions:	Employer contributions are assumed to be received on the last day of the fiscal year.
IRC Section 401(h) Limit:	We did not test for the 401(h) limit on employer contributions for medical benefits. No employer contributions are anticipated in this valuation.
IRC Section 415 Limit:	We assumed that no benefits will be limited by IRC Section 415. The limit is assumed to grow with wage inflation.

Miscellaneous and Technical Assumptions
June 30, 2022

Mandatory Retirement Age:	Currently most members of the DPFRS are subject to a mandatory retirement age of 60. We have, assumed employment would end at age 60 for Fire members regardless of the length of their DROP participation at that age. We understand that the mandatory retirement age is currently not enforced for Police members and have assumed the mandatory retirement age is not in effect for Police members.
Marriage Assumption:	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits. This assumption accounts for potential dependent children/dependent parent death benefits. No other assumption is made for surviving children/dependent parents. Male spouses are assumed to be three years older than female spouses.
New Entrant Assumption:	No assumption is made for experience related to members rehiring/reentering active service.
Pay Increase Timing:	N/A for Component II (Legacy).
Pop-Up Benefits:	For current retirees with a pop-up benefit, the value of the pop-up was estimated by valuing a non-pop-up option and increasing the associated liabilities by 1%.
Post-Retirement COLA / Variable Pension Improvement Factor (VPIF):	Active members are assumed to receive a 0.9% COLA rather than 1.0125% because the annuity portion is not subject to the COLA. Post-retirement increases for retired members were based on the plan in effect at retirement. For the pre-69 plan members, future COLA's are assumed to be the same as wage inflation for active members (not reduced in POA). For other members retiring before 2014, the COLA rate is prorated by the ratio of COLA eligible service to total service at retirement before applying the POA mandated reduction to 1.0125%. The service ratio is provided on the data file.
Service Credit Accruals:	Service accruals for calculating benefits end as of June 30, 2014 for Component II (Legacy) and begin as of June 30, 2014 for Component I (Hybrid). However, service in Component I (Hybrid) and Component II (Legacy) may be used to satisfy benefit eligibility requirements in both plans.
Workers Compensation Offset:	No Workers Compensation offsets are assumed for duty disability benefits.

The rationale for the miscellaneous and technical assumptions is the 2015-2020 Experience Study, modified as necessary for changes in data or administration.

Funding Methods

The unit credit cost method was used in determining liabilities and normal cost. Under this method, there is no normal cost since benefits are frozen and there are no future accruals and Actuarial Accrued Liability is the present value of each individual's accrued benefit.

Unfunded Actuarial Accrued Liabilities (UAAL). Is determined in accordance with the Funding Policy included in the appendix.

Employer contribution dollars were assumed to be *paid in a single sum on the last day* of the employer fiscal year.

The data about persons now covered and about present assets was furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary.

Single Life Retirement Values
Based on PubS-2010
for Males and Females

Sample Attained Ages in 2022	Future Life Expectancy (Years)	
	Males	Females
45	39.35	40.70
50	34.24	35.51
55	29.22	30.44
60	24.38	25.60
65	19.86	21.07
70	15.68	16.82
75	11.88	12.91
80	8.59	9.50

Probabilities of Service Retirement or Entering DROP

Age	Percent of Eligible Active Members Retiring or Entering DROP Within Next Year — Police	Fire
35	20%	
36	20%	
37	20%	
38	20%	
39	20%	
40	20%	
41	20%	
42	20%	
43	20%	
44	20%	
45	20%	
46	20%	
47	20%	
48	20%	
49	20%	
50	30%	20%
51	30%	20%
52	30%	20%
53	30%	20%
54	30%	20%
55	30%	20%
56	30%	20%
57	30%	20%
58	30%	20%
59	30%	20%
60	30%	100%
61	30%	100%
62	30%	100%
63	30%	100%
64	30%	100%
65	100%	100%
Ref	3299	160
	35	50

Police members eligible for retirement under 20 & Out with at least 10-years of Component II (Legacy) benefit service are assumed to retire or enter DROP while eligible for Component II (Legacy) normal retirement. These members are assumed to have 40% probability of retiring or entering DROP during the first year of eligibility. All other members are assumed to retire or enter DROP while eligible for Component I (Hybrid) normal retirement only. This assumption was first used as of June 30, 2021 with the rationale based on the 2015-2020 Experience Study.

Probabilities of Separation

Sample Ages	Years of Service	% of Active Members Withdrawing within Next Year	
		Police	Fire
ALL	0	11.00%	5.00%
	1	9.00%	3.00%
	2	7.50%	3.00%
	3	6.25%	2.50%
	4	5.50%	2.50%
25	5 & Over	5.50%	2.50%
30		4.95%	2.50%
35		3.45%	2.50%
40		2.55%	2.50%
45		2.25%	2.50%
50		1.65%	2.50%
55		1.20%	2.50%
60		1.20%	2.50%
Ref		1400	1401
		1605	1606 x 1

The withdrawal rates for members with less than 5 years of service are shown for completeness. Given the demographics of this closed group, there is likely no one being exposed to the rates. This assumption was first used as of June 30, 2021 with the rationale based on the 2015-2020 Experience Study.

Sample Ages	% of Active Members Becoming Disabled within Next Year	
	Ordinary	Duty
25	0.05%	0.28%
30	0.05%	0.28%
35	0.08%	0.48%
40	0.11%	0.62%
45	0.16%	0.89%
50	0.21%	1.17%
55	0.21%	1.17%
60	0.21%	1.17%
Ref	1237 x 0.15	1237 x 0.85

Glossary

Accrued Service	The service credited under the plan which was rendered before the date of the actuarial valuation.
Actuarial Accrued Liability (AAL)	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
Actuarial Assumptions	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
Actuarial Cost Method	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
Actuarially Determined Employer Contribution	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's actuarial funding policy.
Actuarial Equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV)	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
Actuarial Present Value of Future Benefits (APVFB)	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Funding Value of Assets, and related Actuarial Present Values for a plan.

Glossary

AFC	Average Final Compensation.
Amortization Method	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
ARF	Average Reserve Fund.
ASF	Annuity Savings Fund of the Component II (Legacy) Plan.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc.
COLA	Cost-of-Living Adjustment.
Contribution Budgeting Liability	An expected return-based measure of pension obligation.
DFFA	Detroit Fire Fighters Association.
DPCOA	Detroit Police Command Officers Association.
DPLSA	Detroit Police Lieutenants and Sergeants Association.
DPOA	Detroit Police Officers Association.
DROP	Deferred Retirement Option Program.
Duration	An approximate measure of sensitivity to changes in interest rates.

Glossary

Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Equivalent Single Amortization Period	For plans that do not establish separate amortization bases (separate components of the UAAL), this is the same as the Amortization Period. For plans that do establish separate amortization bases, this is the period over which the UAAL would be amortized if all amortization bases were combined upon the current UAAL payment.
Experience Gain/Loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience, e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience, i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.
Funded Ratio	The ratio of the Funding Value of Assets to the Actuarial Accrued Liability.
Funding Value of Assets (FVA)	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the actuarially determined employer contribution (ADEC).
FY	Fiscal Year.
GASB	Governmental Accounting Standards Board.
GASB Statement No. 67 and GASB Statement No. 28	These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. GASB Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while GASB Statement No. 67 sets the rules for the systems themselves.
MVA	Market Value Assets.
Normal Cost	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.

Glossary

Open Amortization Period	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.
PAF	Pension Accumulation Fund.
POA	The 8th Amended Plan for the Adjustment of the Debt of the City of Detroit.
Reserve Account	An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.
Solvency Liability	A market-based measurement of the pension obligations.
Transition Cost	Initial unfunded liability as described in Section E-16 of the Plan document.
Unfunded Actuarial Accrued Liability	The difference between the Actuarial Accrued Liability and Funding Value of Assets.
Valuation Date	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.
VPIF	Variable Pension Improvement Factor. Discussed in Section 6.2 of the Plan Document.

APPENDIX II – FUNDING POLICY

Introduction

The purpose of this Actuarial Funding Policy is to record the funding objectives and policy set by the Board of Trustees (Board) for the Police and Fire Retirement System of the City of Detroit (the System). The Board establishes this Actuarial Funding Policy to help ensure the systematic funding of future benefit payments for members of the Plan.

In 2014, the Plan for the System was written and approved by the bankruptcy court as part of the City's Plan of Adjustment (POA). At that time, the original retirement plan was split into two Retirement Plans: Component I (Hybrid) and Component II (Legacy). In accordance with the POA, employer contributions and certain assumptions cannot be changed until fiscal year 2024. This Policy is intended to recognize those items as fixed until 2024 and establish a funding policy for the period beginning in fiscal year 2024, when employer contributions must be determined on an actuarial basis. Nothing in this Policy is intended to prevent the Board from altering the Policy prior to fiscal year 2024 as conditions change or additional information becomes available to the Board.

This Policy shall be regularly reviewed by the Board.

Funding Objectives

1. Provide benefit security to members of the System:
   a. For purposes of this policy, benefit security means having adequate liquidity to pay benefits when due.
2. Establish an appropriate employer contribution based on the following objectives:
   a. Fully funding the Legacy Plan liability no later than 2054;
   b. Keeping the Hybrid Plan fully funded; and
   c. Managing employer contribution volatility.
3. Provide a reasonable margin for adverse experience to help offset risks.
4. Measure and monitor funding status, post-2024 contribution estimates and risk.
   a. Perform annual valuations; and
   b. Include post-2024 contribution estimates (based on this Policy) in annual actuarial valuations.

The Plans will have annual actuarial valuations each June 30. Employer contributions will be determined for the fiscal year ending two years after the valuation date. For example, the actuarially determined employer contribution for the fiscal year ending June 30, 2024 will be determined by the June 30, 2022 annual actuarial valuation.

Annual actuarial valuations may or may not also serve other purposes such as Legacy Plan restoration, Hybrid plan Section 9.5 fiscal responsibility calculations, and/or Annuity Savings Fund excess interest transfers between components. Unless otherwise stated, those purposes are not subject to this Policy.

For all other funding purposes, annual actuarial valuations will include the following elements of the Actuarial Funding Policy:

1. Actuarial Cost Method

a. Hybrid Plan: The Entry Age actuarial cost method shall be used in determining the Actuarial Accrued Liability (AAL) and Normal Cost with the entry age based on date of hire. Since this component was created in July 2014 and granted eligibility and vesting service prior to July 2014 (for members hired before that date), this Plan had an unfunded actuarial accrued liability on the effective date, known as the transition cost. As of June 30, 2017, the AAL (including the transition cost) in the Hybrid Plan was fully funded. This Plan could become less than fully funded in the future if experience is less favorable than assumed or there are changes in assumptions or Plan provisions.

b. Legacy Plan: The Unit Credit Normal actuarial cost method shall be used in determining Actuarial Accrued Liability (AAL) and Normal Cost. Since this component is closed and accrued benefits are frozen as of June 30, 2014, this method results in no normal costs and an AAL that equals the Present Value of Accrued Benefits (PVAB) of each member.

2. Asset Smoothing Method

a. For estimating contributions prior to June 30, 2023, the Funding Value of Assets (or actuarial value of assets) will be equal to the Market Value of Assets, as mandated by the Plan of Adjustment. For determining (or estimating) employer contributions on or after fiscal year 2024, the Funding Value of Assets will be based on a method that employs smoothing of market gains and losses over a closed period. The smoothing period for recognized market gains and losses (above or below the assumed rate of return) will be a 3-year period.

b. The Funding Value of Assets shall not diverge from the Market Value of Assets by more than 15%.

c. The annual actuarial valuation will calculate results on both the smoothed value of assets and the (non-smoothed) Market Value of Assets beginning with the June 30, 2019 valuation (the Funding Value of Assets will initially be set to the Market Value of Assets as of June 30, 2018 with smoothing beginning prospectively). The post-2024 contribution estimate will always be based on the smoothed value of assets. Other results (UAAL, Funded Status, etc.) will be based on the Market Value of Assets prior to 2024 and the smoothed value of assets after 2023. Upon consultation with the Actuary, the Funding Value of Assets may be reset to the Market Value of Assets.

3. Amortization Method

a. Hybrid Plan

a) A Level Percent of Payroll amortization method shall be used to systematically eliminate (pay off) the Unfunded Actuarial Accrued Liability (UAAL) over a closed 15-year period from the later of July 1, 2023 or the applicable fiscal year after the funded status falls below 100%.

b) If funded status is above 100%, the contribution requirements for the UAAL will be $0 (thereby creating a minimum employer contribution of employer normal cost).

c) Layered amortizations will be considered by the Board post-2024.

b. Legacy Plan

a) The Level Dollar amortization method shall be used to systematically eliminate (pay off) the Unfunded Actuarial Accrued Liability (UAAL) over a closed period of 20 years from July 1, 2023 for the UAAL as of July 30, 2022 (projected to July 1, 2023), and

b) Layered amortizations that use 20-year closed periods for gains and losses occurring after June 30, 2022 (each 20-year period starts with the first payment after the applicable gain or loss occurs).

4. Funding Target and Cash Flow Projections

a. The targeted funded ratio shall be 100%.

b. The Legacy Plan annual actuarial valuation shall include projections of estimated employer contributions, expected benefit payments and estimated funded status to the later of fiscal year 2054 or 30 years after the applicable employer contribution fiscal year.

c. Section 9.5 of the Plan details the actions to be taken if the 5-year projected funded status falls below 90% (Hybrid Plan, only).

5. Risk Management

a. Assumption Changes

a) The actuarial assumptions used shall be those last adopted by the Board based on the most recent experience study and upon the advice and recommendation of the actuary. In accordance with the City Ordinance, the actuary shall conduct an experience study at least every five years. The results of the study shall be the basis for the actuarial assumption changes recommended to the Board. However, the assumed rate of return and the actuarial value of assets are mandated by the City's POA and cannot be changed prior to June 30, 2023.

b) The actuarial assumptions may be updated at any time, as advised by the actuary, if significant Plan design changes or other significant events occur.

c) The next experience study will be performed after the 2020 actuarial valuation and will include both economic (investment return, inflation, etc.) and demographic (mortality, retirement, disability, etc.) assumptions. Even though the investment rate of return may not be changed for determining employer contributions until after June 30, 2023, the Board may elect to show valuation results under an alternative reasonable assumed rate of investment return prior to 2023.

b. Risk Measures

a) Risk measures will be included in the annual actuarial valuations. Below is a list of potential measures to be included. The measures may be changed over time as deemed appropriate.

(i) Classic measures currently determined

– Funded ratio (assets / liability) on both a market value and funding value (if funding value is not equal to market).

– UAAL amortization period (years required to pay down the UAAL based on current funding rates).

– Portfolio rate of return for the year on both the market value and funding value of assets.

– 5- and 10-year geometric average portfolio rate of return on both the market value and funding value of assets (developed prospectively beginning with the 2019 valuation).

– 5- and 10-year standard deviation of return on both the market value and funding value of assets (developed prospectively beginning with the 2019 valuation).

(ii) Duration of the Actuarial Accrued Liability

– Measures the sensitivity of the liability to a 1% change in assumed rate of return. A decrease in this measure indicates a decrease in assumed rate sensitivity and vice versa.

(iii) Total UAAL / Covered Payroll

– Measures the risk associated with contribution rates relative to the impact on the ability to fund the UAAL. A decrease in this measure indicates a decrease in UAAL contribution risk and vice versa.

– Consideration will be given to using total payroll or revenue source, if available.

(iv) Total Assets / Covered Payroll

– Measures the risk associated with the potential impact of asset experience on contributions. A decrease in this measure indicates a decrease in asset risk and vice versa.

– Consideration will be given to using total payroll or revenue source, if available.

(v) Total AAL / Covered Payroll

– Measures the risk associated with the potential impact of liability experience on contributions. A decrease in this measure indicates a decrease in experience risk and vice versa. This also provides a long-term measure of the asset risk where the System has a target funded ratio of 100%.

– Consideration will be given to using total payroll or revenue source, if available.

(vi) Non-Investment Cash flow / Beginning of year assets

– Measures depletion risk, sensitivity to annual investment gains and losses risk and the maturity of the plan. For a mature open plan, this may converge to the negative of the real rate of return assumption (investment return less wage inflation). A less negative number (or a positive number) indicates a less mature plan and/or a plan that is at lower risk of fund depletion and less sensitive to annual gains and losses. A more negative number indicates a more mature plan and/or a plan that is more at risk of fund depletion and more sensitive to annual gains and losses. For a super-mature closed plan such as the Legacy plan, this may become more negative over time as liquidity needs increase.

(vii) Market Value of Assets / Benefit Payments

- Measure depletion risk. A low value estimates the number of years to depletion disregarding future contributions and investment return.

(viii) Solvency Liability

- Measures the estimated cost of accrued benefits as a result of minimizing investment risk in the portfolio.

b) Risk Control: The Board shall carefully monitor the risk measures above and shall consider steps to mitigate risk, particularly as the Legacy Plan funded ratio increases. Examples of risk mitigating techniques include, but are not limited to:

(i) Reviewing investment risk in accordance with the Board's Investment Policy.

(ii) Adding provisions for adverse deviation in the actuarial assumptions.

(iii) Increasing employer contributions (through a change in methods, assumptions, or amortization period).

(iv) Other.

Glossary

1. **Actuarial Accrued Liability (AAL):** The difference between (i) the actuarial present value of future plan benefits; and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."
2. **Actuarial Assumptions:** Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
3. **Actuarial Cost Method:** A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."
4. **Actuarial Gain (Loss):** A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. For example, if during a given year the assets earn more than the investment return assumption, the amount of earnings above the assumption will cause an unexpected reduction in UAAL, or "actuarial gain" as of the next valuation. These include contribution gains and losses that result from actual contributions made being greater or less than the level determined under the policy.
5. **Actuary:** A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries (MAAA). The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA and ultimately to Fellowship with the designation FSA.
6. **Amortization:** Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.
7. **Unit Credit Normal Actuarial Cost Method:** A funding method that calculates the Normal Cost as the present value of the change in accrued benefits for active members.
8. **Experience Study:** An actuarial investigation of demographic and economic experiences of the system during the period studied. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities.
9. **Funding Value of Assets**: The value of current plan assets recognized for valuation purposes. Generally based on a phased-in recognition of all or a portion of market related investment return. Sometimes referred to as Actuarial Value of Assets or Smoothed value of Assets.
10. **Market Value of Assets:** The fair value of plan assets as reported in the plan's audited financial statements.
11. **Normal Cost (NC):** The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.
12. **Unfunded Actuarial Accrued Liability (UAAL):** The positive difference, if any, between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."

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February 28, 2023 - Revised

Mr. David Cetlinski, Executive Director
The Police and Fire Retirement System
of the City of Detroit
One Detroit Center
500 Woodward Avenue, Suite 3000
Detroit, MI 48226

Re: June 30, 2022 Actuarial Valuation

Dear Mr. Cetlinski:

Enclosed are five copies of the June 30, 2022 Component II annual actuarial valuation.

Sincerely,
Gabriel, Roeder, Smith & Company

Jamal Adora, ASA, EA, MAAA

JA:rmn
Enclosures

cc: Kelly Tapper, City of Detroit Retirement Systems
Gail Oxendine, City of Detroit Retirement Systems
James R. Sparks, GRS
Judith A. Kermans, GRS

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