The Police and Fire Retirement System of the City of Detroit

Annual Actuarial Valuation of Component I

June 30, 2019

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April 7, 2020

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, 2019

Dear Board Members:

The results of the June 30, 2019 Annual Actuarial Valuation of **Component I** (Hybrid Plan) of the Police and Fire Retirement System of the City of Detroit (PFRS) are presented in this report. Component II (Legacy Plan) benefits are the subject of a separate report.

The required contribution rate shown on page 1 is in compliance with the Plan and the City's Plan of Adjustment (POA) as approved by the Bankruptcy Court and should not be considered a recommendation by the Actuary. While a recommended level of contributions is outside the scope of this engagement, we are currently working with the Board to assist them in establishing a funding policy. Users of this report should be aware that contributions made at the POA and Plan required rate do not guarantee benefit security.

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 on page 5 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 purpose of the valuation is to measure the System's funding progress and 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. 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.

The findings in this report are based on data and other information through June 30, 2019. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

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This report does not reflect the impact of COVID-19 which will likely affect the demographic and economic experience of the Plan in the short-term. This report does not include events that occurred subsequent to the measurement date.

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. Except for the assumed rate of investment return, the actuarial assumptions used for the valuation are set by the Board based upon advice of the actuary and other parties. 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 has been prepared by individuals 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.

David T. Kausch and Judith A. Kermans are Members of the American Academy of Actuaries. These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein.

The signing individuals 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,

David T. Kausch, FSA, EA, FCA, MAAA, PhD

Kenneth G. Alberts

Judith A. Kermans, EA, FCA, MAAA

DTK/KGA/JAK:dj

Table of Contents

SECTION A

INTRODUCTION

Executive Summary
($ in Millions)

Valuation Date	June 30, 2019	June 30, 2018
Contributions for Fiscal Year Ending	June 30, 2021	June 30, 2020
Employer Contributions		
Mandated Percentage of Covered Payroll	12.25%	12.25%
Estimated Annual Amount (Mandated Contributions Only)	$ 18.8	$ 18.4
Membership		
Active Members (Excluding DROP)	2,488	2,575
DROP Members	124	112
Retirees and Beneficiaries	117	90
Legacy Disabled^	76	0
Inactive, Nonretired Members	583	471
Total	3,388	3,248
Valuation Payroll *	$ 150.0	$ 146.7
Assets		
Pension Accumulation Fund	$ 113.4	$ 95.8
Employee Voluntary Contribution	0.5	0.2
Employee Mandatory Contribution	41.1	32.0
Rate Stabilization Fund (RSF)@	4.0	-
Total Market Value	$ 159.0	$ 128.0
Return on Market Value (net of administrative expenses)	2.37%	6.25 %
Actuarial Information (Assuming 0.5% VPIF)		
Total Normal Cost Rate	17.79%	17.39%
Member Contribution Rate	6.92%	6.80%
Employer Normal Cost Rate	10.87%	10.59%
Actuarial Accrued Liability	$ 156.5	$ 126.0
Unfunded Actuarial Accrued Liability (Including RSF)	$ (2.5)	$ (2.0)
Funded Ratio	101.60%	101.60%
Equivalent Single Amortization Period (Excluding RSF)	1	0
Employer Rate needed for 15-Year Amortization (Exc. RSF) #	10.87%	10.59%
Additional Funding Information (Assuming a full 1% VPIF)		
Employer Normal Cost Rate	11.87%	11.57%
Equivalent Single Amortization Period (Excluding RSF)	22	8
Employer Rate needed for 15-Year Amortization (Exc. RSF) #	12.57%	11.83%
Risk Metrics		
Actuarial Accrued Liability Divided by Payroll	104.28%	85.90%
Market Value of Assets Divided by Payroll	105.95%	87.24%

** Payroll shown is for non-DROP members.*
 # Based on prior Board policy to set the employer normal cost as the minimum contribution.
^ See Comment 14 on page12.
@ This is the result of the excess ASF interest transfer from Component II (Legacy).

Note: AVA (Actuarial Value of Assets) is equal to MVA (Market Value of Assets).

Please see pages 8 through 12 of the report for important comments 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	2019	2018
Normal Cost for 0.5% VPIF (COLA)		
Age & service allowances	11.51%	11.54%
Disability allowances	5.39%	4.96%
Death-in-service allowances	0.44%	0.44%
Administrative expenses	0.00%	0.00%
Refunds	0.45%	0.45%
Total	17.79%	17.39%
Members Current Contributions@	6.92%	6.80%
Employer Normal Cost (0.5% VPIF)	**10.87%**	**10.59%**
Additional Normal Cost for Full 1.0% VPIF (COLA)#	1.00%	0.98%
Employer Normal Cost (1% VPIF)	**11.87%**	**11.57%**
Fixed Employer Contribution Rate+	12.25%	12.25%
Amount available for UAAL% (0.5% VPIF)	1.38%	1.66%
Amount available for UAAL% (1.0% VPIF)	0.38%	0.68%

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

 # 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. The current assumption is that on average over a members retirement years, they will receive the equivalent of a 0.5% COLA (or VPIF).

+ Employer contributions are set at 12.25% of covered compensation per year through plan year 2023.

Development of Liabilities
Retirement System Totals

Valuation Assumptions (1/2% VPIF)	Total	Rate Stabilization Fund (RSF)	Excluding RSF
Present Value of Future Benefits	$ 389,614,621	$ -	$ 389,614,621
Present Value of Future Normal Costs	233,145,146	-	233,145,146
Actuarial Accrued Liability	156,469,475	-	156,469,475
Accrued Assets	158,967,545	4,030,561	154,936,984
Unfunded Actuarial Accrued Liability (UAAL)	$ (2,498,070)	$ (4,030,561)	$ 1,532,491
Additional Amount for Full 1% COLA	9,055,361	-	9,055,361
UAAL with Full COLA	$ 6,557,291	$ (4,030,561)	$ 10,587,852

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%. For purposes of this valuation we have assumed that the average COLA is equivalent to 0.5%. 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 $412.1 million and the actuarial accrued liability would be $165.5 million.

The Transition Cost is defined in Section G-2 of the Combined Plan as the accrued liability at plan inception due to vesting and eligibility service earned prior to the Component I effective date (7/1/2014). The Board has adopted a VPIF assumption of ½% for the Transition Cost. The Transition Cost is not isolated in the valuation. The Plan provides for a separate funding source for Transition Costs until FY 2024. Because of this separate funding source, it is reasonable to exclude the Transition Cost in the projections called for in Section 9.5 of the Plan (the Fiscal Responsibility). As of June 30, 2019, the plan has a remaining Transition Cost of $16.5 million. Since the plan has an unfunded actuarial accrued liability of $(2.5) million based on the ½% VPIF, the transition cost under the ½% VPIF assumption is currently funded. This could change in the future if experience losses result in a funded status less than 100%.

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	Employee Contributions@	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%	TBD	TBD	2019/20	Mandated
2019	6.92%	10.87%	1.00%	0.38%	TBD	TBD	2020/21	Mandated

 # "Mandated" (Section 9.3(2)) at 12.25% of pay if specified by Plan document and POA; "Actuarially Determined" if determined by a valuation based on the Board's funding policy.

** 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 enter the Plan, the employer normal cost will decrease (in the absence of changes in the Plan or assumption changes).

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.

Plan Maturity 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. Generally accepted plan maturity measures include the following:

	2019	2018
Ratio of the market value of assets to total payroll	1.1	0.9
Ratio of actuarial accrued liability to payroll	1.0	0.9
Ratio of actives to retirees and beneficiaries	21.3	28.6
Ratio of net cash flow to market value of assets	0.2	0.3
Duration of the actuarial accrued liability	24.1	24.2

Ratio of Market Value 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. 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 Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net 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.

Duration of 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, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

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 included additional risk assessments in the funding policy discussions based on the 2018 actuarial valuation. We can update those at the Board's request.

Comments

Comment 1

Benefit Changes

We understand that new DROP plan provisions have been adopted. The new provisions allow DPOA (Detroit Police Officers Association) members to participate in the DROP program for a maximum of 10 years, up from the prior maximum of five (5) years. We modeled this change by changing the DROP assumptions for this group. The assumptions we used are consistent with our February 24, 2017 supplemental valuation modeling proposed changes to the DROP provisions. For eligible DPOA members, it was assumed that 65% (up from 60%) of members would DROP and would stay in DROP for an average of seven (7) years (up from five (5) years). This assumption may be revisited in the next experience study. The change in the DROP provision combined with the corresponding change in the DROP assumption resulted in a $0.8 million decrease in the UAAL.

Comment 2

Experience

Overall, plan experience was less favorable than assumed. There was a net loss of $2.2 million as shown on page 15. This loss is comprised of a $0.2 million liability loss and a $6.0 million investment loss. It is partially offset by a $4.0 million gain related to ASF excess interest transfer. The $0.2 million liability loss consists of losses from pay increases and more than expected disabilities. The liability loss was partially offset by liability gains from more terminations than expected.

Comment 3

Funding of the Rate Stabilization Fund

In accordance with the plan document, if transition cost is 100% funded or more, then any excess interest transferred from the Legacy Plan is deposited into the Rate Stabilization fund (RSF). Since the transition costs were fully funded at the beginning of the year and there was a transfer of excess interest, the entire transfer was deposited into the RSF, in accordance with the Plan document.

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, since this is the first year with a balance in the RSF, we recommend legal counsel review this treatment to confirm our understanding.

Comments

Comment 4

Actuarial Assumptions

The assumed rate of return prescribed by the POA is 6.75%, net of investment and administrative expenses. We have reviewed the reasonableness of this assumption based on the plan's investment policy and the capital market assumptions of fourteen nationally recognized investment consulting firms using GRS' Capital Market Assumption Modeler. The analysis depends on the underlying price inflation and the rate of administrative expenses. Based on our analysis, the prescribed 6.75% rate of return is reasonable for the purpose of the measurement being taken. If the Board would like, we can prepare a separate report of our analysis.

Comment 5

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. Since there are conditions under which the VPIF cannot be paid (and even clawed back) we have assumed that on average a VPIF of ½% will be paid in the development of the accrued liabilities and normal cost. We recommend that this assumption be reviewed in the next experience study. A 1% VPIF was granted on July 1, 2019. Actual versus expected VPIFs are treated as a gain or loss item for purposes of the valuation.

Comment 6

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 changes in the plan or assumption changes).

Comments

Comment 7

Transition Cost

Based on the funded status as of June 30, 2019, transition costs are fully funded based on an assumed ½% VPIF, after inclusion of the Rate Stabilization Fund (RSF).

However, if the RSF is excluded from the assets, then the fund is less than 100% funded. Since this is the first valuation to include the RSF, there does not currently exist a policy that allocates that unfunded amount between Transition Costs and non-Transition Costs. Since future excess interest transfers are affected by whether or not the Transition Costs are fully funded, and there is a scheduled transfer for the year ending June 30, 2020 (based on the FY 18 investment performance), we recommend that the Board adopt a method of allocating any unfunded amounts (after exclusion of the RSF) between Transition Costs and other liabilities. If the Board wishes, we can work with legal counsel and suggests a few methods for consideration and discuss the advantages and disadvantages with the Board.

For purposes of this valuation we have assumed the Transition Cost is fully funded. For this Component I (Hybrid) valuation, this assumption only affects the Section 9.5 projections. In regards to the remedial actions required by Section 9.5, the funded status of the Transition Cost would not have an effect on the remedial actions determined in this valuation.

Comment 8

Funding and Transfers 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. The 12.25% of payroll employer contribution rate exceeds the employer normal cost rate of 11.87% by 0.38% of payroll (when the normal cost rate is based on the full 1% VPIF).

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 2018, it is likely a transfer will occur in 2020. 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.

Comments

Comment 9

It is our understanding that the amount of employer contributions credited to the Rate Stabilization Fund (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 2019 will be credited to the RSF.

Comment 10

The determination of the Normal Cost is dependent on the replacement life normal cost Entry Age Normal Cost Method. Our understanding of the Plan's and City's objectives is to have a level total normal cost and a separately funded transition cost consistent with this method. Based on the current exposure draft of the Actuarial Standards of Practice No. 4, this method is appropriate for determining a Reasonable Actuarially Determined Contribution. If the final standard changes, we may need to re-evaluate use of this method.

Comment 11

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 people were included in the (Component II) valuation.

Comment 12

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 in this task.

Comment 13

The results in this report assume an investment return rate of 6.75%, net of administrative expenses. We understand that the administrative expenses of the Retirement System are being split between Component I (roughly 39%) and Component II (61%). Administrative expenses may put downward pressure on the Component I funded status in the short term. As an indication of the magnitude, the FY 2019 Component I administrative expenses were approximately 1.18% of the Component I market value of assets as of June 30, 2019. As the asset base allocation grows, this rate is expected to diminish.

The computation of the rate of return net of administrative expenses will therefore be significantly lower than the gross rate of return and may differ from investment performance measures. This effect is expected to decline in Comp l over time as the trust builds up assets. The total administrative expenses as a percent of the Combined Plan (Component I and Component II) assets was approximately 17 basis points.

We estimated the rate of return during the year to be 2.37% net of administrative expenses and 3.72% gross of administrative expenses.

Comments

Comment 14

The Police and Fire Retirement System Combined Plan provides disability benefits for both Component I and Component II members. Our understanding of the Component II freeze as it relates to duty disability benefits was that the only benefit payable from Component II 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.

For current duty disabilities, data reported for this valuation is not consistent with that understanding. However, assets reported for this valuation appear to be consistent with this interpretation (note we do not collect sufficient information to confirm this kind of activity in the assets). We have valued the pre-conversion duty disability benefit in a manner consistent with the data (paid out of Component II). 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 future retirees, duty disability retirement benefits prior to age 65 are assumed to be paid from Component I.

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

Comment 15

We are currently working with the Board to assist them in the development of a post 2023 funding policy for this plan.

Comment 16

The next experience study is scheduled to begin subsequent to the June 30, 2020 valuation.

Comment 17

The economic environment has changed dramatically (negatively) within the month prior to the issuance of this report. Unless economic market makes a dramatic recovery prior to the end of FY 20, the June 30, 2020 valuation is expected to show 1) a substantial drop in the funded status of this plan and 2) a need for increased contributions. We also understand that there is a great deal of effort on Staff's part to provide improved data once the new system begins to generate the valuation data. It is unknown if this new data system (with the data improvements) will result in material differences in our liability and contributions estimates for the plan.

SECTION B

FUNDING RESULTS

Actuarial Liabilities
as of June 30, 2019

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	$258,224,699	$ 144,480,670	$113,744,029
Disability benefits likely to be paid to present active members	84,978,708	67,418,319	17,560,389
Death-in-service benefits likely to be paid on behalf of present active members	7,707,778	5,301,388	2,406,390
Separation benefits (refunds of contributions and deferred allowances) likely to be paid to present active members	13,763,673	15,944,769	(2,181,096)
Benefits attributed to voluntary member contributions	472,248	0	472,248
Benefits likely to be paid to vested inactive members	10,212,267	0	10,212,267
Benefits to be paid to members in the DROP, current retirees, beneficiaries, and future beneficiaries of current retirees.	14,255,248	0	14,255,248
Total	$389,614,621	$ 233,145,146	$156,469,475
Less Actuarial Value of Assets	$158,967,545	$ 0	$158,967,545
Plus Rate Stabilization Fund	$ 4,030,561	$ 0	$ 4,030,561
Equals Liabilities to be covered by Future Contributions	$234,677,637	$ 233,145,146	$ 1,532,491
Additional Amount for Full 1% COLA	22,437,752	13,382,391	9,055,361
Total with Full COLA	$257,115,389	$ 246,527,537	$ 10,587,852

Actuarial Balance Sheet

Assets and Present Value of Expected Future Contributons (1/2% VPIF)

Valuation Date June 30:		2019
A. Present Actuarial Value of Assets		
1. Net assets from System financial statements	$	158,967,545
2. Adjustment for Valuation Assets		0
3. Actuarial Value of Assets		158,967,545
B. Actuarial Present Value of Expected Future Employer Contributions		
1. For Normal Costs		139,951,361
2. For Unfunded Actuarial Accrued Liability		(2,498,070)
3. Increase for Rate Stabilization Fund		4,030,561
4. Total		141,483,852
C. Actuarial Present Value of Expected Future Member Contributions		93,193,785
D. Total Present and Expected Future Resources	$	393,645,182

Present Value of Expected Future Benefit Payments

A. To DROP Members, Retirees and Beneficiaries	$	14,255,248
B. To Vested Terminated Members		10,212,267
C. To Present Active Members		
1. Allocated to service rendered prior to valuation date – Actuarial Accrued Liability		131,529,712
2. Allocated to service likely to be rendered after valuation date		233,145,146
3. Total		364,674,858
D. Voluntary Member Contributions		472,248
E. Total Actuarial Present Value of Expected Future Benefit Payments	$	389,614,621

The Actuarial Balance Sheet does not reflect Transition Cost (see Comment 7 on page 10).

Development of Actuarial Gain or Loss (1/2% VPIF)

	Actuarial Accrued Liability (AAL) (A)	Actuarial Value of Assets (B)	Unfunded Actuarial Accrued Liability (C) = (A) - (B)
(1) Beginning of Year (BOY)	$ 126,008,382	$ 127,971,386	$ (1,963,004)
(2) Normal Cost for Service Accruals	25,509,382	N/A	25,509,382
(3) Normal Cost for Vol. Employee Contributions	278,811	N/A	278,811
(4) Total Contributions	N/A	27,600,298	(27,600,298)
(5) Benefit Payments and Refunds	(4,013,358)	(4,013,358)	-
(6) Interest 6.75% x (1) + 6.75% x [(2) + (3) + (4) + (5)] / 2	9,240,466	9,434,128	(193,662)
(7) Expected End of Year (1)+(2)+(3)+(4)+(5) + (6)	$ 157,023,683	$ 160,992,454	$ (3,968,771)
(8) Actual End of Year - Before DROP Changes	157,225,243	158,967,545	(1,742,302)
(9) Gain or Loss (7)-(8)	$ (201,560) Loss	$ 2,024,909 Loss	$ (2,226,469) Loss
(10) Percent of BOY AAL (9)/(1A)	(0.16%)	1.61%	(1.77%)
Gain or Loss Related to Transfers	$ -	$ (4,030,561)	$ 4,030,561
Gain or Loss Unrelated to Transfers	$ (201,560)	$ 6,055,470	$ (6,257,030)

There was a loss on both assets and liabilities. The liability loss is discussed in Comment 2 on page 8.

Type of Risk Area	Gain (Loss) in Period * Totals ($ in millions)	Percent of Beginning of Year Liabilities #
Data Improvements	(0.5)	(0.4)%
Excess Interest Transfers	4.0	3.2 %
Risks Related to Assumptions		
Economic Risk Areas:		
Pay Increases **	(2.6)	(2.1)%
Investment Return	(6.1)	(4.8)%
VPIF	(0.0)	0.0 %
Demographic Risk Areas:		
Full and Reduced Service Retirements	(0.3)	(0.2)%
Death Benefits	0.4	0.3 %
Disability Benefits^	(1.7)	(1.4)%
Other Terminations	4.6	3.6 %
Post-Retirement Mortality	(0.0)	0.0 %
Total Gain (or Loss) During Period	($2.2)	(1.8)%

 # Beginning of year liabilities were $126 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.*
^ Includes improvements to modelling to align with administration.

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 to use the following methods and assumptions:

- Projections based on valuation assumptions.
- VPIF assumption is ½%. This assumption will be reviewed and adjusted as experience emerges.
- 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.
- 12.25% of payroll 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 page 14 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

Valuation Date June 30	Fiscal Year June 30	A Total AAL (Net of Vol. Cont.)	B Transition Cost at Fiscal Year	C = (A - B) Net AAL	D Assets (Net of Vol. Cont. & RSF)	E = (D/C) Net Funded Ratio
2019	2020	$ 155,997,227	$ 16,517,966	$139,479,261	$ 154,464,736	111%
2020	2021	192,034,895	12,783,854	179,251,041	192,304,411	107%
2021	2022	229,896,172	8,797,689	221,098,483	232,480,435	105%
2022	2023	270,038,551	4,542,459	265,496,092	275,351,671	104%
2023	2024	312,490,153	-	312,490,153	320,941,140	103%
2024	2025	357,348,558	-	357,348,558	369,369,424	**103%**

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

Comment 2: The funded status of the Transition Cost determines the amount of ASF Return Excess credited to Component I. For purposes of this valuation we have assumed the Transition Cost is fully funded. For this Component I (Hybrid) valuation, this assumption only affects the Section 9.5 projections. In regards the remedial actions required by Section 9.5, the funded status of the Transition Cost would not have an effect on the remedial actions determined in this valuation.

History of VPIF Granted to Retirees

Plan Year Ending June 30 of	Actual	Assumed
(1)	(2)	(3)
2014	N/A	N/A
2015	0.0%	0.5%
2016	0.0%	0.5%
2017	1.0%	0.5%
2018	1.0%	0.5%
2019	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)

Item	June 30, 2019	June 30, 2018
A. Cash and Cash Equivalents	$ 34,463,600	$ 16,361,957
B. Investments		
1. Global equities	$ 56,565,433	$ 54,424,352
2. Global fixed income	19,971,365	22,763,000
3. Real assets	20,954,318	17,563,729
4. Private equity	12,178,552	5,852,399
5. Diversifying strategies	9,591,883	6,515,125
6. Total Investments	$ 119,261,551	$ 107,118,605
C. Receivables		
1. Accrued interest receivable	$ 211,717	$ 235,299
2. Contributions	4,274,284	4,220,826
3. Other accounts receivables	254,290	0
4. Notes receivable from participants	0	0
5. Receivables from investment sales	3,587,055	3,267,227
6. Total Receivables	$ 8,327,346	$ 7,723,352
D. Prepaid expenses and other assets	0	4,895
E. Cash and investments held as collateral for securities lending		
1. Asset-backed securities	$ 2,297,630	$ 924,484
2. Repurchase agreements	1,668,168	1,538,035
3. U.S. corporate floating rate	7,157,221	6,519,484
4. Total	$ 11,123,019	$ 8,982,003
F. Capital assets - Net	$ 776,512	$ 300,441
G. Liabilities		
1. Claims payable to retirees and beneficiaries	$ 3,198	$ 3,108
2. Payables for investment purchases	3,924,018	3,528,737
3. Due to City of Detroit, Michigan	0	0
3. Amounts due to broker under securities lending arrangements	10,978,768	8,886,368
4. Other liabilities	78,499	101,654
5. Total Liabilities	$ 14,984,483	$ 12,519,867
H. Total Market Value of Assets Available for Benefits	$ 158,967,545	$ 127,971,386
I. Voluntary employee contribution fund	$ 472,248	$ 177,741
J. Market Value Net of Reserves	$ 158,495,297	$ 127,793,645

Asset Allocation Percent
For Combined Plan (Component I and Component II)

The prior page shows results for the Hybrid (Component I) plan only. We understand that, for purposes of determining investment return, Hybrid and Legacy assets are comingled and that resulting investment return is prorated between the two plans proportionate to the total assets within each system. The schedule below shows the allocation of Combined Plan (Hybrid and Legacy) investments:

	June 30, 2019
Allocation of Combined Plan (Hybrid and Legacy) Investments	
1. Short-term investments	3.55 %
2. Global equities	48.08 %
3. Global fixed income	18.62 %
4. Real assets	15.12 %
5. Private equity	8.18 %
6. Diversifying strategies	6.45 %
7. Total Investments	100.00 %

Reconciliation of Plan Assets

	Fiscal Year Ending June 30, 2019					FYE June 30, 2018
	Pension Accumulation Fund	Employee Voluntary Contribution	Employee Mandatory Contribution	Rate Stabilization Fund	Total	Total
Market Value Beginning	$ 95,763,005	$ 177,741	$ 32,030,640	$ -	$ 127,971,386	$ 93,356,020
Additions:						
Employer Contributions	17,832,015	-	-	-	17,832,015	19,244,806
Member Contributions	15,696	278,811	9,473,776	-	9,768,283	9,170,876
Investment Income - Net	5,219,524	16,003	-	-	5,235,527	8,634,498
Other Income	11,915	-	-	4,030,561	4,042,476	55,353
Transfers	-	-	-	-	-	-
Total	23,079,150	294,814	9,473,776	4,030,561	36,878,301	37,105,533
Deductions:						
Benefit Payments	3,617,625	-	-	-	3,617,625	345,297
Refund of Member Contributions	-	307	395,426	-	395,733	216,264
Administrative Expenses	1,868,784	-		-	1,868,784	1,928,606
Total	5,486,409	307	395,426	-	5,882,142	2,490,167
Market Value Ending	$ 113,355,746	$ 472,248	$ 41,108,990	$ 4,030,561	$ 158,967,545	$ 127,971,386

SECTION E

PARTICIPANT DATA

Summary of Participant Data as of June 30, 2019

Actives

A) Count Reported on file	3,288
B) Deferreds - "AnnSt" = "F"	-
C) Non-active status	(22)
D) Agency "88"	-
E) Non-eligible class code & bargaining unit	-
F) Hired after val date	(22)
G) No date of hire on file	-
H) No salary on file	-
I) Also in retiree file (including DROP)	(756)
J) Actives excluding DROP	2,488

Retired

A) Number of records reported on data file	43,696
B) Number of records not in P/F plan	(27,353)
C) Records not currently in receipt of benefits based on reported status codes	(7,237)
D) Coded as Legacy records	(8,865)
E) Records in DROP	(124)
F) Number of records valued	117

Deferred

A) Number of records reported on data file	136
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.	461
C) Zero hybrid service	(6)
D) Less than 10 years of vesting service	(6)
E) Zero mandatory contribution balance	(2)
F) Terminated before 6/30/2014	-
G) Number of records to value	583

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 D: Service provided in the data file is benefit service. Since benefit service doesn’t accrue prior to June 30, 2014, vesting service was determined by combining service in the Legacy inactive file with service in the Hybrid inactive file.

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

Retired Row I: The Retired Life file has a field named “STATUS”. We understand that if this field is populated with a number that is one or greater, the member is no longer receiving a benefit and should not be valued.

Reconciliation

	Active		Term. Vested	DROP		Retirees		Totals
	Count	Pay	Count	Count	Monthly Benefits	Count	Monthly Benefits	Count
2018	**2,575**	**$146,689,948**	**471**	**112**	**$ 29,327**	**90**	**$19,091**	**3,248**
Change in Pay/Pensions	N/A	11,488,467	N/A	N/A	363	N/A	190	
New	185	7,666,786	-					185
New Beneficiary						-	-	-
DROP	(23)	(1,721,286)	-	23	11,148			-
Retired	(12)	(1,020,763)	(2)	(11)	(4,905)	27	12,045	2
Non-Duty Disabled								-
Duty Disabled						-	-	-
Assumed Death/Removals			(16)	-	-	-	-	(16)
Vested Term	(151)	(9,179,917)	131					(20)
Non-Vested Terminated	(87)	(3,939,588)						(87)
Rehired	1	58,296	(1)	-	-	-	-	-
Data Adjustment	-	-	-	-	(20)	-	-	-
2019	**2,488**	**$150,041,943**	**583**	**124**	**$35,913**	**117**	**$31,326**	**3,312**

Notable Data Changes:

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

16 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.

2 new retirees came from nowhere. We assumed these are a result of EDRO's.

The data adjustments relate to records where we could not specifically identify the activity during the year. We assumed these are the result of duplicate record numbers or corrected record numbers.

Data Adjustments

Active records are reported in the access data file in the table titled PF_Benefits_Hybrid. Information from the Legacy active file (service) is appended to this file. Hybrid service provided on the data file was reduced by one month to account for additional service granted past the valuation date.

Inactive vested records are reported in the access data file in the table titled PF_Benefits_Vested_Hybrid. Information from the Legacy inactive file (Legacy service) is appended to the Hybrid file. Inactive vested members for Component I (Hybrid) have not been fully processed by Detroit staff. In particular, members that have retired or DROPed under the Legacy plan with a deferred Hybrid benefit are not included in the Inactive data sent to us. These members were processed using information from the active or retiree file with the following assumptions:

- Benefit service was calculated by using the time elapsed from June 30, 2014 to the retirement date.
- The AFC that was used to calculate the benefit is the Component II (Legacy) amount reported on the retiree file.

For the inactive vested records, if unavailable, $52,500 was used for the AFC. This estimate was determined by analyzing the AFC reported in the June 30, 2019 inactive vested data.

For retirees, 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 three years older than females. Benefits for dependent children are assumed to cease at age 21.

We have been instructed by System Staff to use bargaining unit information to determine membership in DPLSA and DPCOA. As a result, class information was used from the 2014 valuation data to assign retirement probabilities since class code no longer has meaning under Component I. This information is used to determine DPLSA and DPCOA (and Fire equivalents) membership as defined in Component II as of June 30, 2014. In particular, for members older than 43 or with more than 17 years of service as of June 30, 2014, individuals with DPLSA and DPCOA (and Fire equivalent) class codes were assumed to be eligible for Component II 25 & Out retirement conditions and individuals with DPOA (and Fire equivalent) class codes were assumed to be eligible for Component II 20 & Out retirement conditions.

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 as active in this plan.

Please see our 2019 data summary letter dated January 31, 2020 for additional details.

After processing the data, we sent the above-mentioned data letter to staff for their review. Staff authorized GRS to proceed with the valuation based on that letter including the data processing procedures and assumptions described therein.

Active Members June 30, 2019
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	7							7	$ 285,124
20-24	228	1						229	10,317,120
25-29	324	40	1					365	18,179,473
30-34	136	53	29					218	11,875,341
35-39	46	28	64	51	1			190	11,853,059
40-44	10	12	41	150	63			276	19,091,001
45-49	4	6	22	114	159	7	1	313	22,457,240
50-54		5	10	46	72	9	3	145	10,296,662
55-59		3	3	23	25	3	4	61	4,119,643
60-64			1	2	1	1	1	6	392,007
65-69				1			2	3	212,706
70-74				1				1	65,216
Totals	**755**	**148**	**171**	**388**	**321**	**20**	**11**	**1,814**	**$109,144,592**

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									$ 0
20-24	25	1						26	1,183,219
25-29	64	21	2					87	4,356,762
30-34	58	27	2	2				89	4,743,675
35-39	27	14	14	17	3			75	4,332,244
40-44	7	5	12	72	15			111	6,761,509
45-49	3	3	9	63	61	10		149	9,724,094
50-54			7	27	35	21	11	101	7,094,678
55-59				12	11	6	4	33	2,449,487
60-64				2		1		3	251,683
Totals	**184**	**71**	**46**	**195**	**125**	**38**	**15**	**674**	**$40,897,351**

** Excluding DROP members.*

Total Active Members June 30, 2019
by Attained Age and Years of Eligibility Service

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll *
Under 20	7							7	$ 285,124
20-24	253	2						255	11,500,339
25-29	388	61	3					452	22,536,235
30-34	194	80	31	2				307	16,619,016
35-39	73	42	78	68	4			265	16,185,303
40-44	17	17	53	222	78			387	25,852,510
45-49	7	9	31	177	220	17	1	462	32,181,334
50-54		5	17	73	107	30	14	246	17,391,340
55-59		3	3	35	36	9	8	94	6,569,130
60-64			1	4	1	2	1	9	643,690
65-69				1			2	3	212,706
70-74				1				1	65,216
Totals	**939**	**219**	**217**	**583**	**446**	**58**	**26**	**2,488**	**$150,041,943**

Summary

	Police	Fire	6/30/2019 Totals	6/30/2018 Totals
Number	1,814	674	2,488	2,575
% Change in active members from prior year	(3.6)%	(2.9)%	(3.4)%	2.1 %
Annual payroll ($ millions)	$ 109.1	$ 40.9	$ 150.0	$ 146.7
Average pay	$60,168	$60,679	$60,306	$56,967
% Change in average pay from prior year	5.4 %	7.1 %	5.9 %	1.8 %
Average age	37.0	40.9	38.0	38.4
Average benefit service	3.7	4.4	3.9	3.2
Average eligibility service	10.9	14.0	11.7	12.0

** Excluding DROP members.*

Historical Summary of Active Member Data

Valuation	Active Members		Covered 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

Summary of Retiree and Inactive Data

Retirees

	Police	Fire	6/30/2019 Totals	6/30/2018 Totals
Number	82	35	117	90
Annual benefits including annuities as reported	292,116	83,799	375,915	229,068
Average benefits as reported	$ 3,562	$ 2,394	$ 3,213	$ 2,545
% Change in average benefit from prior year	26.7 %	20.7 %	26.2 %	38.9 %

Deferred Members

	Police	Fire	6/30/2019 Total	6/30/2018 Total
Number	527	56	583	471
Average AFC	57,636	56,924	57,568	54,925
Average service	2.7	2.1	2.6	2.1
Annual benefits (estimated)	1,661,584	132,211	1,793,795	1,074,912
Average benefits (estimated)	$3,153	$2,361	$3,077	$2,282
% Change in average Service	28.6%	10.5%	27.3%	5.6%
% Change in average AFC	5.3%	0.9%	4.8%	3.6%

Drop Members

	Police	Fire	6/30/2019 Totals	6/30/2018 Totals
Number	92	32	124	112
Annual benefits as reported	336,924	94,028	430,952	266,100
Average benefits as reported	$ 3,662	$ 2,938	$ 3,475	$ 2,376
% Change in average benefit from prior year	46.8%	41.2%	46.3%	45.1%

Legacy Disabled Members

	Police	Fire	6/30/2019 Totals	6/30/2018 Totals
Number	51	25	76	N/A
Annual post-conversion benefits (estimated)	708,808	305,738	1,014,546	N/A
Average post-conversion benefits (estimated)	$ 13,898	$ 12,230	$ 13,349	N/A
% Change in average benefit from prior year				

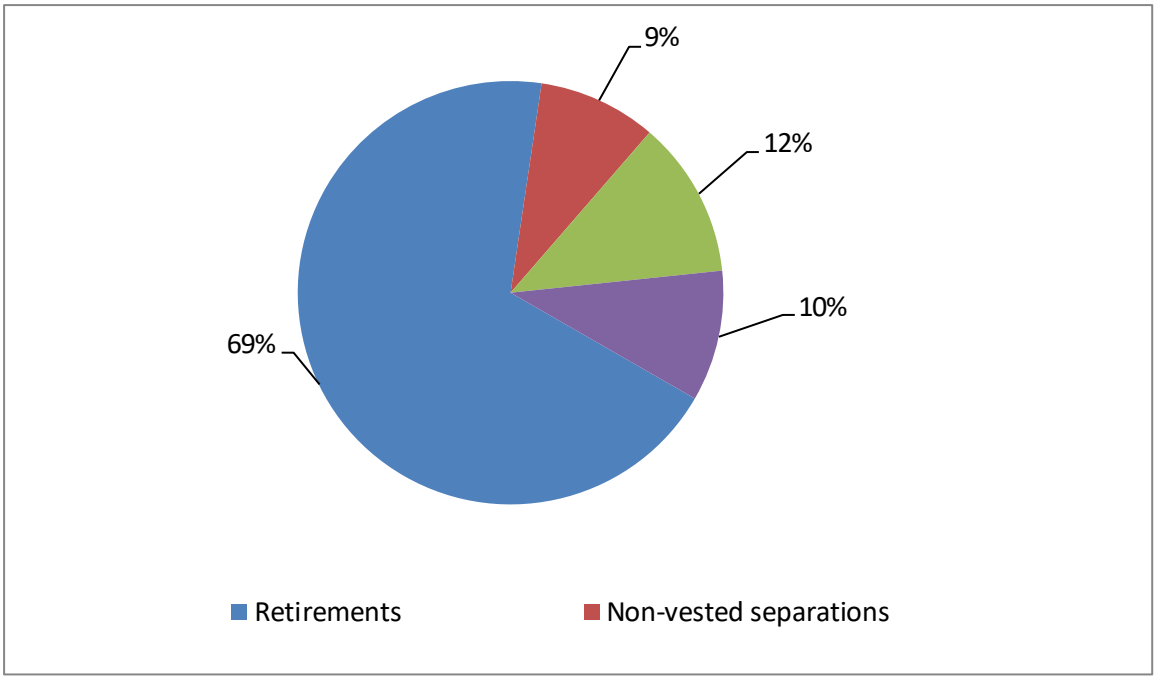
We were not provided with Hybrid specific information for members that entered duty disability after June 30, 2014. In order to value the post-conversion (age 65) benefit for these individuals, we:

- Took duty disability members listed in the Legacy data that became disabled after June 30, 2014;
- 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%).

Summary of Membership Data by Category

	June 30, 2019	June 30, 2018
Active Members (Excluding DROP)		
Number	2,488	2,575
Average age (years)	38.0	38.4
Average service (years)	11.7	12.0
Average salary	$ 60,306	$ 56,967
Total payroll supplied, annualized	$ 150,041,943	$ 146,689,948
Members in DROP		
Number	124	112
Average age (years)	54.1	53.4
Total annual benefits	$ 430,952	$ 351,925
Average annual benefit	$ 3,475	$ 3,142
Vested Inactive Members		
Number	583	471
Average age (years)	48.5	47.8
Total annual deferred benefits	$ 1,793,795	$ 1,074,913
Average annual deferred benefit	$ 3,077	$ 2,282
Service Retirees		
Number	112	85
Average age (years)	55.5	54.2
Total annual benefits	$ 278,650	$ 132,784
Average annual benefit	$ 2,488	$ 1,562
Disability Retirees		
Number	1	1
Average age (years)	59.7	58.7
Total annual benefits	$ 36,205	$ 35,846
Average annual benefit	$ 36,205	$ 35,846
Beneficiaries (Including Death in Service)		
Number	4	4
Average age (years)	23.1	22.1
Total annual benefits	$ 61,061	$ 60,456
Average annual benefit	$ 15,265	$ 15,114
Legacy Disability Retirees		
Number	76	N/A
Average age (years)	46.4	N/A
Total annual post-conversion benefits	$ 1,014,546	N/A
Average annual benefit	$ 13,349	N/A

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 2,488 active members. Eventually, 225 members are expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 1,970 members are expected to receive monthly retirement benefits either by retiring directly from active service (including DROP), or by retiring from vested deferred status. 293 members are expected to become eligible for death-in-service or disability benefits.

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.

Present assets are set equal to the Market Value.

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.

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 the 2002-2007 Experience Study of the Component II plan unless noted otherwise. The Board has elected to defer the next experience study until a full five years of experience is available after the City's bankruptcy. The next study is anticipated to cover the period from July 1, 2015 through July 30, 2020.

ECONOMIC ASSUMPTIONS

The investment return rate used in the valuation was 6.75% per year, compounded annually (net after investment and administrative 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 all expenses.

Pay increase assumptions for individual active members are shown on page 34. Part of the assumption for each age is for a merit and/or seniority increase, and the other recognizes wage inflation (as of June 30, 2014, assumed to be 2.00% for five years, 2.50% for the next five years after that and 3.00% thereafter). The rationale for this assumption is that it is consistent with expectations by the employer used during the plan design.

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.

NON-ECONOMIC ASSUMPTIONS

The mortality table used to measure retired life mortality is the RP-2014 Blue Collar Annuitant Table for males and females. Tables were extended below age 50 with a cubic spline to the published Juvenile rates. Pre-retirement mortality is the RP-2014 Blue Collar Employee Tables for males and females. The tables are projected to be fully generational, based on the two-dimensional, sex distinct mortality improvement scale MP-2014 (which was published and intended to be used with RP-2014). The rationale for the mortality assumption is based on the 2008-2013 Mortality Experience Study issued February 13, 2015.

The probabilities of age/service retirement for members eligible to retire are shown on pages 35 through 37. The rationale is based on the 2002-2007 Experience Study modified as necessary to account for the difference in eligibility of the Component I plan.

The probabilities of separation from service are shown for sample ages on page 38.

Sample Salary Adjustment Rates

Service	Salary Increase Assumptions for an Individual Member: Merit & Seniority	Base (Economic)*	Increase Next Year
5	5.20%	3.00%	8.20%
10	1.70%	3.00%	4.70%
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%

** Ultimate rate shown. Base (Economic) salary increase rates as of June 30, 2014 are assumed to be 2.00% for five years, 2.50% for the next five years after that and 3.00% thereafter.*

Single Life Retirement Values Based on RP-2014 Blue Collar for Males and Females

Sample Attained Ages in 2019	Future Life Expectancy (Years): Males	Females
45	39.70	43.04
50	34.72	37.97
55	29.91	33.04
60	25.33	28.26
65	20.97	23.65
70	16.91	19.28
75	13.20	15.23
80	9.91	11.62

Probabilities of Service Retirement for Members Older Than Age 43 or with 17 or More Years of Credited Service (Including Prior Service) as of June 30, 2014

	Percent of Eligible Active Members Retiring or Entering DROP Within Next Year			
	Police		Fire	
Service	20 & Out	25 & Out	20 & Out	25 & Out
19	40%		40%	
20	40%		40%	
21	40%		40%	
22	40%		40%	
23	40%		40%	
24	100%	40%	100%	40%
25	100%	40%	100%	40%
26	100%	40%	100%	40%
27	100%	40%	100%	40%
28	100%	40%	100%	40%
29	100%	100%	100%	100%
30	100%	100%	100%	100%
31	100%	100%	100%	100%
32	100%	100%	100%	100%
33	100%	100%	100%	100%
34	100%	100%	100%	100%
35	100%	100%	100%	100%
36	100%	100%	100%	100%
37	100%	100%	100%	100%
38	100%	100%	100%	100%
39	100%	100%	100%	100%
40	100%	100%	100%	100%

The rationale for the retirement probabilities is the 2002-2007 Experience Study modified to account for the different eligibility in Component I and split to estimate which eligibility (Component I or Component II) would influence members based on the relative service under each component.

Probabilities of Service Retirement for Members Older Than Age 43 or with 17 or More Years of Credited Service (Including Prior Service) as of June 30, 2014

	Percent of Eligible Active Members Retiring or Entering DROP Within Next Year	
Age	**Police**	**Fire**
60	40%	100%
61	40%	100%
62	40%	100%
63	40%	100%
64	40%	100%
65	100%	100%
66	100%	100%
67	100%	100%
68	100%	100%
69	100%	100%
70	100%	100%

Members eligible for 20 & Out are assumed to be first eligible for normal retirement after 19 years of service due to their ability to purchase service. Members eligible for 25 & Out are assumed to be eligible for normal retirement after 24 years of service due to their ability to purchase service Members are also eligible to retire at age 60 with no service requirement.

Probabilities of Service Retirement for Members Age 43 or Younger and with Less Than 17 Years of Service on June 30, 2014

	Percent of Eligible Active Members Retiring or Entering DROP Within Next Year	
Age	**Police**	**Fire**
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	100%	100%

The rationale for the retirement probabilities is the 2002-2007 Experience Study modified to account for the different eligibility in Component I and split to estimate which eligibility (Component I or Component II) would influence members based on the relative service under each component.

Probabilities of Separation

Sample Ages	Years of Service	% of Active Members Withdrawing within Next Year	
		Police	Fire
ALL	0	8.50%	5.00%
	1	7.50%	4.00%
	2	6.00%	3.00%
	3	5.00%	2.00%
	4	4.50%	2.00%
25	5 & Over	4.50%	1.96%
30		3.30%	1.62%
35		2.30%	1.11%
40		1.70%	0.77%
45		1.50%	0.60%
50		1.10%	0.51%
55		0.80%	0.51%
60		0.80%	0.51%

Sample Ages	% of Active Members Becoming Disabled Within Next Year			
	Police		Fire	
	Ordinary	Duty	Ordinary	Duty
25	0.06%	0.13%	0.07%	0.34%
30	0.07%	0.19%	0.08%	0.52%
35	0.08%	0.34%	0.09%	0.90%
40	0.11%	0.49%	0.12%	1.30%
45	0.16%	0.73%	0.18%	1.92%
50	0.47%	1.16%	0.53%	3.06%
55	0.73%	1.96%	0.82%	5.18%
60	0.83%	2.82%	0.94%	7.47%

Miscellaneous and Technical Assumptions
June 30, 2019

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.
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.
Decrement Timing:	Decrements are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date of decrement.
Decrement Operation:	Disability and mortality decrements do not operate during the first five years of service. Disability and withdrawal do not operate during retirement eligibility.
Longevity in AFC:	None
Unused Sick Leave Payout:	None
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.
Mandatory Retirement Age:	Currently most members of the DPFRS are subject to a mandatory retirement age of 60. However, we understand that the mandatory retirement age is currently not enforced for Police members. Recent membership data indicates that very few Police members stay in employment past age 65. We have, therefore, assumed employment would end at age 65 for Police members and age 60 for Fire members regardless of the length of their DROP participation at that age.
DROP Assumption:	Members are assumed to retire or DROP based on assumed rates. For Police members, 65% of eligible members are assumed to enter the DROP and remain in the DROP for seven 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. DROP account balances are assumed to grow at 6.75% per year.

Miscellaneous and Technical Assumptions
June 30, 2019
(Concluded)

Service Credit Accruals:	Service accruals for calculating benefits begin as of June 30, 2014 for Component I liabilities. However, service in Component II may be used to satisfy benefit eligibility requirements in Component I.
Workers Compensation Offset:	No Workers Compensation offsets are assumed for duty disability benefits.
DROP Account:	Members in the Component II DROP as of June 30, 2014 were excluded from this valuation.
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 deferred retirement commencement.
Form of Payment:	No adjustment has been made for alternate forms of payment elections.
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.
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.
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.
COLA (VPIF):	Unless stated otherwise, liabilities in this report are based on an assumed average 0.5% future VPIF. The rationale is that COLAs are not guaranteed. This assumption was set based on scenario analysis at Plan inception and will be revised as experience emerges and the Plan evolves.
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.
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%.

SECTION G

PLAN PROVISION SUMMARY (AS APPROVED BY STAFF)

Summary of Benefit Provisions
(July 1, 2017)

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.

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.

Summary of Benefit Provisions (Continued)

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, Actuarial Value of Assets, and related Actuarial Present Values for a plan.
Actuarial 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.
DFFA	Detroit Fire Fighters Association.
DPCOA	Detroit Police Command Officers Association.
DPOA	Detroit Police Officers Association.
DROP	Deferred Retirement Option Program.
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.

Glossary

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 Actuarial Value of Assets to the Actuarial Accrued Liability.
GASB	Governmental Accounting Standards Board.
GASB No. 67 and GASB 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. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
LSA	Lieutenants and Sergeants Association.
Normal Cost	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.
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.
Transition Cost	Initial unfunded liability as described in Section E-16 of the Plan document.

Glossary

Unfunded Actuarial Accrued Liability	The difference between the Actuarial Accrued Liability and Actuarial 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.

The Police and Fire Retirement System of the City of Detroit

Annual Actuarial Valuation of Component II

June 30, 2019

800.521.0498 | P: 248.799.9000 | www.grsconsulting.com

April 15, 2020

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, 2019.**

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 provide 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. In very general terms, Component I provide benefits for service rendered on and after July 1, 2014 and Component II provides benefits for service rendered prior to July 1, 2014.

The results provided herein relate solely to the **Component II** benefits. Component I benefits will be the subject of a separate report. The purposes of the valuation are to measure the funding progress of Component II in accordance with the terms of the POA and to provide alternate illustrative actuarially determined contribution amounts for comparison with the contribution amounts provided in the POA. 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 POA will also be provided in a separate report at the Board's request.

The contribution amounts on page 4 include POA stipulated contributions plus two illustrative contribution amounts from alternate funding policies. Users of this report should be aware that contributions made at any of 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.

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

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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.

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. Except for the assumed rate of investment return, the actuarial assumptions used for the valuation are set by the Board based upon discussion with the actuary and other parties. 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. In our judgement, all of the actuarial assumptions used for the valuation are reasonable for purposes of the measurement being taken.

This report does not reflect events occurring after the valuation date. In particular, it does not reflect the impact of COVID-19 that is likely to affect economic and demographic experience during calendar year 2020 and possibly beyond.

This report has been prepared by individuals 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.

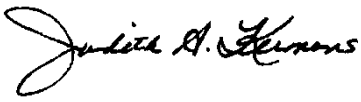
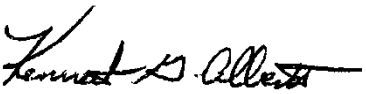
The individuals signing the report are independent of the plan sponsor.

David T. Kausch and Judith A. Kermans 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.

Our understanding, based on recent information provided by the Retirement System, is that in spring 2019 the Bankruptcy Court approved a change to the POA that now allows Detroit Police Officers Association (DPOA) members who DROP to stay in the DROP plan for up to 10 years. We have incorporated that change into this valuation.

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 are expected to lead to a decrease in the funded status through June 30, 2023 (as contemplated by the POA), even if all assumptions are met.

Respectfully submitted,

David T. Kausch, FSA, EA, FCA, MAAA, PhD | Judith A. Kermans, EA, FCA, MAAA | Kenneth G. Alberts

DTK/JAK/KGA:bd

Table of Contents

VALUATION RESULTS

Executive Summary

($ in Millions)

Valuation Date	June 30, 2019	June 30, 2018
Contributions For Fiscal Year Ending	June 30, 2021	June 30, 2020
POA Mandated Employer Contributions	$ 18.3	$ 18.3
Membership		
Number of:		
Active Members	1,551	1,752
DROP Members	764	694
Retirees and Beneficiaries	8,102	8,151
Inactive, Nonretired Members	394	410
Total	10,811	11,208
Valuation Payroll	$ 105.2	$ 111.4
Assets		
Market Value (1)	$ 2,670.8	$ 2,866.3
Return on Market Value (net of administrative expenses)	3.54 %	8.46 %
Actuarial Information		
Actuarial Accrued Liability (2)	$ 3,843.3	$ 3,907.4
Unfunded Actuarial Accrued Liability: (2) - (1)	1,172.4	1,041.1
Funded Ratio: (1) / (2)	69.49 %	73.36 %
Risk Metrics		
Actuarial Accrued Liability Divided by Payroll	36.5	35.1
Market Value of Assets Divided by Payroll	25.4	25.7

Valuation Results

Actual POA Contributions

Required contributions to the Plan through FY 2023 are provided in the POA. The schedule below details our understanding of the remaining contributions required by the POA.

Fiscal Year	Contribution (Millions)
2020	$ 18.3
2021	18.3
2022	18.3
2023	18.3

We have assumed that the contributions outlined above (as called for in the POA with adjustments) will not change. An estimate of the probability of those payments being made was outside the scope of this project, not required by Actuarial Standards, and was not made.

Estimated 2024 Contributions

In order to help the Board assess the longer term implications of the funding requirements dictated in the POA, we have estimated the contribution that will be needed in 2024 when actuarially determined contributions will again be required according to the Plan.

The Estimated Employer Contribution for FY 2024 shown below is based on a projection of results assuming only the POA contributions are made and all future experience between the valuation date and FY 2024 is as assumed. Actual experience will impact the final result (which will be based on the June 30, 2022 actuarial valuation) and could be materially different than shown.

	($ millions)
UAAL * as of June 30, 2019	$ 1,172.4
Anticipated POA Contribution for FY 2020	18.3
Anticipated Expenses@	-
Interest at 6.75%	79.1
Projected UAAL * as of June 30, 2020	$ 1,233.3
Anticipated POA Contributions for FY 2021	**18.3**
Estimated Employer Contributions for FY 2024!	
Level Principal (30-year period beginning in FY 2024)	**$ 145.4**
Level Dollar (30-year period beginning in FY 2024)	**$ 113.3**

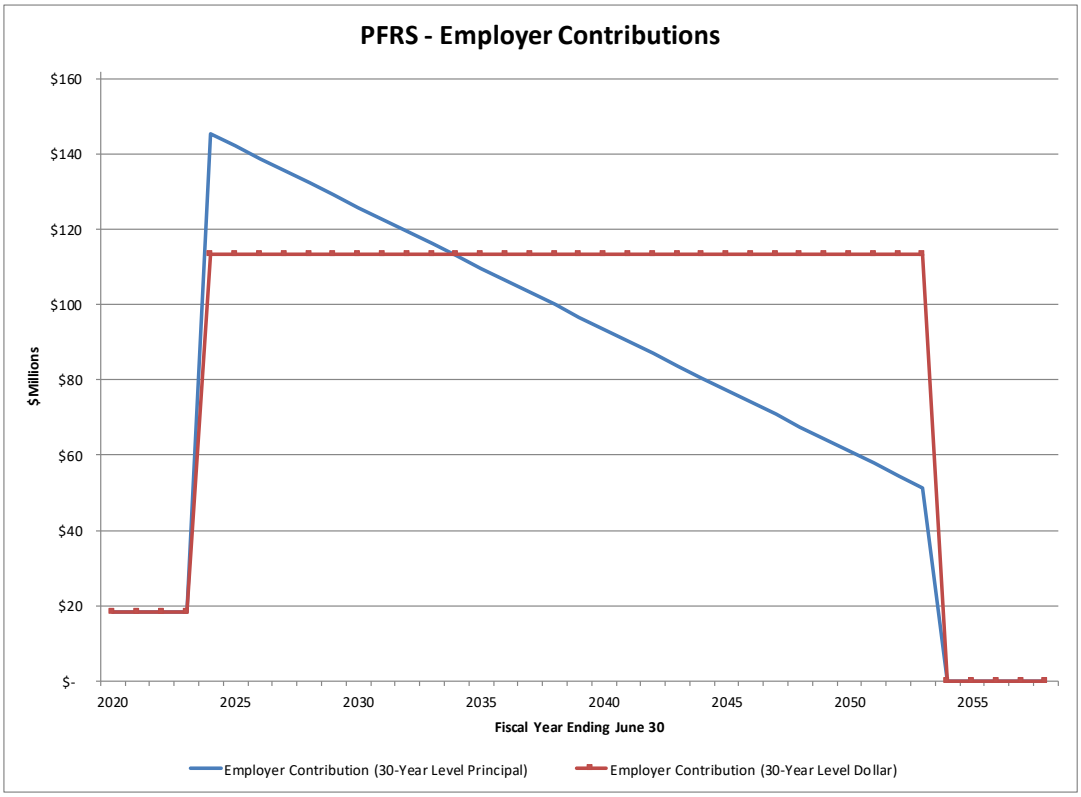
* *Unfunded Actuarial Accrued Liability.*

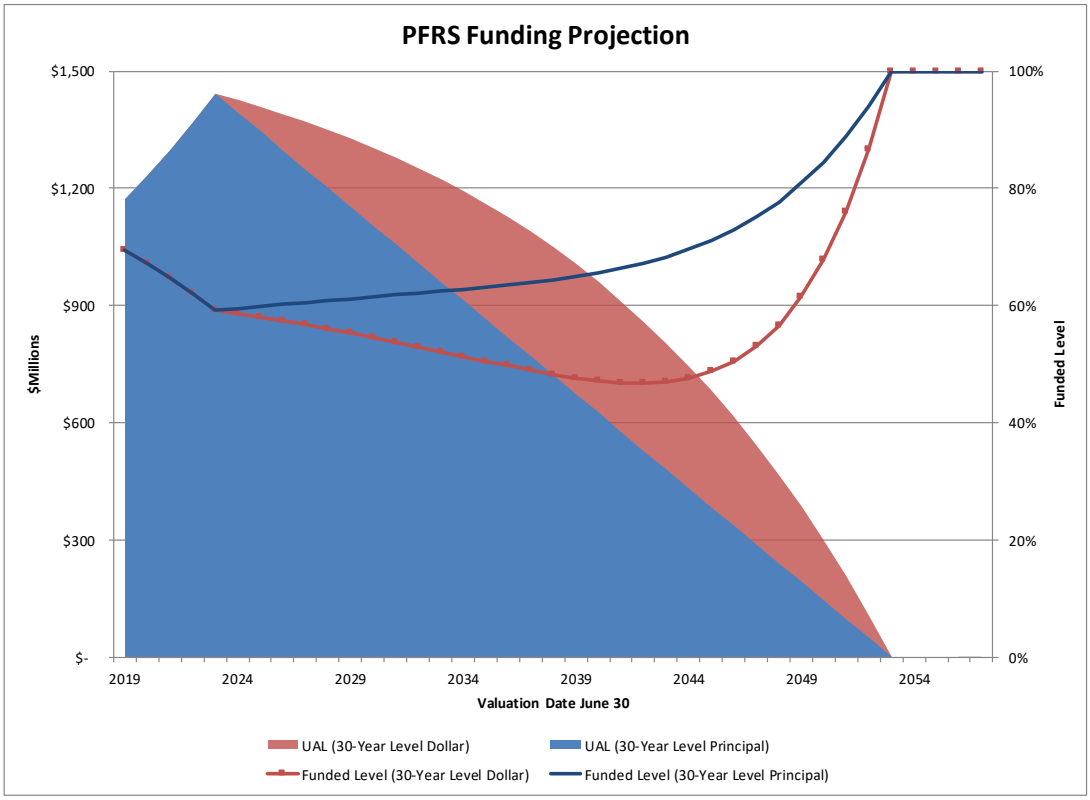
@ *In accordance with the Plan Document, the mandated 6.75% rate of return is net of investment and administrative expenses. Contributions are assumed to be made at the end of the year.*

! *Total estimated employer contributions needed, including amounts paid by employer but funded from other sources as required by the POA.*

The POA contributions will continue to result in a defunding of the plan between now and June 30, 2023, which was contemplated by the POA. In fact, the anticipated POA contribution for FY 2020 is about one fourth of the interest that will accrue on the UAAL and about 6% of the annual benefit payments.

Valuation Results (Continued)





Notes: 30-year amortization periods are assumed to begin in FY 2024.
30-year level dollar is expected to result in a declining funded status for many years after June 30, 2023.

Valuation Results (Continued)

We have recommended that the Board establish a funding policy for the contribution determinations on and after Fiscal Year 2024. The Board has accepted this recommendation and has begun the process. Once that process has been completed we will incorporate the adopted policy in future valuation reports. Until that process is completed, we will continue to show the following two possible policies.

In the chart below, the first policy funds the UAAL over the expected remaining active service life of this group. The second policy is similar to the Board's pre-bankruptcy policy, but with accelerated principle payments of the UAAL to prevent insolvency prior to the end of the funding period. The illustrations are intended to show that there are a broad range of possible funding policies, but are not intended to provide specific recommendation or a minimum or maximum level of contributions.

Funding Policy 1 is based on amortizing the UAAL over the average remaining service life of active members (4 years) using level dollar amortization.

Funding Policy 2 is based on amortizing the UAAL with level principal payments over a 30-year period plus interest. This method is also known as level principal declining interest amortization.

Illustrative Contribution Shortfall	($ millions)
(1) Illustrative Contribution for FY 2021 (Funding Policy 1)	$ 362.0
(2) Illustrative Contribution for FY 2021 (Funding Policy 2)	124.4
(3) POA Contribution for FY 2021	18.3
Fiscal Year 2021 Shortfall - Funding Policy 1: (1) - (3)	$ 343.7
Fiscal Year 2021 Shortfall - Funding Policy 2: (2) - (3)	$ 106.1

We understand the Employer has set aside some money to contribute to the Pension Plans in the future. Since the portion of the fund this Plan will receive has not been determined, we have not taken those assets into account in our calculations. We commend the Employer for taking proactive steps to manage the estimated increase in funding requirements beginning in FY 2024. In the meantime, we recommend continued consideration of increasing contributions actually deposited into the trust.

In addition, as the Board works through the funding policy, we would suggest considering a funding period less than 30 years. Given the fact that not all of the retiree liabilities are funded, a period of 15 years or less should be considered so that progress can be made in paying off the UAAL.

Valuation Results (Continued)

Present Value	June 30, 2019	June 30, 2018
Accrued Pension Liabilities		
Retirees and beneficiaries	$3,055,699,278	$3,073,060,042
Inactive members future deferred pensions	61,658,034	61,836,388
Active members	577,882,824	667,994,063
Total accrued pension liabilities	3,695,240,136	3,802,890,493
Pension fund balances	2,522,817,278	2,761,816,192
Unfunded accrued pension liabilities	$1,172,422,858	$1,041,074,301
Accrued Annuity Liabilities		
Retirees and beneficiaries		
Future annuities	$ 3,730,401	$ 3,962,935
Reserve for outstanding refunds & contingencies	26,819,139	26,017,157
Total	$ 30,549,540	$ 29,980,092
Members annuities & future refunds	117,476,538	74,507,521
Total accrued annuity liabilities	148,026,078	104,487,613
Annuity fund balances	148,026,078	104,487,613
Unfunded accrued annuity liabilities	$ 0	$ 0
System Totals		
Actuarial accrued liabilities	$3,843,266,214	$3,907,378,106
Accrued assets	2,670,843,356	2,866,303,805
Unfunded actuarial accrued liabilities	$1,172,422,858	$1,041,074,301

Valuation Results (Concluded)

Funded Ratio - POA

		Defined Benefit	Annuity Funds	Total
A	Actuarial Accrued Liability	$ 3,695,240,136	$ 148,026,078	$ 3,843,266,214
B	Market Value of Assets	$ 2,522,817,278	$ 148,026,078	$ 2,670,843,356
C	Unfunded Actuarial Accrued Liability (A - B)	$ 1,172,422,858	$ -	$ 1,172,422,858
D	Funded Ratio (B/A)	68.3%	100.0%	69.5%
E	Prior Years Funded Ratio	72.6%	100.0%	73.4%

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.

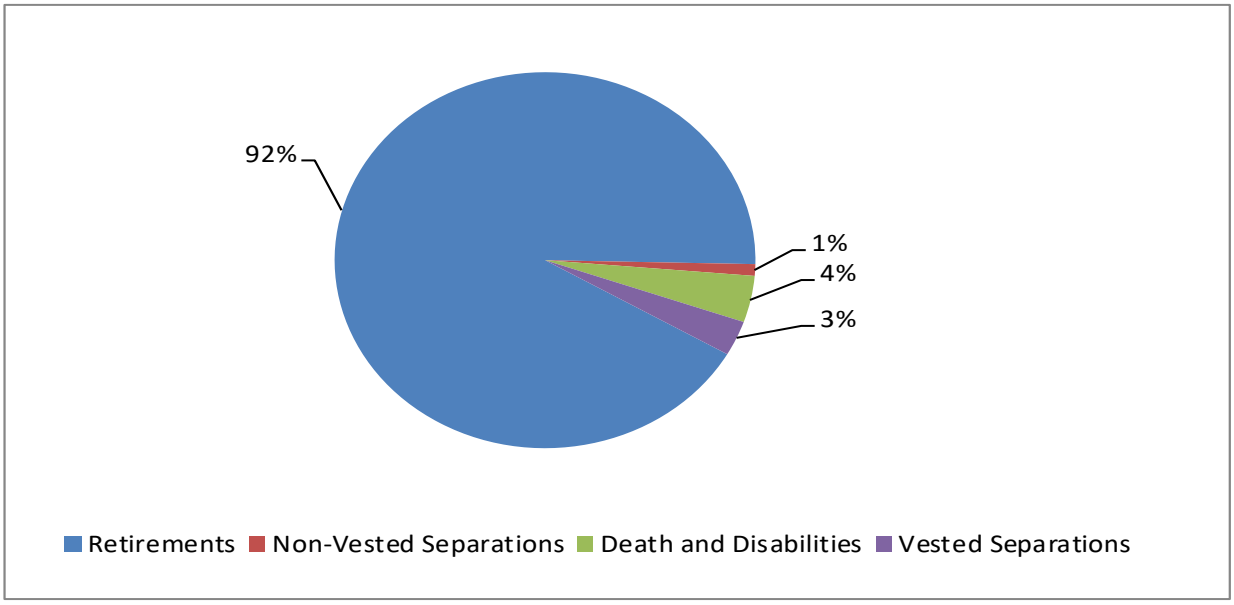
Funded Ratio - Solvency

		Defined Benefit	Annuity Funds	Total
A	Actuarial Accrued Liability	$ 5,600,097,657	$ 148,026,078	$ 5,748,123,735
B	Market Value of Assets	$ 2,522,817,278	$ 148,026,078	$ 2,670,843,356
C	Unfunded Actuarial Accrued Liability (A - B)	$ 3,077,280,379	$ -	$ 3,077,280,379
D	Funded Ratio (B/A)	45.0%	100.0%	46.5%

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 3.13% as of June 30, 2019, based on the long-term municipal bond rate ("20-Year Municipal GO AA Index" rate from the Fidelity Index as of June 28, 2019). 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.

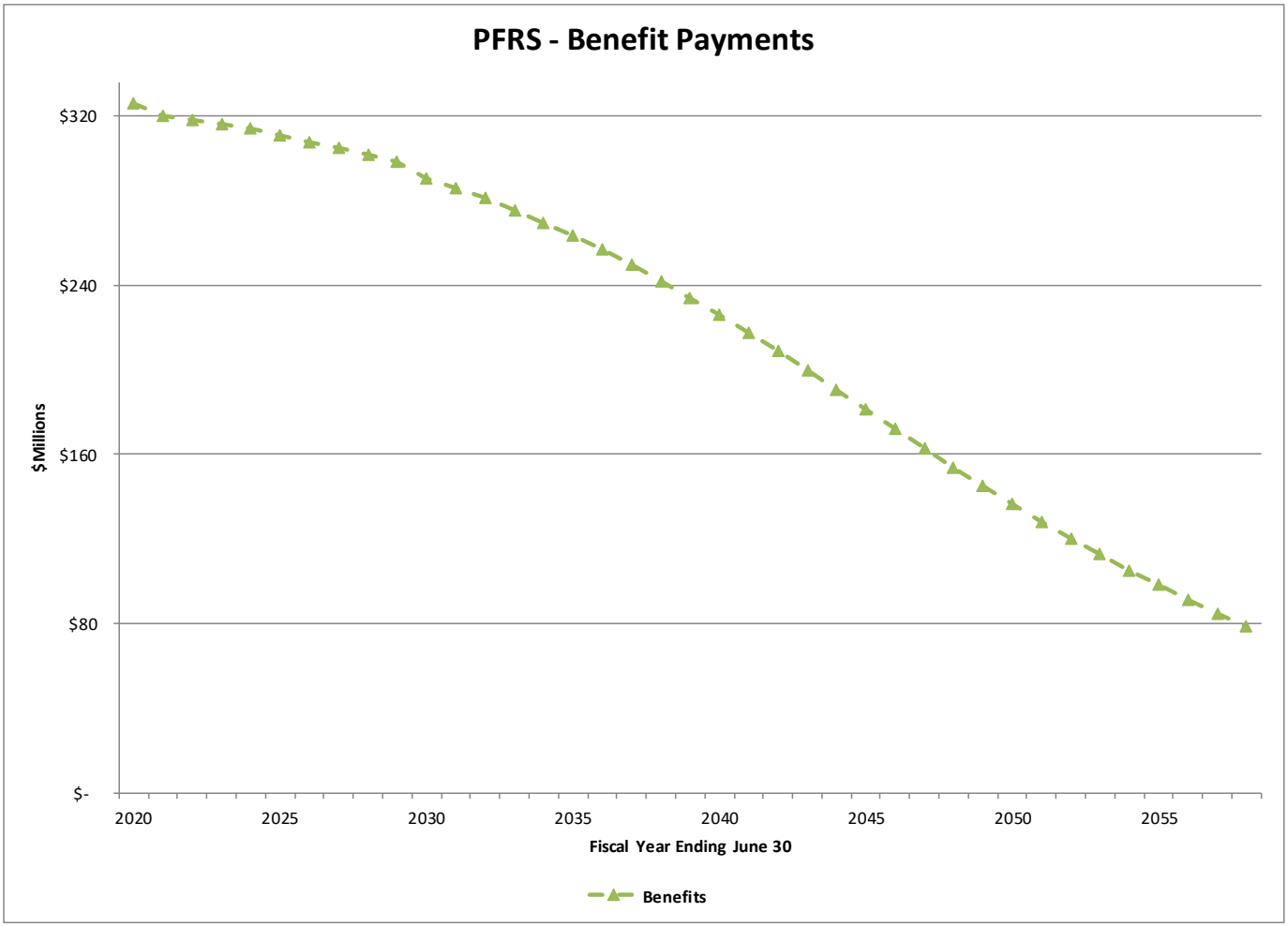
Expected Terminations from Active Employment for Current Active Members



The chart above shows the expected future development of the present population in simplified terms. The Retirement System presently covers 1,551 active members (excluding 764 members currently in the DROP). Eventually, 22 members are expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 1,464 members are expected to receive monthly retirement benefits either by retiring directly from active service (including DROP), or by retiring from vested deferred status. 65 members are expected to become eligible for death-in-service or disability benefits.

Expected Benefit Payments

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



Comments, Recommendations and Conclusion

Experience

Experience was less favorable than assumed during the year ending June 30, 2019. The main sources of the losses were investment experience. These losses were partially offset by experience gains as a result of retirements (fewer members retired then 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) ($ millions)

	$ Millions
(1) UAAL* as of June 30, 2018	$ 1,041.1
(2) POA Contribution FY 2019	18.3
(3) Interest at 6.75%	70.3
(4) Benefit Changes	(4.3)
(5) Projected UAAL* as of June 30, 2019 (1) - (2) + (3) + (4)	$ 1,088.7
(6) Actual UAAL* as of June 30, 2019	1,172.4
Gain (Loss): (5) - (6)	$ (83.7)
Gain (Loss) from Investments	(87.1)
Gain (Loss) from Excess Interest Transfers (Inc. FY 2019)	(2.9)
Gain (Loss) from Liabilities	6.3

** Unfunded Actuarial Accrued Liability.*

Type of Risk Area	Gain (Loss) in Period* Totals ($ in millions)	Percent of Beginning of Year Liabilities^
Data Improvements**	$ (3.6)	(0.1)%
Excess Interest Transfers (Inc. FY 2019)	(2.9)	(0.1)%
Risks Related to Assumptions		
Economic Risk Areas:		
Investment Return	(87.1)	(2.2)%
Demographic Risk Areas:		
Full and Reduced Service Retirements	9.5	0.2 %
Death Benefits	(0.3)	0.0 %
Disability Benefits	(3.5)	(0.1)%
Other Terminations	0.2	0.0 %
Post-Retirement Mortality	4.0	0.1 %
Total Gain (or Loss) During Period	(83.7)	(2.1)%

** Results are approximate due to limitations in data.*
^ Beginning of year accrued liabilities is equal to $3,907.4 million.
***Net of adjustments to modeling as a result of data changes.*

Year Ended June 30	Actives: Number Added During Year A	E	Terminations During Year: Normal Retirement A	E	Disability Retirement A	E	Died-in-Service A*	E	Withdrawal: Vested A	Other A	Total A	E	Retiree Deaths A	E
2019	5	0	157	363	18	12	0	1	23	8	31	18	281	247

Comments, Recommendations and Conclusion

Benefit Changes

We understand that new DROP plan provisions have been adopted. The new provisions allow DPOA (Detroit Police Officers Association) members to participate in the DROP program for a maximum of 10 years, up from the prior maximum of five (5) years. We modeled this change by changing the DROP assumptions for this group. The assumptions we used are consistent with our February 24, 2017 supplemental valuation modeling proposed changes to the DROP provisions. For eligible DPOA members, it was assumed that 65% (up from 60%) of members would DROP and would stay in DROP for an average of seven (7) years (up from five (5) years). This assumption may be revisited in the next experience study. The change in the DROP provision combined with the corresponding change in the DROP assumption resulted in a $4.3 million decrease in the UAAL.

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, 2018 valuation to our estimate from this valuation (June 30, 2019). For purposes of this reconciliation, amortized periods are 30 years.

	$ Millions	
	Level Principal	Level Dollar
Estimated FY 2024 Employer Contribution from 6/30/2018 Valuation	$ 135.0	$ 105.2
Benefit Changes	(0.6)	(0.4)
Investment Loss (Gain)	11.4	8.9
Gain (Loss) from Excess Interest Transfers (Inc. FY 2019)	0.4	0.3
Other Experience	(0.8)	(0.7)
Estimated FY 2024 Employer Contribution from 6/30/2019 Valuation	$ 145.4	$ 113.3

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.

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 earning 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. However, since the fund earned approximately 8% during FY 2018, we expect that there will be a transfer of excess ASF interest to Component I in FY 2020. Approximately $1.9 million was added to the liabilities in this report to account for anticipated excess earnings expected to occur as a result of return on assets in the 2018 fiscal year. We have previously discussed this additional liability with the Plan's auditors, who have indicated that the excess earnings transfer should not be included as a liability in the GASB Statements Nos. 67 and 68 reports until it actually occurs.

In FY 2019, approximately $4.0 million was transferred from Component II (Legacy) to Component I (Hybrid) due to excess interest earned in FY 2017.

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 Trasferred Out (BOY) (K) = (H) x (J)
2020	$ 117,476,538	$ 15,010,030	$ 108,245,053	2018	8.46%	3.21%	$ 3,770,997	>100%	50%	$ 1,885,499
2021	108,245,053	15,010,030	98,528,915	2019	3.54%	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.

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.

Plan Maturity 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. Generally accepted plan maturity measures include the following:

	2019	2018
Ratio of the market value of assets to total payroll*	17.8	19.5
Ratio of actuarial accrued liability to payroll*	25.6	26.6
Ratio of actives to retirees and beneficiaries	0.2	0.2
Ratio of net cash flow to market value of assets	-10.8%	-10.1%
Duration of the actuarial accrued liability	9.5	9.7

**Payroll for this purpose is Component I payroll of $150.0 million for 2019 and $146.7 million for 2018.*

Ratio of Market Value 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 Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net 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.

Duration of 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%.

Additional Risk Assessment

The Solvency Liability shown on page 6 may be considered as a 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 included additional risk assessments in the funding policy discussions based on the 2018 actuarial valuation. We can update those at the Board's request.

Comments, Recommendations and Conclusion

Reserves

As discussed in the 2018 valuation report, the Annuity Reserve Fund does not appear to have been credited with any interest during the year (asset details provided were not sufficient to definitively determine). The interest credit to the Annuity Savings Fund is approximately 7.1% of the beginning of year ASF balance. However, that amount is approximately 5.4% of the sum of the ASF and ARF at the beginning of the year. We, therefore, recommend that the development of these reserves be reviewed. Note ASF interest credits are determined by Plan provisions and Board policy and are calculated by System staff. Section C-1(20) of the Combined PFRS Plan details the method in which the ASF is credited interest. We recommend the System review the administration of the ASF interest crediting.

Census Data and Approximations

Data was reported separately for Component I and Component II. Additional time was needed to reconcile these two data sets. Processing time for the valuation could be shortened if data for future valuations is reconciled before being provided to GRS. We would be happy to work with the Retirement System staff to help them provide the information that is needed for the valuation. After we issued our annual data letter (in which we questioned the reported frozen AFC amounts for the Legacy plan), we were informed that the amounts reported on the file were incorrect. While an additional file with other frozen AFC information was subsequently provided to us, the frozen AFC data did not seem to be consistent with data reported in previous years. We then worked with the Executive Director to develop a process that would enable us to complete the 2019 valuation. We acknowledge his help with appreciation. That process was to file match the Legacy actives reported on the 2019 data file to the Legacy actives reported on the 2018 data file for purposes of using the Frozen AFC reported on the 2018 file for this valuation. All other active member data used in this valuation was taken from the 2019 data files. Additional information about the data approximations and assumptions may be found on page 30.

Disability Retirees

The Police and Fire Retirement System Combined Plan provides disability benefits for both Component I and Component II. Our understanding of the Component II freeze as it relates to duty disability benefits was that the only benefit payable from Component II 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. Data reported for this valuation is not consistent with that understanding. However, assets reported for this valuation appear to be consistent with this interpretation. We have valued the pre-conversion duty disability benefit in a manner consistent with the data (paid out of Component II). 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 future retirees, duty disability retirement benefits prior to age 65 are assumed to be paid from Component I.

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

Comments, Recommendations and Conclusion

Option Factors

The Board adopted new option factors for the Plan. 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.

Actuarial Assumptions

The Retirement System routinely has five-year experience studies in accordance with the City ordinance. The last experience study for the period from July 1, 2007 through June 30, 2012 was started but not completed due to the bankruptcy. We conducted a review of the mortality experience in 2013. We recommend that the System consider the experience study schedule. The next experience study would be scheduled for the period from July 1, 2012 through June 30, 2017. However, in order to avoid distortions from the bankruptcy, the next experience study could be scheduled to begin just after the City emerged from bankruptcy. This, however, would suggest a study based on the period July 1, 2015 through June 30, 2020. We understand the Board has chosen to follow this suggestion and has scheduled the next experience study to begin subsequent to the June 30, 2020 valuation.

Additional Contributions

We understand the City has set aside money to be contributed to the General and Police and Fire Component II (Legacy) plans. We have not included any of this money in the valuations or projections since: 1) it has not been determined how the money will be split between the two Legacy plans; and 2) it has not been reported in the audited assets of the trust. Once the money has been contributed (or has been legally determined to be irrevocably allocated to the trust), we will reflect it.

Restoration

This valuation assumes no future restoration of Component II benefits. Calculations related to restoration will be provided in a separate report at the Board's request. Any future restoration will be reflected beginning in the next valuation after being granted.

Future Results

While FY 2020 investment performance has not yet been provided to us, the S&P 500 and the Dow Jones Industrial Average have so far both returned substantially less than 6.75%. If the Retirement System's experience is similar, this will result in downward pressure on the funded status and upward pressure on the FY 2024 contribution requirements (below what is shown in this report).

The POA mandated contributions for FY 2020 and beyond are expected to defund the Retirement System from 69% to approximately 59% (see page 3), even if all assumptions are realized. In FY 2020, the POA mandated contributions will be about ¼ of the interest accrued on the UAAL.

Comments, Recommendations and Conclusion (Concluded)

New Data System

We understand that the Retirement System is in the process of moving to a new data system. The results in this report could be different once the data is improved with the new system.

Recommendation

We recommend that every potential action be taken to generate contributions to the Retirement System above those provided in the POA. Benefit payments to retirees in the Plan were approximately $300 million compared to FY 2019 contributions of $18 million.

Prior Recommendation

The Board is currently working on the development of a funding policy for FY 2024 and beyond.

Conclusion

It is likely that the funded status will decline and the unfunded actuarial accrued liability will increase between now and FY 2024 to approximately 59% if assumptions are met. Events occurring after the valuation date have not been included in this valuation. The economic downturn occurring in the first quarter of calendar year 2020 could have a significant detrimental effect on the funded status of this plan.

We have developed a projection tool in past years for the funding policy, that allows us to model the effect of investment return different from assumed on future employer contribution requirements. We recommend the Board have us update that tool to estimate the potential range of effects of the current downturn.

DATA FURNISHED FOR VALUATION

Summary of Benefit Provisions
(June 30, 2019)

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 LSA 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 LSA 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 LSA 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 LSA 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.

Summary of Benefit Provisions (June 30, 2019) (Continued)

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, 2019) (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 LSA 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 LSA 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 LSA 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, LSA members are limited to 10 years of DROP participation. Effective May 9, 2019, DPOA members are limited to 10 years of DROP participation.

Asset Information Furnished for Valuation

Reported Assets
(Market Value)

Market Value - June 30, 2019	
Cash and Cash Equivalents	$ 57,654,902
Investments at fair value	2,610,224,281
Receivables	99,739,032
Cash and Investments held as collateral for securities lending	200,383,824
Capital Asset - Net	1,198,468
Accounts Payable	(298,357,151)
Total Current Assets	**$2,670,843,356**

Asset Information Used for Valuation

Reserve Accounts

Funds	Fund Balances June 30, 2019	Fund Balances June 30, 2018
Annuity Savings	$ 117,476,538	$ 74,507,521
Annuity Reserve	30,549,540	29,980,092
Total Annuity Funds	148,026,078	104,487,613
Pension Accumulation	(2,079,310)	(49,397,010)
Pension Reserve	2,526,084,121	2,808,564,732
Accrued Liability Fund Reserve	0	0
Survivor Benefit	(1,187,533)	2,648,470
Market Stabilization Fund	0	0
Total Pension Funds	2,522,817,278	2,761,816,192
Total Fund Balances	$2,670,843,356	$2,866,303,805

Revenues and Expenditures

	Pension Funds	Annuity Funds +	Total Funds
Market Value July 1, 2018	$2,761,816,192	$104,487,613	$2,866,303,805
Revenues			
Member Contributions	3,600	0	3,600
Employer Contributions	18,300,000	0	18,300,000
Investment Income	92,069,101	6,269,761	98,338,862
Less Investment Expense	0	0	0
Other Income	166,811	329,277	496,088
Total	$ 110,539,512	$ 6,599,038	$ 117,138,550
Expenditures			
Benefit Payments	286,316,614	240,900	286,557,514
Refund of Member Contributions	0	19,054,169	19,054,169
Other	0	0	0
Administrative Expenses	2,956,755	0	2,956,755
Total	$ 289,273,369	$ 19,295,069	$ 308,568,438
Transfer to Component I	(4,030,561)	0	(4,030,561)
Transfer to Annuity Funds	(56,234,496)	56,234,496	0
Market Value June 30, 2019	$2,522,817,278	$148,026,078	$2,670,843,356
Market Value Rate of Return	3.4%	5.4%	3.5%

\+ *Reported Market Value of Annuity Savings Fund (ASF) and Annuity Reserve Fund (ARF). The ARF is credited with a fixed rate of return by the Plan document/ordinance (see comment on page 15). ASF interest credit is determined by the Board based on parameters set forth in the Plan document/ordinance.*

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.

Retirees and Beneficiaries as of June 30, 2019
Tabulated by Attained Age@

Attained Age	Age & Service		Disability		Death-in-Service		Totals	
	No.	Monthly Allowances	No.	Monthly Allowances	No.	Monthly Allowances	No.	Monthly Allowances
Under 20*	7	$ 22,766	1	$ 2,989	39	$ 21,239	47	$ 46,994
20-24	3	4,606					3	4,606
25-29	3	7,925	4	11,518	1	2,131	8	21,574
30-34	2	3,313	0	0			2	3,313
35-39	12	20,388	32	95,426	4	6,336	48	122,150
40-44	46	71,860	75	233,415	10	17,893	131	323,168
45-49	167	282,122	113	354,767	13	24,919	293	661,808
50-54	332	805,753	106	331,218	18	33,896	456	1,170,867
55-59	410	1,149,519	132	390,764	15	26,191	557	1,566,474
60-64	652	1,960,467	149	427,346	23	49,786	824	2,437,599
65-69	1,210	3,932,865	315	836,035	38	70,946	1,563	4,839,846
70-74	1,301	4,172,339	383	969,102	47	83,434	1,731	5,224,875
75-79	863	2,502,855	200	498,520	25	47,487	1,088	3,048,862
80-84	463	1,231,182	62	167,047	11	22,387	536	1,420,616
85-89	347	806,321	28	76,410	17	38,260	392	920,991
90-94	272	591,065	31	87,330	16	36,471	319	714,866
95 & Over	93	180,580	10	28,893	1	2,144	104	211,617
Totals	**6,183**	**$17,745,926**	**1,641**	**$4,510,780**	**278**	**$483,520**	**8,102**	**$22,740,226**

@ 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.

** May include records with incorrect birth dates reported.*

Inactive Vested Members June 30, 2019

Attained Age	No.	Estimated Annual Allowances
Under 40	41	$ 727,684
40-44	97	1,941,607
45-49	115	2,588,095
50-54	63	1,375,723
55-59	35	883,801
60-64	15	411,543
65 & over	28	786,536
Totals	**394**	**$8,714,989**

Pre-1969 Retirees and Beneficiaries as of June 30, 2019
Tabulated by Attained Age

Attained Age	Age & Service#		Disability#		Death-in-Service		Totals	
	No.	Monthly Allowances	No.	Monthly Allowances	No.	Monthly Allowances	No.	Monthly Allowances
40-44	1	$ 2,034					1	$ 2,034
45-49	0	0					0	0
55-59	3	4,141					3	4,141
60-64	4	3,012			1	$ 2,072	5	5,084
65-69	19	36,420	0		3	7,041	22	43,461
70-74	148	315,283	45	$ 117,075	14	31,082	207	463,440
75-79	357	817,775	108	267,385	14	29,169	479	1,114,329
80-84	291	672,641	46	116,930	9	17,755	346	807,326
85-89	233	487,928	22	55,708	15	32,525	270	576,161
90-94	200	396,878	27	74,450	14	30,617	241	501,945
95 & Over	89	171,207	10	28,893	1	2,144	100	202,244
Totals	**1,346**	**$2,908,528**	**258**	**$660,441**	**71**	**$152,405**	**1,675**	**$3,721,374**

 # Includes survivor beneficiaries of service and disability retirees.

DROP Participants June 30, 2019

Attained Age	No.	Estimated Monthly Allowances &
Under 25	2	$ 3,392
35-39	0	0
40-44	58	70,306
45-49	156	231,289
50-54	220	490,039
55-59	206	559,328
60-64	87	272,835
65-69	26	104,341
70-74	7	27,842
75-79	2	9,128
Totals	**764**	**$1,768,500**

& Reflects the 75% of reported monthly benefits being paid into DROP accounts.

Active Members as of June 30, 2019
by Attained Age and Years of Service (Excludes DROP)

Note the following active member schedules show eligibility service (total service) and reported payroll as of the valuation date. However, benefits are based on service and AFC as of June 30, 2014.

Police Members

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24		1						1	$ 62,415
25-29		40	1					41	2,499,189
30-34	2	53	29					84	5,333,601
35-39	2	27	64	51	1			145	9,647,556
40-44	2	11	41	150	63			267	18,604,595
45-49		6	22	112	159	6	1	306	22,055,725
50-54		5	10	46	71	9	3	144	10,232,062
55-59		3	3	23	25	3	4	61	4,119,643
60				1	1			2	139,538
61			1	1		1		3	188,806
62							1	1	63,663
63									0
64									0
68									0
69									0
Totals	**6**	**146**	**171**	**386**	**320**	**19**	**11**	**1,059**	**$73,224,715**

Fire Members

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24		1						1	$ 58,296
25-29	3	21	2					26	1,467,049
30-34	1	26	2	2				31	1,787,905
35-39		14	14	17	3			48	2,953,954
40-44		5	12	72	15			104	6,413,752
45-49		2	9	63	61	10		145	9,531,559
50-54			7	27	35	21	11	101	7,094,678
55-59				12	11	6	4	33	2,449,487
Totals	**4**	**69**	**46**	**195**	**125**	**38**	**15**	**492**	**$32,008,363**

Total Active Members as of June 30, 2019 by Attained Age and Years of Service (Excludes DROP)

Note the following active member schedules show eligibility service (total service) and reported payroll as of the valuation date. However, benefits are based on service and AFC as of June 30, 2014.

Total Members

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24		2						2	$ 120,711
25-29	3	61	3					67	3,966,238
30-34	3	79	31	2				115	7,121,506
35-39	2	41	78	68	4			193	12,601,510
40-44	2	16	53	222	78			371	25,018,347
45-49		8	31	175	220	16	1	451	31,587,284
50-54		5	17	73	106	30	14	245	17,326,740
55-59		3	3	35	36	9	8	94	6,569,130
60				3	1	1		5	391,221
61			1	1		1		3	188,806
62							1	1	63,663
63									
64									
68									
69									
Totals	**10**	**215**	**217**	**581**	**445**	**57**	**26**	**1,551**	**$105,233,078**

	Group Averages		
	Police	Fire	Total
Age:	43.9 years	44.7 years	44.1 years
Benefit Service:	12.2 years	13.1 years	12.5 years
Eligibility Service:	17.1 years	18.1 years	17.4 years
Annual Pay:	$69,145	$65,058	$67,849

Summary of Membership Data by Category

	June 30, 2019
Active Members (Excluding DROP)	
Number	1,551
Average age (years)	44.1
Average service (years)	17.4
Average salary	$ 67,849
Total payroll supplied, annualized	$ 105,233,078
Members in DROP	
Number	764
Average age (years)	54.0
Total annual benefits*	$ 21,221,995
Average annual benefit*	$ 27,777
Vested Inactive Members	
Number	394
Average age (years)	49.6
Total annual deferred benefits	$ 8,714,989
Average annual deferred benefit	$ 22,119
Service Retirees	
Number	4,975
Average age (years)	69.0
Total annual benefits	$ 182,363,445
Average annual benefit	$ 36,657
Disability Retirees	
Number	1,641
Average age (years)	65.9
Total annual benefits	$ 54,129,360
Average annual benefit	$ 32,981
Beneficiaries (Including Death in Service)	
Number	1,486
Average age (years)	75.0
Total annual benefits	$ 36,389,907
Average annual benefit	$ 24,488

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

Reconciliation of Reported Data as of June 30, 2019

Active Data

A) Count reported in PF_Benefits table:	2,317
B) In PF_Benefits file but not in Hybrid file:	(1)
C) Hired after plan closed:	(6)
D) Non-active Status:	(3)
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):	(756)
J) Actives excluding DROP:	1,551

Retired Data

A) Number of records reported on data file:	43,696
B) Number of records not in P/F plan:	(27,352)
C) Records not currently in receipt of benefits based on reported status codes:	(7,237)
D) Component I (Hybrid) Records:	(241)
E) Records in DROP:	(764)
F) Number of records valued:	8,102

Deferred Data

A) Number of records reported on data file:	424
B) Less than 8 years of service:	(30)
C) Number of records to value:	394

Active Row B: There was 1 record that appeared in the Legacy active file but did not appear in the Hybrid active file. It was assumed that this member was no longer active in the Police and Fire plan.
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.
Deferred Row B: Service provided in the data file is benefit service. Since benefit service was frozen as of June 30, 2014 for members that terminated after June 30, 2014, vesting service was determined by combining service in the Legacy inactive file with service in the Hybrid inactive file.

Reconciliation of Year-to-Year Data as of June 30, 2019

	Active		Term. Vested	DROP		Retirees		Totals
	Count	Pay*	Count	Count	Monthly Benefits	Count	Monthly Benefits	Count
2018	**1,752**	**$111,407,220**	**410**	**694**	**$1,907,519**	**8,151**	**$22,627,221**	**11,007**
Change in Pay/Pensions	N/A	6,631,854	N/A	N/A	16,102	N/A	313,182	
Rehired (Not Vested)	3	155,782	-					3
New Beneficiary			-			82	175,351	82
DROP	(119)	(7,610,419)	-	120	208,179			1
Retired	(38)	(2,513,605)	(14)	(48)	(135,641)	123	252,595	23
Non-Duty Disabled	-	-				-	-	-
Duty Disabled	(18)	(1,062,206)	-			19	58,389	1
Death/Off			(10)	(2)	(6,275)	(279)	(701,580)	(291)
Vested Term	(23)	(1,538,051)	9					(14)
Non-Vested Terminated	(8)	(357,006)						(8)
Rehired	2	119,509	(1)	-	-	(1)	(95)	-
Data Adjustment	-	-	-	-	1,640	7	15,163	7
2019	**1,551**	**$105,233,078**	**394**	**764**	**$1,991,524**	**8,102**	**$22,740,226**	**10,811**

** This represents current pay and is not used for the Component II (Legacy) valuation.*

Notable Data Changes:

1 member appears to have DROPed this year that was not reported in the prior year's data.

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

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

10 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 social security numbers or corrected social security numbers.

1 duty disability came from nowhere.

Data Approximations and Assumptions

Active

These records are reported in the 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 (Water/Sewage identifier, 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. The frozen AFC reported on the June 30, 2019 data file was not useable. As such, we used the frozen AFC as reported on the June 30, 2018 data file. For purposes of this valuation, we matched the June 30, 2018 AFC to the AFC data reported for the June 30, 2014 valuation to check against AFC as of June 30, 2014. In cases where the frozen AFC as reported in the 2018 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 LSA and DPOA was taken from the 2014 data file.

Hybrid service provided on the data file was reduced by one month to account for additional service granted past the valuation date.

Deferred

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

Data provided for deferred vested members was incomplete. As part of the processing of deferred member data, in cases where AFC was incomplete, we used $30,000 to estimate the AFC. Since vesting service is not directly provided on the file, we estimated vesting service based on reported Component II (Legacy) benefit service increased by Component I (Hybrid) benefit service as reported on the corresponding Component I (Hybrid) file. Members with estimated vesting service of less than 8 years were assumed to be non-vested and were not valued.

Retired and Beneficiary

These records are reported in the 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;
- For non-equated members that elected a pop-up benefit, the pop-up amount is estimated based on the chosen option and benefit amounts provided in the data;
- Benefits for dependent children are assumed to cease at age 21; and
- For non-converted disabled 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.

Please see our 2019 data summary letter dated January 23, 2019 for additional details.

APPENDIX

Summary of Assumptions Used for DPFRS 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 and administrative 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.

Non-Economic Assumptions

The mortality table used to measure retired life mortality is the RP-2014 Blue Collar Annuitant Table for males and females. Tables were extended below age 50 with a cubic spline to the published Juvenile rates. Pre-retirement mortality is the RP-2014 Blue Collar Employee Tables for males and females. The tables are projected to be fully generational, based on the 2-dimensional, sex distinct mortality improvement scale MP-2014. This table was first used as of June 30, 2014. The rationale for the mortality assumption is based on the 2008-2013 Mortality Experience Study issued February 13, 2015.

The probabilities of age/service retirement for members eligible to retire are shown on page 38. The rationale is based on the 2002-2007 Experience Study. However, probabilities were modified effective with the June 30, 2014 valuation to reflect a change in the modeling of future DROP members, consistent with the plan closure. The revised probabilities were selected so that, when combined with the model change, the effect on the present value of benefits would be immaterial.

The probabilities of separation from service (including *death-in-service*) are shown for sample ages on page 39. These probabilities were first used for the June 30, 2008 valuation. The rationale is based on the 2002-2007 Experience Study.

Miscellaneous and Technical Assumptions
June 30, 2019

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.
Pay Increase Timing:	N/A
Decrement Timing:	Decrements are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date of decrement.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and mortality decrements do not operate during the first 5 years of service. Disability and withdrawal do not operate during retirement eligibility.
Incidence of Contributions:	Employer contributions are assumed to be received on the last day of the fiscal year.
Longevity in AFC:	Longevity payments were included directly in the AFC data provided by the System. No further adjustment was included.
Unused Sick Leave Payout:	Sick leave banks as of June 30, 2014 were included in the 2014 data file provided by the System. No further adjustment to the sick banks was included.
Post-Retirement COLA:	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.
AFC Period:	AFC data was provided by the System.

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.
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.
Mandatory Retirement Age	Currently most members of the DPFRS are subject to a mandatory retirement age of 60. However, we understand that the mandatory retirement age is currently not enforced for Police members. Recent membership data indicates that very few Police members stay in employment past age 65. We have, therefore, assumed employment would end at age 65 for Police members and age 60 for Fire members regardless of the length of their DROP participation at that age.
DROP Assumption:	All active members not in the DROP are assumed to have a 40% chance of retiring or entering the DROP in their first five years of retirement eligibility (see page 38). For Police members, 65% of eligible members are assumed to enter the DROP and remain in the DROP for seven years. For Fire members, 60% of eligible members are assumed to enter the DROP and remain in the DROP for five years.
Workers Comp Offset:	No Workers Compensation offsets are assumed for duty disability benefits.
DROP Account:	DROP account balances are not reported. No liability is included for DROP account balances.
Class Codes:	For valuation purposes, members are categorized as DPOA, DFFA or LSA based on class codes provided by the Retirement System and are primarily used in the valuation to determine normal retirement eligibility (20 & Out versus 25 & Out). The class codes used for this valuation were taken from the 2014 data file. Therefore, counts in the valuation may not represent actual membership in the respective associations.
Frozen Benefit Estimate:	Reported frozen AFC was adjusted to include 25% of unused sick leave (to a maximum of 25 days per year of service).

Miscellaneous and Technical Assumptions
June 30, 2019 (Concluded)

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.
Retiree Pop-Up Factor:	If a retiree has a pop-up option but no pop-up factor is provided in the data, the pop-up factor is determined by using an average age at retirement of 50.2, beneficiary age of 47.2, and the optional form of payment assumptions (determined above).
Member Contributions:	Member contributions to this Component II plan are assumed to have ceased with the bankruptcy. However, for purposes of determining refunds on member contributions, contribution balances are assumed to earn 5.25% interest.
Limit Testing:	We understand the System has specific outside counsel regarding I.R.C. section 415 testing. We have not adjusted liabilities for potential 415 limits.
Data Assumptions:	Assumptions regarding incomplete or missing data are reviewed annually with the System and adjusted as directed by the System.

The rationale for the miscellaneous and technical assumptions is the 2002-2007 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). UAAL contribution is not actuarially determined. Actual employer contributions through June 30, 2023 are set by the POA. The funding policy after 2023 has not yet been established by the Board.

Employer contribution dollars were assumed to be *paid in a single sum on the last day* of the employer fiscal year. (Adopted for the June 30, 1979 actuarial valuation.)

Present assets are set equal to the Market Value in accordance with the POA.

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 RP-2014 Blue Collar for Males and Females

Sample Attained Ages in 2019	Future Life Expectancy (Years)	
	Men	Women
45	39.70	43.04
50	34.72	37.97
55	29.91	33.04
60	25.33	28.26
65	20.97	23.65
70	16.91	19.28
75	13.20	15.23
80	9.91	11.62

Probabilities of Service Retirement

Service	Percent of Eligible Active Members Retiring within Next Year			
	Police		Fire	
	20 & Out	25 & Out	20 & Out	25 & Out
19	40%		40%	
20	40%		40%	
21	40%		40%	
22	40%		40%	
23	40%		40%	
24	100%	40%	100%	40%
25	100%	40%	100%	40%
26	100%	40%	100%	40%
27	100%	40%	100%	40%
28	100%	40%	100%	40%
29	100%	100%	100%	100%
30	100%	100%	100%	100%
31	100%	100%	100%	100%
32	100%	100%	100%	100%
33	100%	100%	100%	100%
34	100%	100%	100%	100%
35	100%	100%	100%	100%
36	100%	100%	100%	100%
37	100%	100%	100%	100%
38	100%	100%	100%	100%
39	100%	100%	100%	100%
40	100%	100%	100%	100%
Ref	922	922	922	922

Age	Percent of Eligible Active Members Retiring within Next Year	
	Police	Fire
60	40%	100%
61	40%	100%
62	40%	100%
63	40%	100%
64	40%	100%
65	100%	100%
66	100%	100%
67	100%	100%
68	100%	100%
69	100%	100%
70	100%	100%
Ref	922	1

Members eligible for 20 & Out are assumed to be first eligible for normal retirement after 19 years of service due to their ability (and experience) to purchase service. Members eligible for 25 & Out are assumed to be eligible for normal retirement after 24 years of service due to their ability (and experience) to purchase service. Members are also eligible to retire at age 60 with no service requirement. The rationale for these assumptions is the 2002-2007 Experience Study.

Probabilities of Separation

Sample Ages	Years of Service	% of Active Members Withdrawing within Next Year	
		Police	Fire
ALL	0	8.50%	5.00%
	1	7.50%	4.00%
	2	6.00%	3.00%
	3	5.00%	2.00%
	4	4.50%	2.00%
25	5 & Over	4.50%	1.96%
30		3.30%	1.62%
35		2.30%	1.11%
40		1.70%	0.77%
45		1.50%	0.60%
50		1.10%	0.51%
55		0.80%	0.51%
60		0.80%	0.51%
Ref		566 207	230 113 x 0.85

Sample Ages	% of Active Members Becoming Disabled within Next Year			
	Police		Fire	
	Ordinary	Duty	Ordinary	Duty
25	0.06%	0.13%	0.07%	0.34%
30	0.07%	0.19%	0.08%	0.52%
35	0.08%	0.34%	0.09%	0.90%
40	0.11%	0.49%	0.12%	1.30%
45	0.16%	0.73%	0.18%	1.92%
50	0.47%	1.16%	0.53%	3.06%
55	0.73%	1.96%	0.82%	5.18%
60	0.83%	2.82%	0.94%	7.47%
Ref	105 x 0.75	90 x 0.85	105 x 0.85	90 x 2.25

The rationale for these assumptions is the 2002-2007 Experience Study.

Glossary

Actuarial Accrued Liability. 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."

Accrued Service. The service credited under the plan which was rendered before the date of the actuarial valuation.

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.

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."

Actuarial Equivalent. A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.

Actuarial Present Value. The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

AFC. Average Final Compensation.

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.

ARF. Annuity Reserve Fund.

ASF. Annuity Savings Fund.

Contribution Budgeting Liability. An expected return based measure of pension obligation.

DPOA. Detroit Police Officers Association.

DFFA. Detroit Fire Fighters Association.

DPCOA. Detroit Police Command Officers Association.

DROP. Deferred Retirement Option Program.

Glossary (Concluded)

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 valuation dates, in accordance with the Actuarial Cost Method being used.

LSA. Lieutenants and Sergeants Association.

Normal Cost. 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.

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 measure of the present value of accrued benefits at a municipal bond discount rate unadjusted for the credit quality of the plan sponsor.

Unfunded Actuarial Accrued Liability. The difference between the Actuarial Accrued Liability and Valuation Assets. Sometimes referred to as "unfunded accrued liability."

Valuation Assets. The value of current plan assets recognized for valuation purposes.