

City of Columbia Police and Firemen's Retirement Fund

Actuarial Valuation Report
September 30, 2020



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April 30, 2021

Retirement Boards

Police Retirement Fund

Firemen's Retirement Fund

Columbia, Missouri

Dear Board Members:

Submitted in this report are the results of the September 30, 2020 actuarial valuation of the assets, actuarial values, and contribution requirements associated with the benefits provided by the City of Columbia Police and Firemen's Retirement Fund. The purpose of the valuation is to measure funding progress in relation to the actuarial cost method and to determine employer contribution rates. Calculations required for compliance with the Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68 were issued in a separate report (see report dated December 17, 2020). The results of the valuation may not be applicable for other purposes.

The computed contribution rates shown on page A-1 may be considered as a minimum contribution rate that complies with the Board's funding policy. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions in excess of those presented in this report be considered.

The results of the valuation are contained in Section A along with comments regarding valuation results.

The valuation was based upon information furnished by the City regarding benefits, financial transactions, active members, retirees and beneficiaries. Data was checked for year-to-year consistency and completeness but was not audited by us. This information is summarized in Section B.

Descriptions of the **actuarial funding method and assumptions regarding future experience** are contained in Section C. The assumptions are established by the Board after consulting with the actuary.

The signing individuals are independent of the Plan Sponsor.

The actuarial valuation was prepared using generally accepted actuarial principles and practices based upon the methods, assumptions, summary of plan provisions and the member and financial data described in this report.

The report should not be relied upon for any purpose other than those described above. It was prepared at the request of the Board and is intended for use by the Retirement Fund and those designated or approved by the Board. This report may be provided to parties other than the Fund 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 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 contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section C of this report. This report does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of the 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 using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report has been prepared by individuals who have substantial experience valuing public employee 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 actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable.

Mita D. Drazilov and Heidi G. Barry 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.

Respectfully submitted,



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SECTION A

VALUATION RESULTS AND COMMENTS

Contributions for Fiscal Year 2022 to Provide Benefits

Member Portion and Employer Portion

September 30, 2020

Contributions for	% of Active Payroll					
	Police			Fire		
	Pre 10/1/2012	Pst 10/1/2012	Police Total*	Pre 10/1/2012	Pst 10/1/2012	Fire Total*
Normal Cost of Benefits:						
Age & service	21.58%	12.35%	17.47%	36.03%	16.85%	29.02%
Casualty	1.96	2.32	2.12	6.76	3.90	5.71
Refunds of member contributions	0.48	0.60	0.53	0.61	0.15	0.44
Administrative expenses	0.35	0.35	0.35	0.35	0.35	0.35
Total	24.37%	15.62%	20.47%	43.75%	21.25%	35.52%
Less Member Contributions	3.50% &	4.50%	3.94%	16.32%	4.00%	11.94%
Employer Normal Cost	20.87%	11.12%	16.53%	27.43%	17.25%	23.58%
Unfunded Actuarial Accrued Liabilities (26-year amortization)	26.42%	26.42%	26.42%	39.60%	39.60%	39.60%
TOTAL COMPUTED EMPLOYER CONTRIBUTION RATE	47.29%	37.54%	42.95%	67.03%	56.85%	63.18%

* This is a weighted average. Please see pages B-2, B-5, B-7 and B-9 for a description of member contributions for the Police and Fire groups.

& There are currently no Police members in the Pre 10/1/2012 contributory group.

Determining Employer Dollar Contributions

For any period of time, the percent-of-payroll contribution rate needs to be converted to dollars and then contributed to the pension fund.

The recommended procedure is: (1) **at the end of each payroll period, multiply the active member payroll for the period by the employer contribution percent**; and (2) **contribute the dollar amount so determined**.



Computed Actuarial Accrued Liabilities

The following schedule presents the computed "actuarial accrued liabilities" and "unfunded actuarial accrued liabilities" as of the valuation date:

		Police	Fire	Total Fund
Computed Actuarial Accrued Liabilities:				
Retirees and Beneficiaries		\$ 69,547,968	\$ 105,530,238	\$ 175,078,206
Active Members, LOA Members & Vested Terminated Members		<u>35,531,418</u>	<u>54,784,161</u>	<u>90,315,579</u>
Total		105,079,386	160,314,399	265,393,785
Funding Value of Assets*		<u>59,055,588</u>	<u>93,249,926</u>	<u>152,305,514</u>
Unfunded Actuarial Accrued Liabilities		\$ 46,023,798	\$ 67,064,473	\$ 113,088,271
Total Percent Funded (Assets/Liabilities)	9/30/2020	56%	58%	57%
	9/30/2019	56	57	57
	9/30/2018	56	56	56
	9/30/2017	56	56	56
	9/30/2016#	55	55	55
	9/30/2015@	60	60	60
	9/30/2014	56	57	56
	9/30/2013	55	55	55
	9/30/2012@	54	54	54
	9/30/2011	53	53	53

* The Police and Firemen's Retirement Fund is treated as two separate funds for purposes of accounting and administration, with assets pooled for investment purposes.

@ Reflects changes in benefit provisions.

Reflects changes in assumptions.

In accordance with plan provisions, an allocation of the total fund balance was made. For purposes of plan analysis, the amounts allocated to police and fire were then divided among retired life reserves, reserves for member contributions and employer reserves, as follows:

	Police	Fire	Total
1. Funding Value of Assets	\$ 59,055,588	\$ 93,249,926	\$ 152,305,514
2. Reserve for Member Contributions (Active Member Accumulated Contributions)	<u>4,658,880</u>	<u>21,741,082</u>	<u>26,399,962</u>
3. 1. minus 2.	54,396,708	71,508,844	125,905,552
4. Retired Life Reserve	<u>69,547,968</u>	<u>105,530,238</u>	<u>175,078,206</u>
5. Employer Reserve (3. minus 4.) (Includes actuarial value of assets adjustment)	\$ (15,151,260)	\$ (34,021,394)	\$ (49,172,654)



The **Reserve for Member Contributions** represents employee contributions accumulated toward (1) monthly benefits upon future retirements and (2) refunds upon termination if monthly benefits are not payable for current active members.

The **Retired Life Reserve** represents employer and employee contributions accumulated for benefits being paid to present retirees and beneficiaries.

The **Employer Reserve** represents employer contributions accumulated for the employer-financed portion of accrued liabilities for active members.

The Reserve for Member Contributions and the Retired Life Reserve are adequate to cover the related accrued liabilities. Another way of stating this is to say ***the liabilities for active member contributions and for retirees and beneficiaries are fully funded.***

The remaining assets and liabilities may then be examined as follows:

		Police	Fire	Total
1. Employer accrued liability for active members and vested terminated members		\$ 30,872,538	\$ 33,043,079	\$ 63,915,617
2. Employer Reserve		<u>(15,151,260)</u>	<u>(34,021,394)</u>	<u>(49,172,654)</u>
3. Unfunded Actuarial Accrued Liabilities		\$ 46,023,798	\$ 67,064,473	\$ 113,088,271
4. Employer Percent Funded (2/1)	9/30/2020	0%	0%	0%
	9/30/2019	0	0	0
	9/30/2018	0	0	0
	9/30/2017	0	0	0
	9/30/2016#	0	0	0
	9/30/2015@	0	0	0
	9/30/2014	0	0	0
	9/30/2013	0	0	0
	9/30/2012@	0	0	0
	9/30/2011	0	0	0

@ Reflects changes in benefit provisions.

Reflects changes in assumptions.

Comparative Contribution Rates

Police Fund

Valuation Date	Active Members*	Valuation Payroll	Average Pay	Unfunded Actuarial Accrued Liabilities	Fiscal Year	Contribution Rates				
						Member			Employer	Combined
						Pre 10/1/12	Non-Contrib.	Pst 10/1/12		
						Contrib.		Contrib.		
9/30/2011	149	\$8,475,940	\$56,886	\$ 32,486,719	2013	8.35 %	3.50 %	n/a	39.43 %	42.93 %
9/30/2012@	146	8,279,852	56,711	32,673,941	2014	8.35	3.50	4.50	40.35	43.85
9/30/2013	150	8,276,896	55,179	33,428,124	2015	8.35	3.50	4.50	40.85	44.40
9/30/2014	148	8,140,637	55,004	34,101,704	2016	8.35	3.50	4.50	41.58	45.21
9/30/2015@^	155	8,723,289	56,279	32,657,047	2017	8.35	3.50	4.50	39.19	42.87
9/30/2016#	151	8,947,152	59,253	40,879,593	2018	8.35	3.50	4.50	42.98	46.67
9/30/2017	151	8,645,882	57,257	41,153,907	2019	8.35	3.50	4.50	43.78	47.54
9/30/2018	161	9,073,800	56,359	42,450,859	2020	8.35	3.50	4.50	42.80	46.66
9/30/2019	157	9,131,578	58,163	43,855,202	2021	8.35	3.50	4.50	43.84	47.72
9/30/2020	160	9,882,239	61,764	46,023,798	2022	8.35	3.50	4.50	42.95	46.89

Fire Fund

Valuation Date	Active Members*	Valuation Payroll	Average Pay	Unfunded Actuarial Accrued Liabilities	Fiscal Year	Contribution Rates			
						Member		Employer	Combined
						Pre 10/1/2012	Pst 10/1/2012		
9/30/2011	127	\$7,170,923	\$56,464	\$ 47,387,835	2013	16.32 %	n/a %	58.68 %	75.00 %
9/30/2012@	126	7,209,301	57,217	49,600,258	2014	16.32	4.00	60.71	77.03
9/30/2013	136	7,539,548	55,438	49,567,756	2015	16.32	4.00	58.82	74.15
9/30/2014	134	7,753,834	57,864	50,111,769	2016	16.32	4.00	58.91	73.86
9/30/2015^	134	8,056,819	60,126	47,721,500	2017	16.32	4.00	56.46	70.92
9/30/2016#	139	8,605,280	61,908	62,389,991	2018	16.32	4.00	62.93	76.20
9/30/2017	142	8,598,788	60,555	61,877,319	2019	16.32	4.00	62.94	75.91
9/30/2018	141	8,784,183	62,299	63,696,108	2020	16.32	4.00	63.81	76.48
9/30/2019	137	8,724,771	63,684	64,566,247	2021	16.32	4.00	65.31	77.85
9/30/2020	137	9,592,099	70,015	67,064,473	2022	16.32	4.00	63.18	75.12

@ Reflects changes in benefit provisions.

Reflects changes in assumptions and for the 2010 valuation, a change in the amortization period from 17 years to 29 years and for the 2016 valuation, a change in the amortization period from 23 years to 30 years.

* Includes 11 DROP members for Police and 5 DROP members for Fire as of 9/30/2020.

^ Includes the addition of an administrative expense load of 0.35% as of 9/30/2015.



Schedule of Funding Progress

Police

Actuarial Valuation Date	(a) Actuarial Value of Assets	(b) Entry Age Actuarial Accrued Liability	(b-a) Unfunded Accrued Liability (UAL)	(a/b) Funded Ratio	(c) Annual Covered Payroll	[(b-a)/c] UAL as a Percentage of Covered Payroll
9/30/2011	\$ 36,776,070	\$ 69,262,789	\$ 32,486,719	53 %	\$ 8,475,940	383 %
9/30/2012 @	38,862,427	71,536,368	32,673,941	54	8,279,852	395
9/30/2013	41,564,868	74,992,992	33,428,124	55	8,276,896	404
9/30/2014	43,868,797	77,970,501	34,101,704	56	8,140,637	419
9/30/2015	48,364,215	81,021,262	32,657,047	60	8,723,289	374
9/30/2016 #	50,744,190	91,623,783	40,879,593	55	8,947,152	457
9/30/2017	52,328,979	93,482,886	41,153,907	56	8,645,882	476
9/30/2018	53,940,512	96,391,371	42,450,859	56	9,073,800	468
9/30/2019	56,226,578	100,081,780	43,855,202	56	9,131,578	480
9/30/2020	59,055,588	105,079,386	46,023,798	56	9,882,239	466

Fire

Actuarial Valuation Date	(a) Actuarial Value of Assets	(b) Entry Age Actuarial Accrued Liability	(b-a) Unfunded Accrued Liability (UAL)	(a/b) Funded Ratio	(c) Annual Covered Payroll	[(b-a)/c] UAL as a Percentage of Covered Payroll
9/30/2011	\$ 53,951,012	\$101,338,847	\$ 47,387,835	53 %	\$ 7,170,923	661 %
9/30/2012 @	57,179,657	106,779,915	49,600,258	54	7,209,301	688
9/30/2013	61,190,565	110,758,321	49,567,756	55	7,539,548	657
9/30/2014	65,440,925	115,552,694	50,111,769	57	7,753,834	646
9/30/2015 @	72,876,702	120,598,202	47,721,500	60	8,056,819	592
9/30/2016 #	75,438,867	137,828,858	62,389,991	55	8,605,280	725
9/30/2017	78,564,441	140,441,760	61,877,319	56	8,598,788	720
9/30/2018	82,231,009	145,927,117	63,696,108	56	8,784,183	725
9/30/2019	87,096,048	151,662,295	64,566,247	57	8,724,771	740
9/30/2020	93,249,926	160,314,399	67,064,473	58	9,592,099	699

@ Reflects changes in benefit provisions.

Reflects changes in assumptions and for the 2010 valuation, a change in the amortization period from 17 years to 29 years and for the 2016 valuation, a change in the amortization period from 23 years to 30 years.



Schedule of Employer Contributions

Police

Year Ended September 30	Actuarially Determined Contribution	Actual Contribution*	Percent of Actuarially Determined Contribution Contributed
2011	\$ 3,033,164	\$ 3,033,164	100.0%
2012	3,153,367	3,153,367	100.0
2013	3,243,455	3,243,455	100.0
2014	3,245,420	3,245,420	100.0
2015	3,486,784	5,486,784	157.4
2016	3,812,192	3,812,192	100.0
2017	3,365,161	3,365,161	100.0
2018	3,796,494	3,796,494	100.0
2019	4,019,648	4,019,648	100.0
2020	4,159,256	4,159,256	100.0

Fire

Year Ended September 30	Actuarially Determined Contribution	Actual Contribution*	Percent of Actuarially Determined Contribution Contributed
2011	\$ 3,598,322	\$ 3,598,322	100.0%
2012	3,995,869	3,995,869	100.0
2013	4,382,296	4,382,296	100.0
2014	4,674,412	4,674,412	100.0
2015	4,751,496	7,751,496	163.1
2016	5,226,250	5,226,250	100.0
2017	4,789,910	4,789,910	100.0
2018	5,426,042	5,426,042	100.0
2019	5,306,842	5,306,842	100.0
2020	5,965,276	5,965,276	100.0

* An additional \$5,000,000 was contributed by the City for the fiscal year ending September 30, 2015.

Derivation of Experience Gain (Loss)

Year Ended September 30, 2020

Actual experience will never (except by coincidence) exactly match assumed experience. It is hoped that gains and losses will cancel each other over a period of years, but sizable year-to-year fluctuations are common. Detail on the derivation of the experience gain (loss) is shown below:

	<u>Year Ending September 30</u>
(1) UAAL* at start of year	\$ 108,421,449
(2) Normal cost from last year	5,109,862
(3) Actual contributions	11,835,925
(4) Net interest accrual on (1), (2) and (3)	7,354,089
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	109,049,475
(6) Change from benefit changes	0
(7) Change from revised actuarial assumptions	0
(8) Expected UAAL after changes: (5) + (6) + (7)	109,049,475
(9) Actual UAAL at end of year	113,088,271
(10) Gain (Loss): (8) - (9)	\$ (4,038,796)
(11) Gain (Loss) as percent of actuarial accrued liabilities at start of year	(1.6)%

* *Unfunded actuarial accrued liability.*

Comments

1. For the Police group, the total computed employer contribution rate as a % of payroll was lower this valuation year. The computed employer contribution rate for fiscal year 2022 is 42.95% compared with 43.84% for fiscal year 2021. The decrease was primarily due to total payroll increasing by approximately 8.2% versus the 3.25% it was expected to increase. The normal cost decreased as more active members came into the post 10/1/2012 benefit plan.
2. For the Fire group, the total computed employer contribution rate as a % of payroll was lower this valuation. The computed employer contribution rate for fiscal year 2022 is 63.18% compared with 65.31% for fiscal year 2021. The increase was primarily due to total payroll increasing by approximately 9.9% versus the 3.25% it was expected to increase. The normal cost decreased as more active members came into the post 10/1/2012 benefit plan.
3. The rate of return based upon the funding value of assets was 7.4% for the valuation year ended September 30, 2020. The rate of return based upon the market value of assets was 6.8% for the valuation year ended September 30, 2020. The funding value of assets currently exceeds the market value of assets by approximately 0.8%. (Please see page B-19 for details.)
4. Based upon the funding value of assets, the police group's funded ratio is 56.2% and the fire group's funded ratio is 58.2%. Based upon the market value of assets (including the DROP account balance), the police group's funded ratio is 55.8% and the fire group's funded ratio is 57.7%.
5. For the continued well-being of the fund, the fund must receive contributions at least at the levels recommended in the actuarial valuation.
6. The Missouri Local Government Employees Retirement System (LAGERS) recently adopted updated mortality tables for use in their annual valuations. Beginning with the September 30, 2021 valuations for the City of Columbia Police and Fire Retirement Fund (both the GASB Statement Nos. 67 and 68 valuation and the annual funding valuation), these mortality tables will be used.
7. Given the fact that the last Experience Study (i.e., review of economic and demographic assumptions) was last completed after the September 30, 2015 annual valuation, we recommend that the Board have an updated Experience Study performed prior to the next annual valuation.

Comments (Concluded)

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.0% on the actuarial value of assets), it is expected that:

- (1) Amortization payments will remain level as a percentage of total payroll over the amortization period;
- (2) Employer normal cost contributions will decrease as a percentage of payroll as more active members become covered under the post October 1, 2012 benefit provisions;
- (3) In nominal dollars, the unfunded actuarial accrued liability is expected to increase until the amortization period becomes approximately 21 years, at which point it would be expected to decline;
- (4) The unfunded actuarial accrued liability will be fully amortized after the end of the amortization period; and
- (5) The funded status of the plan will increase gradually towards a 100% funded ratio.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regards to any funded status measurements presented in this report:

- (1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.
- (2) The measurement is inappropriate for assessing the need for or the amount of future employer contributions.
- (3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Risks Associated with Measuring the Actuarial Accrued Liability and the Total Computed Employer Contribution

The determination of the actuarial accrued liability and the total computed employer 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 actuarial accrued liability and the total computed employer 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.

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

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:

	September 30, 2020	
	Police	Fire
Ratio of actives to retirees and beneficiaries	0.9	0.9
Ratio of net cash flow to market value of assets	(1.1)%	(1.1)%
Duration of the actuarial accrued liability	12.20	12.58

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of actives 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 the Actuarial Accrued Liability

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

Summary of Other Risk Metrics

Police

Valuation Date September 30,	Funded Ratio		UAAL Amortization Period	Total UAAL / Total Payroll	Total Funding Value of Assets / Total Payroll	Total AAL / Total Payroll	Standard Deviation of Investment Return / Total Payroll
	Based on AVA	Based on MVA					
2011	53 %	49 %	28	3.8	4.3	8.2	**
2012 @	54	54	27	3.9	4.7	8.6	**
2013	55	56	26	4.0	5.0	9.1	**
2014	56	58	25	4.2	5.4	9.6	**
2015	60	57	24	3.7	5.5	9.3	76 %
2016 #	55	53	30	4.6	5.7	10.2	78
2017	56	56	29	4.8	6.1	10.8	88
2018	56	57	28	4.7	5.9	10.6	87
2019	56	56	27	4.8	6.2	11.0	89
2020	56	56	26	4.7	6.0	10.6	86

Fire

Valuation Date September 30,	Funded Ratio		UAAL Amortization Period	Total UAAL / Total Payroll	Total Funding Value of Assets / Total Payroll	Total AAL / Total Payroll	Standard Deviation of Investment Return / Total Payroll
	Based on AVA	Based on MVA					
2011	53 %	49 %	28	6.6	7.5	14.1	**
2012 @	54	52	27	6.9	7.9	14.8	**
2013	55	55	26	6.6	8.1	14.7	**
2014	57	57	25	6.5	8.4	14.9	**
2015 @	60	57	24	5.9	9.0	15.0	124 %
2016 #	55	52	30	7.3	8.8	16.0	121
2017	56	56	29	7.2	9.1	16.3	132
2018	56	57	28	7.3	9.4	16.6	138
2019	57	57	27	7.4	10.0	17.4	145
2020	58	58	26	7.0	9.7	16.7	140

@ Reflects changes in benefit provisions.

Reflects changes in assumptions and for the 2016 valuation, a change in the amortization period from 23 years to 30 years.

** Unavailable.

Summary of Other Risk Metrics

An explanation of the significance of the risk metrics presented on the previous page follow:

- (1) **Funded Ratio (Funding Value of Assets basis)** – This is the most widely known measure of a plan's financial strength. The trend in the funded ratio and the actual funded ratio are both important metrics. A trend approaching 100% is desirable.
- (2) **Funded Ratio (Market Value of Assets basis)** – This is similar to the above, except that the asset value used is the market value.
- (3) **UAAL Amortization Period** – Periods above about 17 to 23 years generally indicate that the UAAL payment is less than the interest on the UAAL. This situation is referred to as "negative amortization." Negative amortization is increasingly viewed as undesirable.
- (4) **Total UAAL / Total Payroll** – The ratio of UAAL to payroll gives an indication of the plan sponsor's ability to pay off the UAAL. A declining ratio is desirable. A ratio above approximately 3.0 to 4.0 may indicate difficulty in discharging the unfunded liability in some circumstances.
- (5) **Total Funding Value of Assets / Total Payroll** – The ratio of assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 5.0 and 7.0. Social Security Replacement Plans may fall above that range. A high ratio can indicate volatility of contribution rates and amortization period.
- (6) **Total AAL / Total Payroll** – This is similar to (5). It illustrates the expected ratio of assets to payroll when the plan has a funded ratio of 100%.
- (7) **Standard Deviation of Investment Return / Total Payroll** – The portfolio standard deviation measures the volatility of investment return. When divided by payroll, it gives the effect of a one standard deviation asset gain or loss as a percent of payroll. This theoretically may happen once every 6 years.

SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Brief Summary of POLICE Provisions Evaluated and/or Considered for Members Hired Before October 1, 2012 (September 30, 2020)

Age or Service Retirement

Eligibility. Age 65 with any amount of service or any age with 20 years of continuous service. (All service prior to 4/1/62 is considered, even if not continuous.)

Amount. Covered employees of the Plan as of October 1, 1991, elected either the benefit under (a) or (b). Employees becoming covered by the Plan after October 1, 1991 receive the benefit in (a).

(a) Prior to age 62, 3.0% of “Highest Average Salary” times the number of years of continuous service up to 20 years. For each year over 20, 2% of “Highest Average Salary” is added. The maximum benefit is 70% of Highest Average Salary with 25 years of continuous service. After age 62, the benefit is the same as the benefit prior to age 62. In the first month of each plan year, the retirement benefit shall be increased by 0.6%.

(b) Prior to age 62, 3.0% of “Highest Average Salary” times the number of years of continuous service up to 20 years. For each year over 20, 2% of “Highest Average Salary” is added. The maximum benefit is 70% of Highest Average Salary with 25 years of continuous service. In the first month of each plan year, the retirement benefit shall be increased by 2.0%, up to age 62. After age 62, 2.20% of Highest Average Salary times the number of years of continuous service up to 20 years. For each year over 20, 1.70% of “Highest Average Salary” is added. The maximum benefit is 52.5% of Highest Average Salary with 25 years of continuous service. The benefit calculated at age 62 is then increased by 2.0% for each year from retirement to age 61. This benefit is then payable from age 62 and increased in each future year by 2.0% of the preceding year’s benefit.

Highest Average Salary (HAS) means the average of the employee’s highest 36 months of salary.

Duty Disability Retirement

Eligibility. Disabled to the extent that employee is no longer able to perform the duties of a police officer.

Amount. 50% of Highest Average Salary plus 10% of Highest Average Salary for each dependent child under age 18. Maximum benefit is 90% of Highest Average Salary. Employee receives credit for covered employment for each year of duty-related disability retirement up to a maximum, when combined with years of actual covered employment, of 20 years. At that point disability retirement benefits cease and the benefit shall become a regular age & service retirement benefit.



Non-Duty Disability Retirement

Eligibility. Disabled to the extent that employee is no longer able to perform the duties of a police officer. One year of continuous service is required.

Amount. 2.5% of HAS per year of covered employment plus 0.5% of HAS per year for each year for each unmarried dependent child under the age of 18, up to a maximum of 4 children. At age 65, the retiree may elect to receive, in lieu thereof, retirement benefits based on age.

Member's Death While Active or While on Disability Retirement

Eligibility.

Spouse. Legally married to member at time of death.

Child. Single and younger than age 18. (Natural, adopted or step-child).

Amount.

Spouse. 66-2/3% of the base retirement benefit equal to which the deceased employee would otherwise have been entitled without regard to any offset or reduction of any kind.

Child. If no widowed spouse is eligible to receive benefits then the surviving children divide equally the benefit to which a widowed spouse would have been entitled.

Member's Death While on Age or Service Retirement

Eligibility. Surviving spouse, legally married to member at time of death.

Amount. 66-2/3% of retired members benefit (ignoring any Social Security offset). The benefit, plus any Social Security benefit the spouse may be eligible to receive cannot exceed 90% of the salary the former member had been receiving at retirement.

Lump-Sum Death Benefits. If no survivor benefits are payable, a lump-sum funeral benefit of \$1,000 is paid.

Vested Deferred. One year of service and separated before age 65 without taking refund of member contributions. Payment beginning date is deferred to attainment of age 65.

Member Contributions.

Option 1 - No Salary Reduction. Member contributes 4.85% of salary.

Option 2 - Salary Reduction of 3.95%.

In addition, each covered police employee shall be assessed and required to contribute 3.50% of compensation (as defined in Sec. 18-40 of the City Ordinance).



Members terminating prior to being eligible for retirement benefits are eligible to receive a refund of their contributions plus interest at the annual investment rate of return of the fund as determined by the annual actuarial report for each year in which contributions were made by the covered employee, compounded annually from the last day of the calendar year in which such covered employee contributions are made to date of withdrawal.

Deferred Retirement Option Plan (DROP). Members age 65 with any amount of service or any age with 20 years of continuous service are eligible to participate.

Members, for a maximum of 5 years, may continue employment and have 100% of their accrued benefit (at date of DROP participation) paid into the DROP in lieu of any further benefit accruals. The payments into the DROP accumulate with interest at 2% (4% for DROP members with an effective DROP date on or before September 1, 2012) on the mean balance and are paid to the member at termination of active membership in either a lump sum or as an annuity. DROP participants are still eligible for COLA increases. Employer and member contributions continue to be made while the member participates in the DROP. Member contributions are not deposited to the member's DROP account.

Brief Summary of POLICE Provisions Evaluated and/or Considered for Members Hired On or After October 1, 2012 (September 30, 2020)

Age or Service Retirement

Eligibility. Age 65 with any amount of service or any age with 25 years of continuous service.

Amount. 2.0% of "Highest Average Salary" times the number of years of continuous service up to 25 years. For each year over 25, 1.5% of "Highest Average Salary" is added. The maximum benefit is 57.5% of "Highest Average Salary." The benefit is increased by 0.60% annually compounded.

Highest Average Salary (HAS) means the average of the employee's highest 36 months of salary.

Duty Disability Retirement

Eligibility. Disabled to the extent that employee is no longer able to perform the duties of a police officer.

Amount. 50% of the base retirement benefit equal to which the deceased employee would otherwise have been entitled without regard to any offset or reduction of any kind, plus 10% of Highest Average Salary for each dependent child under age 18. Maximum benefit is 90% of Highest Average Salary.

Non-Duty Disability Retirement

Eligibility. Disabled to the extent that employee is no longer able to perform the duties of a police officer. One year of continuous service is required.

Amount. 2.5% of HAS per year of covered employment plus 0.5% of HAS per year for each year for each unmarried dependent child under the age of 18, up to a maximum of 4 children. At age 65, the retiree may elect to receive, in lieu thereof, retirement benefits based on age.

Member's Death While Active or While on Disability Retirement

Eligibility.

Spouse. Legally married to member at time of death.

Child. Single and younger than age 18. (Natural, adopted or step-child)

Amount.

Spouse. 50% of the base retirement benefit equal to which the deceased employee would otherwise have been entitled without regard to any offset or reduction of any kind.

Child. If no widowed spouse is eligible to receive benefits then the surviving children divide equally the benefit to which a widowed spouse would have been entitled.



Member's Death While on Age or Service Retirement

Eligibility. Surviving spouse, legally married to member at time of death.

Amount. 50% of retired members benefit.

Lump-Sum Death Benefits. If no survivor benefits are payable, a lump-sum funeral benefit of \$1,000 is paid.

Vested Deferred. One year of service and separated before age 65 without taking refund of member contributions. Payment beginning date is deferred to attainment of age 65.

Member Contributions. Member contributes 4.50% of salary.

Members terminating prior to being eligible for retirement benefits are eligible to receive a refund of their contributions plus interest at the annual investment rate of return of the fund as determined by the annual actuarial report for each year in which contributions were made by the covered employee, compounded annually from the last day of the calendar year in which such covered employee contributions are made to date of withdrawal.

Deferred Retirement Option Plan (DROP). Members age 65 with any amount of service or any age with 25 years of continuous service are eligible to participate.

Members, for a maximum of 5 years, may continue employment and have 100% of their accrued benefit (at date of DROP participation) paid into the DROP in lieu of any further benefit accruals. The payments into the DROP accumulate with interest at 2% on the mean balance and are paid to the member at termination of active membership in either a lump sum or as an annuity. DROP participants are still eligible for COLA increases. Employer and member contributions continue to be made while the member participates in the DROP. Member contributions are not deposited to the member's DROP account.

Brief Summary of FIRE Provisions Evaluated and/or Considered for Members Hired Before October 1, 2012 (September 30, 2020)

Age or Service Retirement

Eligibility. Age 65 with any amount of service or any age with 20 years continuous service. (All service prior to 4/1/62 is considered, even if not continuous.)

Amount. 2% of "Highest Average Salary" times the number of years of continuous service. For members retiring with 20 or more years of service, benefit is 70% of HAS plus 2% per year for each year in excess of 20 years, up to a maximum of 80% of HAS. For employees retiring after January 4, 1993, the benefit is increased by 2% annually compounded.

Highest Average Salary (HAS) means the average of the employee's highest 36 months of salary.

Disability Retirement

Eligibility. Disabled to the extent that employee is no longer able to perform the duties of a firefighter. If disability is not duty related, one year of continuous service is required.

Amount. 50% of Highest Average Salary (HAS) plus 10% of HAS for each dependent child under age 18. The maximum benefit is 90% of HAS. At the time in which a member is eligible for normal retirement (based on service at time of termination plus service accrued while on disability retirement), the retiree receives the greater of the benefit being received or the age or service benefit based on salary at time of termination of employment and service at time of termination plus service accrued while on disability retirement to a maximum of 20 years or actual years of service, whichever is greater.

Member's Death While Active or on Disability Retirement

Eligibility.

Spouse. Legally married to member at time of death.

Child. Single and younger than age 18. (Natural or adopted)

Amount.

Spouse. 50% of Highest Average Salary. A \$1,000 funeral benefit is also paid.

Child. The amount which would have been paid by Social Security had employment with the City been covered by Social Security. If no spouse benefit is payable, the qualifying children receive an additional amount totaling 25% of Highest Average Salary and the \$1,000 funeral benefit.



Member's Death While on Age or Service Retirement

Eligibility. Surviving spouse, legally married to member at time of death.

Amount. 100% of retired member's benefit. A lump-sum funeral benefit of \$1,000 is paid.

Vested Deferred. One year of service and separated before age 65 without taking refund of member contributions. Payment beginning date is deferred to attainment of age 65.

Member Contributions. Member contributes 15.24% of salary. In addition, each covered firefighter employee shall be assessed and be required to pay into the fund 1.08% of the employee's compensation. This amount is to pay for the 1997 improvements in disability retirement benefits and is subject to periodic adjustment.

Members terminating prior to being eligible for retirement benefits are eligible to receive a refund of their contributions plus interest at the annual investment rate of return of the fund as determined by the annual actuarial report for each year in which contributions were made by the covered employee, compounded annually from the last day of the calendar year in which such covered employee contributions are made to date of withdrawal.

Deferred Retirement Option Plan (DROP). Members age 65 with any amount of service or any age with 20 years of continuous service are eligible to participate.

Members, for a maximum of 5 years, may continue employment and have 100% of their accrued benefit (at date of DROP participation) paid into the DROP in lieu of any further benefit accruals. The payments into the DROP accumulate with interest at 2% (4% for DROP members with an effective DROP date on or before September 1, 2012) on the mean balance and are paid to the member at termination of active membership in either a lump sum or as an annuity. DROP participants are still eligible for COLA increases. Employer and member contributions continue to be made while the member participates in the DROP. Member contributions are not deposited to the member's DROP account.

Brief Summary of FIRE Provisions Evaluated and/or Considered for Members Hired On or After October 1, 2012 (September 30, 2020)

Age or Service Retirement

Eligibility. Age 55 with 1 year of service **or** any age if the combination of years of age and years of service equals 80 or more.

Amount. 2.5% of "Highest Average Salary" times the number of years of continuous service. There is no maximum benefit.

Highest Average Salary (HAS) means the average of the employee's highest 36 months of salary.

Early Retirement

Eligibility. Age 50 with 1 year of service.

Amount. The normal retirement benefit amount reduced by 0.50% for each month earlier than normal retirement age.

Disability Retirement

Eligibility. Disabled to the extent that employee is no longer able to perform the duties of a firefighter. If disability is not duty related, one year of continuous service is required.

Amount. The normal retirement benefit. If duty related, the benefit is based on years of credited service the member would have completed had the member continued working until age 60.

Member's Death While Active or on Disability Retirement

Eligibility.

Spouse. Legally married to member at time of death.

Amount. The normal retirement benefit. If duty related, the benefit is based on years of credited service the member would have completed had the member continued working until age 60.

Member's Death While on Age or Service Retirement or on Disability Retirement

Eligibility. Surviving spouse, legally married to member at time of death.

Amount. 0% of retired member's benefit. A lump-sum funeral benefit of \$1,000 is paid.

Vested Deferred. One year of service and separated before age 65 without taking refund of member contributions. Payment beginning date is deferred to attainment of age 65.

Member Contributions. Member contributes 4.0% of salary.

Members terminating prior to being eligible for retirement benefits are eligible to receive a refund of their contributions plus interest at the annual investment rate of return of the fund as determined by the annual actuarial report for each year in which contributions were made by the covered employee, compounded annually from the last day of the calendar year in which such covered employee contributions are made to date of withdrawal.

Deferred Retirement Option Plan (DROP). Members age 55 with 1 year of service **or** any age if the combination of years of age and years of service equals 80 or more are eligible to participate.

Members, for a maximum of 5 years, may continue employment and have 100% of their accrued benefit (at date of DROP participation) paid into the DROP in lieu of any further benefit accruals. The payments into the DROP accumulate with interest at 2% on the mean balance and are paid to the member at termination of active membership in either a lump sum or as an annuity. DROP participants are still eligible for COLA increases. Employer and member contributions continue to be made while the member participates in the DROP. Member contributions are not deposited to the member's DROP account.

Comparative Summary of Active Members (Including DROP Members)

Police Fund

Year Ended	Number	Valuation Payroll	Averages		
			Age	Service	Pay
9/30/2011	149	\$8,475,940	38.1 yrs.	11.1 yrs.	\$ 56,886
9/30/2012	146	8,279,852	38.2	11.2	56,711
9/30/2013	150	8,276,896	37.3	10.5	55,179
9/30/2014	148	8,140,637	36.7	9.6	55,004
9/30/2015	155	8,723,289	37.2	10.0	56,279
9/30/2016	151	8,947,152	38.0	10.1	59,253
9/30/2017	151	8,645,882	37.4	9.9	57,257
9/30/2018	161	9,073,800	36.7	9.1	56,359
9/30/2019	157	9,131,578	36.8	9.2	58,163
9/30/2020	160	9,882,239	36.8	9.1	61,764

Fire Fund

Year Ended	Number	Valuation Payroll	Averages		
			Age	Service	Pay
9/30/2011	127	\$ 7,170,923	40.7 yrs.	12.1 yrs.	\$ 56,464
9/30/2012	126	7,209,301	41.0	12.4	57,217
9/30/2013	136	7,539,548	39.7	11.2	55,438
9/30/2014	134	7,753,834	39.9	11.5	57,864
9/30/2015	134	8,056,819	39.6	11.3	60,126
9/30/2016	139	8,605,280	38.1	9.6	61,908
9/30/2017	142	8,598,788	38.8	10.2	60,555
9/30/2018	141	8,784,183	39.2	10.6	62,299
9/30/2019	137	8,724,771	39.9	11.2	63,684
9/30/2020	137	9,592,099	40.3	11.4	70,015

Active Police Members
(Includes Members Participating in the DROP)
as of September 30, 2020
by Attained Age and Years of 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
20-24	9							9	\$ 436,625
25-29	27	2						29	1,521,228
30-34	15	14	3					32	1,769,422
35-39	11	11	12	1				35	2,126,919
40-44	3	1	8	4				16	1,069,935
45-49		1	2	12	5			20	1,530,626
50-54	1		2	9	4	2		18	1,348,109
55-59				1				1	79,375
60+									
Totals	66	29	27	27	9	2		160	\$ 9,882,239

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 36.8 years

Service: 9.1 years

Annual Pay: \$61,764

Active Fire Members
(Includes Members Participating in the DROP)
as of September 30, 2020
by Attained Age and Years of 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
20-24	1							1	\$ 42,140
25-29	10	2						12	623,938
30-34	13	12						25	1,485,004
35-39	7	14	4	2				27	1,726,966
40-44	3	2	10	11				26	1,967,035
45-49	1	1	4	19	3			28	2,232,338
50-54			1	8	3	2		14	1,164,318
55-59				4				4	350,360
60+									
Totals	35	31	19	44	6	2		137	\$9,592,099

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 40.3 years

Service: 11.4 years

Annual Pay: \$70,015

Retirees and Beneficiaries Added to and Removed from Rolls

Police Fund

Year Ended	Added to Rolls		Removed from Rolls		Rolls End of Year		Benefits as % of Active Member Payroll	% Change in Annual Benefits
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits		
9/30/2011	8	\$ 297,365	1	\$ 4,823	125	\$ 2,991,976	35.30 %	+ 11
9/30/2012	8	312,164	2	13,022	131	3,291,117	39.75	+ 10
9/30/2013	14	452,712	3	16,663	142	3,727,166	45.03	+ 13
9/30/2014	14	595,928	6	31,054	150	4,292,040	52.72	+ 15
9/30/2015	6	52,536	4	40,647	152	4,303,929	49.34	+ 0
9/30/2016	3	98,788	2	22,233	153	4,380,484	48.96	+ 2
9/30/2017	7	271,315	0	0	160	4,651,799	53.80	+ 6
9/30/2018	9	353,325	4	27,216	165	4,977,908	54.86	+ 7
9/30/2019	9	403,539	3	72,787	171	5,308,660	58.14	+ 7
9/30/2020	8	326,665	3	39,099	176	5,596,226	56.63	+ 5

Fire Fund

Year Ended	Added to Rolls		Removed from Rolls		Rolls End of Year		Benefits as % of Active Member Payroll	% Change in Annual Benefits
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits		
9/30/2011	8	\$ 363,933	7	\$ 164,481	127	\$ 4,355,306	60.74 %	+ 5
9/30/2012	7	345,388	4	47,477	130	4,653,217	64.54	+ 7
9/30/2013	13	478,485	5	67,153	138	5,064,549	67.17	+ 9
9/30/2014	7	366,060	3	43,987	142	5,386,622	69.47	+ 6
9/30/2015	10	554,172	5	172,021	147	5,768,773	71.60	+ 7
9/30/2016	15	864,648	4	140,717	158	6,492,704	75.45	+ 13
9/30/2017	1	159,972	3	52,737	156	6,599,939	76.75	+ 2
9/30/2018	6	389,099	3	112,088	159	6,876,950	78.29	+ 4
9/30/2019	5	338,213	4	52,568	160	7,162,595	82.09	+ 4
9/30/2020	6	467,161	5	156,110	161	7,473,646	77.91	+ 4

Retirees and Beneficiaries as of September 30, 2020

Tabulated by Attained Ages

Attained Ages	Retirees		Beneficiaries		Total	
	No.	Annual Benefit	No.	Annual Benefit	No.	Annual Benefit
6	1	\$ 4,080		\$ -	1	\$ 4,080
10			1	2,504	1	2,504
13			1	2,504	1	2,504
17			1	2,504	1	2,504
42	1	40,175			1	40,175
43	1	49,084	1	15,801	2	64,885
44	1	50,888			1	50,888
45	6	237,654			6	237,654
46	8	355,012	1	14,827	9	369,839
47	2	107,603			2	107,603
48	4	134,436			4	134,436
49	5	200,433			5	200,433
50	6	251,713			6	251,713
51	7	315,864			7	315,864
52	5	216,993			5	216,993
53	7	244,009			7	244,009
54	8	375,621			8	375,621
55	8	349,255			8	349,255
56	11	551,243	1	31,855	12	583,098
57	15	685,945			15	685,945
58	9	505,306			9	505,306
59	14	736,647			14	736,647
60	15	727,518	1	11,252	16	738,770
61	10	508,318	1	2,175	11	510,493
62	12	621,224			12	621,224
63	9	416,366			9	416,366
64	5	210,648			5	210,648
65	6	208,001	1	47,689	7	255,690
66	12	526,240			12	526,240
67	11	541,364			11	541,364

(Concluded on next page)

Retirees and Beneficiaries as of September 30, 2020
Tabulated by Attained Ages
(Concluded)

Attained Ages	Retirees		Beneficiaries		Total	
	No.	Annual Benefit	No.	Annual Benefit	No.	Annual Benefit
68	9	\$ 351,114	1	\$ 58,940	10	\$ 410,054
69	6	215,739	1	10,821	7	226,560
70	12	485,328	3	31,149	15	516,477
71	12	501,384	1	19,471	13	520,855
72	11	394,818	4	101,014	15	495,832
73	11	421,307	2	67,448	13	488,755
74	3	60,647	1	12,778	4	73,425
75	2	73,398			2	73,398
76	8	203,752			8	203,752
77	5	106,785	1	8,239	6	115,024
78	2	52,744	2	19,725	4	72,469
79	3	102,283	2	20,324	5	122,607
80	2	47,040	1	7,834	3	54,874
81			1	9,424	1	9,424
82	4	89,549	1	11,646	5	101,195
83	1	98,683	2	18,277	3	116,960
84			1	12,370	1	12,370
85	1	17,207	1	11,627	2	28,834
86	1	13,894	1	7,337	2	21,231
88	2	17,172	2	20,475	4	37,647
89	1	19,212	1	12,113	2	31,325
90			2	19,461	2	19,461
94			1	8,367	1	8,367
96			1	6,225	1	6,225
Totals	295	\$ 12,443,696	42	\$ 626,176	337	\$13,069,872

Police DROP Members as of September 30, 2020

Tabulated by Attained Ages

Attained Ages	DROP			
	No.	Annual Benefit	Annual Pay	DROP Account Balance
43	2	\$ 72,423	\$ 131,610	\$ 133,369
44	1	50,325	74,080	37,996
45	1	42,449	72,652	141,428
48	1	34,845	61,902	137,503
49	2	129,387	219,841	171,545
50	2	107,045	158,913	31,803
51	1	35,217	119,498	2,935
53	1	50,611	82,770	240,050
Totals	11	\$ 522,302	\$ 921,266	\$ 896,629

Fire DROP Members as of September 30, 2020

Tabulated by Attained Ages

Attained Ages	DROP			
	No.	Annual Benefit	Annual Pay	DROP Account Balance
46	1	\$ 66,469	\$ 84,843	\$ 137,303
47	1	69,408	97,212	104,212
49	3	205,694	272,375	414,196
Totals	5	\$ 341,571	\$ 454,430	\$ 655,711

Police Vested Terminated Members as of September 30, 2020 Tabulated by Attained Ages

Attained Ages	No.	Annual Benefits
20-24	1	\$ 1,306
25-29	3	10,783
30-34	7	31,641
35-39	9	54,983
40-44	3	17,090
45-49	6	83,740
50-54	2	35,574
55-59	4	100,833
60-65	2	16,272
Totals	37	\$ 352,222

Fire Vested Terminated Members as of September 30, 2020 Tabulated by Attained Ages

Attained Ages	No.	Annual Benefits
28	1	\$ 4,201
29	1	4,351
30	1	3,069
31	1	4,317
44	1	10,905
Totals	5	\$ 26,843

Summary of Asset Information and Recent Financial Activity Furnished for Valuation

Reserves by Division (Market Value Basis) Year Ended September 30, 2020

Reserves For	
Police Group	\$ 58,608,812
Fire Group	92,544,457
Total Assets	\$ 151,153,269

The reported market value of assets (less accruals net of payables) was \$151,153,269. Final asset values for actuarial valuation purposes include the funding value of assets of \$152,305,514 (including the DROP account balances presented on page B-16) from page B-19.

Revenues and Expenses (Market Value Basis) Year Ended September 30, 2020

Revenues

Employee contributions	\$ 1,711,393
Employer contributions	10,124,532
Interest and dividend revenue	9,654,815
Total Revenues	\$ 21,490,740

Expenses

Pension & death benefits	\$ 13,222,717
Refund of employees' contributions	83,636
Administrative expenses	97,739
Other	44,460
Total Expenses	\$ 13,448,552
Excess of Revenues over Expenses	\$ 8,042,188

Development of Funding Value of Assets

Valuation Date September 30:	2019	2020	2021	2022	2023
A. Funding Value Beginning of Year	\$ 136,171,521	\$ 143,322,626			
B. Market Value End of Year	143,111,081	151,153,269			
C. Market Value Beginning of Year	138,172,000	143,111,081			
D. Non-Investment Net Cash Flow	(2,501,498)	(1,612,627)			
E. Investment Income					
E1. Market Total: B - C - D	7,440,579	9,654,815			
E2. Assumed Rate of Investment Return	7.00%	7.00%			
E3. Amount for Immediate Recognition	9,444,454	9,976,142			
E4. Amount for Phased-In Recognition: E1 – E3	(2,003,875)	(321,327)			
F. Phased-In Recognition of Investment Income					
F1. Current Year: 0.25 x E4	(500,969)	(80,332)			
F2. First Prior Year	90,688	(500,969)	\$ (80,332)		
F3. Second Prior Year	1,109,985	90,688	(500,969)	\$ (80,332)	
F4. Third Prior Year	(491,555)	1,109,986	90,687	(500,968)	\$ (80,331)
F5. Total Phase-In Amount	208,149	619,373	(490,614)	(581,300)	(80,331)
G. Funding Value End of Year:					
G1. Preliminary Funding Value End of Year: A + D + E3 + F5	\$ 143,322,626	\$ 152,305,514			
G2. Corridor Percent	25%	25%			
G3. Upper Corridor Limit: (100% + G2) x B	\$ 178,888,851	\$ 188,941,586			
G4. Lower Corridor Limit: (100% - G2) x B	\$ 107,333,311	\$ 113,364,952			
G5. Funding Value End of Year	\$ 143,322,626	\$ 152,305,514			
H. Difference between Market & Funding Value	(211,545)	(1,152,245)			
I. Recognized Rate of Return	7.2%	7.4%			
J. Market Rate of Return	5.4%	6.8%			
K. Ratio of Funding Value to Market Value	100.1%	100.8%			

The Funding Value of Assets recognizes assumed investment income (line E3) fully each year. Differences between actual and assumed investment income (line E4) are phased-in over a closed four-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for three consecutive years, funding value will become equal to market value.



SECTION C

SUMMARY OF VALUATION METHODS AND ASSUMPTIONS

Valuation Methods

Age and Service and Casualty Benefits. Normal cost and the allocation of benefit values between service rendered before and after the valuation date was determined using an individual entry-age normal cost method having the following characteristics:

- (i) The annual normal costs for each individual active member, payable from the date of employment to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement; and
- (ii) Each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

Financing of Unfunded Actuarial Accrued Liabilities. Unfunded actuarial accrued liabilities were amortized by level (principal & interest combined) percent-of-payroll contributions over a period of 26 years.

Actuarial Assumptions Used for the Valuation

The actuarial assumptions are adopted by the Retirement Board after consultation with the actuary. The actuarial assumptions were based upon the results of an Experience Study covering the period September 30, 2010 through September 30, 2015. A report dated November 7, 2016 presented the results of this Experience Study. The actuarial assumptions represent estimates of future experience.

The actuary calculates the contribution requirements and benefit values of the Fund by applying financial assumptions to the benefit provisions and people information furnished, using the valuation methods described on the previous page.

The principal areas of financial risk which require assumptions about future experiences are:

- (i) Long-term rates of investment return to be generated by the assets of the Fund;
- (ii) Patterns of pay increases to members;
- (iii) Rates of mortality among members, retirants and beneficiaries;
- (iv) Rates of withdrawal of active members (without entitlement to a retirement benefit);
- (v) Rates of disability among members; and
- (vi) The age patterns of actual retirements.

In making a valuation, the actuary calculates the monetary effect of each assumption for as long as a present covered person survives - - - a period of time which may be several decades long.

Actual experience of the Fund will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions, or the skill of the actuary and the precision of the numerous calculations made. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments to the computed contribution rate.

From time-to-time it becomes appropriate to modify one or more of the assumptions, to reflect experience trends (but not random year-to-year fluctuations).

The rate of investment return was 7.0% a year (net of investment expenses), compounded annually, and was first used for the September 30, 2016 valuation. The assumption is used to make money payable at one point in time equal in value to a different amount of money payable at another point in time. The assumed real rate of investment return is the rate of investment return in excess of either wage inflation or price inflation. Considering a wage inflation assumption of 3.25% and a price inflation assumption of 2.5%, the 7.0% nominal rate of investment return translates into a real rate of investment return of 3.75% over wage inflation and 4.5% over price inflation. (Because of the interdependence of assumptions about future salary increase rates, investment return rates, and inflation rates, comparison of actual investment return to actuarially assumed investment return does NOT provide a useful tool for the evaluation of investment performance.)

The rates of salary increase used for individual members are in accordance with the following table. The assumption is used to project a member's current salary to the salaries upon which benefit amounts will be based.

Police				Fire			
Salary Increase Assumptions For an Individual Member				Salary Increase Assumptions For an Individual Member			
Sample Ages	Merit & Seniority	Base (Economic)	Increase Next Year	Sample Ages	Merit & Seniority	Base (Economic)	Increase Next Year
25	4.15%	3.25%	7.40%	25	8.50%	3.25%	11.75%
30	2.66	3.25	5.91	30	4.30	3.25	7.55
35	1.56	3.25	4.81	35	3.00	3.25	6.25
40	0.85	3.25	4.10	40	2.00	3.25	5.25
45	0.59	3.25	3.84	45	1.20	3.25	4.45
50	0.44	3.25	3.69	50	0.50	3.25	3.75
55	0.30	3.25	3.55	55	0.00	3.25	3.25
60	0.15	3.25	3.40	60	0.00	3.25	3.25
65	0.00	3.25	3.25	65	0.00	3.25	3.25

This assumption was first used for the September 30, 2016 valuation.

If the active member population is stationary, then the total active member payroll will increase 3.25% annually, the base portion of the individual salary increase assumptions. This increasing payroll was recognized in amortizing unfunded accrued liabilities.

The pre-retirement mortality tables, for pre-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males was then established to be 2017. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables. This assumption was last reviewed and updated as part of the five-year experience study for the period October 1, 2010 through September 30, 2015.

The healthy retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males was then established to be 2017. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables. This assumption was last reviewed and updated as part of the five-year experience study for the period October 1, 2010 through September 30, 2015.

The disabled retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 disabled mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males was then established to be 2017. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables. This assumption was last reviewed and updated as part of the five-year experience study for the period October 1, 2010 through September 30, 2015.

Sample Attained Ages	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	\$150.65	\$157.08	33.68	38.00
55	143.11	150.72	28.96	33.05
60	133.42	142.59	24.36	28.24
65	121.44	132.31	19.99	23.60
70	107.42	119.60	15.94	19.19
75	91.56	104.49	12.28	15.09
80	74.53	87.47	9.08	11.41

Applicable to calendar year 2020. Values for future years are determined using the MP-2015 projection scale. The above values are for a healthy retiree.

These assumptions were first used for the September 30, 2016 valuation.

The rates of retirement used to measure the probability of eligible members retiring during the next year were as follows:

Percents of Active Fire Members Retiring within the Next Year

Normal Retirement				With Rule of 80		Early Retirement	
Years of Service	Pre 10/1/12	Pst 10/1/12		Pst 10/1/12		Pst 10/1/12	
	Hires	Age	Hires	Age	Hires	Age	Hires
20	30%	55	30%	50	30%	50	2.5%
21	20	56	20	51	20	51	2.5
22	20	57	20	52	20	52	2.5
23	20	58	20	53	20	53	2.5
24	20	59	20	54	20	54	2.5
25	35	60	35	55	35		
26	35	61	35	56	35		
27	35	62	35	57	35		
28	50	63	50	58	50		
29	50	64	50	59	50		
30	100	65	100	60	100		

Percents of Active Police Members Retiring within the Next Year

Years of Service	Normal Retirement	
	Pre 10/1/12	Pst 10/1/12
	Hires	Hires
20	65%	
21	25	
22	25	
23	25	
24	25	
25	25	65%
26	25	25
27	25	25
28	25	25
29	25	25
30	100	100

For members who have already DROPPed, it is assumed that members will not participate more than five years in the DROP.

Members hired prior to 10/1/12 were assumed to be eligible for retirement after 20 years of service, or after attaining age 65. For those members who do not accrue 20 years of service credit prior to age 65, it was assumed that 100% of those members will retire upon attaining age 65.

These rates were first used for the September 30, 2016 valuation.



Rates of separation from active membership were as follows:

(Rates do not apply to members eligible to retire and do not include separation on account of death or disability.) This assumption measures the probabilities of members remaining in employment. This assumption was first used for the September 30, 2016 valuation.

Sample Ages	Years of Service	% of Active Members Separating within Next Year	
		Police	Fire
All	0	12.0%	4.0%
	1	11.0	4.0
	2	10.0	3.0
	3	9.0	3.0
	4	7.0	3.0
25	5 & Over	4.7	2.5
30		3.8	2.0
35		2.9	1.1
40		2.0	0.4
45		1.3	0.4
50		1.0	0.4
55		0.7	0.4
60		0.2	0.4

Rates of disability were as follows:

This assumption was first used for the September 30, 2003 valuation.

Sample Ages	% of Active Members Becoming Disabled within Next Year	
	Police	Fire
20	0.15%	0.29%
25	0.18	0.36
30	0.20	0.40
35	0.28	0.57
40	0.42	0.85
45	0.65	1.30
50	1.05	2.10
55	1.84	3.67
60	3.06	6.12

Seventy-five percent (75%) of disability benefits were assumed to be duty related and 25% were assumed to be non-duty related for members of the Police group.

Since the only difference between non-duty and duty disability benefits for Fire members hired before October 1, 2012 is the one year of continuous service requirement for non-duty disability benefits, we have assumed that 100% of disabilities are non-duty related. Given the different benefit structure of duty and non-duty disability benefits for Fire members hired on or after October 1, 2012, we have assumed that 50% of disabilities are non-duty related and 50% of disabilities are duty related.

Summary of Assumptions Used

Miscellaneous and Technical Assumptions

Pay Increase Timing:	Middle of (Fiscal) year.
Decrement Timing:	Decrements of all types 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 valuation date.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and turnover decrements do not operate during retirement eligibility.
Normal Form of Benefit:	The assumed normal form of benefit is the straight life form with 50% joint and survivor for Police (66-2/3% joint and survivor for members hired before 10/1/12) and the straight life form for Fire (100% joint and survivor for members hired before 10/1/12).
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed percent-of-payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
Allocation of Assets:	Funding value of assets are allocated to each group based on the ratio of the Market value of assets for each group.
Marriage Assumption:	80% of members are assumed to be married at retirement.
DROP Participation:	It was assumed that members will participate in the forward DROP to the extent that participating in the forward DROP would provide the highest value of benefits.
Administrative Expenses:	Assumed administrative expenses are added to the Normal Cost, and were 0.35% of payroll in the September 30, 2020 valuation.



April 30, 2021

Mr. James McDonald
Assistant Finance Director
City of Columbia
Municipal Building
701 E. Broadway, 5th Floor
Columbia, Missouri 65205

Dear Mr. McDonald:

Enclosed are 10 copies of the September 30, 2020 annual actuarial valuation of the City of Columbia Police and Firemen's Retirement Fund.

Sincerely,

A handwritten signature in black ink, reading "Mita Drazilov". The signature is fluid and cursive, with the first name "Mita" and last name "Drazilov" clearly distinguishable.

Mita D. Drazilov, ASA, FCA, MAAA

MDD:dj
Enclosures

cc: Kelli Hall
McGladrey & Pullen, LLP (electronic copy)
Janice Finley, City of Columbia (+1 electronic copy)