

City of Kansas City, Missouri Firefighters' Pension System

Actuarial Valuation as of May 1, 2019

**Produced by Cheiron
September 2019**

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September 23, 2019

Board of Pension Trustees
City of Kansas City, Missouri Firefighters' Pension System
12th Floor, City Hall
414 East 12th Street
Kansas City, Missouri 64106

Dear Members of the Board:

At your request, we have conducted an actuarial valuation of the City of Kansas City, Missouri Firefighters' Pension System (KCFPS) as of May 1, 2019. The valuation is organized as follows:

- In Section I, **Board Summary**, we describe the purpose of an actuarial valuation and summarize the key results found in this valuation.
- In Section II, **Disclosures Related to Risk**, we identify and assess the primary risks to the System in accordance with Actuarial Standard of Practice No. 51;
- The **Main Body** of the report presents details on the System's:
 - Section III Assets
 - Section IV Liabilities
 - Section V Contributions
 - Section VI Financial Statement Information
- In the **Appendices**, we conclude our report with detailed information describing System membership (Appendix A), actuarial assumptions and methods employed (Appendix B), a summary of pertinent plan provisions (Appendix C), and a glossary of terms (Appendix D).

The purpose of this report is to present the annual actuarial valuation of the City of Kansas City, Missouri Firefighters' Pension System. This report is for the use of the Firefighters' Pension Board and its auditors in preparing financial reports in accordance with applicable law and accounting requirements.

In preparing our report, we relied on information (some oral and some written) supplied by KCFPS staff. This information includes, but is not limited to, the plan provisions, employee data, and unaudited financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

Future results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the assumptions; changes in assumptions; and changes in plan provisions or applicable law.

Board of Pension Trustees
September 23, 2019


This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared for the Firefighters' Pension System for the purposes described herein and for the use by the plan auditor in completing an audit related to the matters herein. Other users of this valuation report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron



Stephen T. McElhaney, FSA, FCA, EA, MAAA
Principal Consulting Actuary



Jacqueline King, ASA, EA, MAAA
Associate Actuary

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION I – BOARD SUMMARY

The primary purpose of the actuarial valuation and this report is to measure, describe, and identify as of the valuation date:

- The financial condition of the System,
- Past and expected trends in the financial progress of the System,
- The primary risks to the System,
- The City's contributions for Fiscal Year 2021, and
- Information required for the System's financial statement.

In the balance of this Board Summary, we present (A) the basis upon which this year's valuation was completed, (B) the key findings of this valuation including a summary of all key financial results, (C) an examination of the historical trends, and (D) the projected financial outlook for the System.

A. Valuation Basis

This May 1, 2019 valuation represents Cheiron's thirteenth valuation performed for KCFPS. There have been no changes in assumptions, methodologies, and plan provisions since the May 1, 2018 valuation. The contribution rate changes as a result of the May 1, 2017 revised assumptions are being phased-in over five years, and the current valuation is at the third year of this phase-in. The data, methods, assumptions, and plan provisions that serve as the basis for this valuation are all summarized in the appendices.

B. Key Findings of this Valuation

The key results of the May 1, 2019 actuarial valuation are as follows:

- We have calculated the City's contribution rate on two bases:
 - The actuarially determined City contribution rate under the Board's funding policy would have increased from 37.12% as of May 1, 2018 to 38.19% as of May 1, 2019 if the full effect of the revised actuarial assumptions had been recognized at both valuation dates. Due to the five-year phase-in of the new assumptions, the actuarially determined employer contribution rate has been calculated as 35.14% as of May 1, 2019 compared to 32.54% as of May 1, 2018. The actual rate that the City is scheduled to contribute for the current year is 32.54% of payroll, which is the actuarially determined Board contribution rate reflecting the five-year phase-in for the prior year.
 - Under the City ordinance, the City's budgeted contribution rate for the year beginning May 1, 2020 is to be based upon a 30-year closed amortization from May 1, 2014, for the entire amount of unfunded actuarial liability. This rate is 33.87%, which also reflects the five-year phase-in of the revised actuarial assumptions.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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- The FPS's unfunded actuarial liability increased from \$221 million on May 1, 2018 to \$235 million on May 1, 2019.
- The FPS's funding ratio, the ratio of assets over liabilities, decreased from 70.8% as of May 1, 2018 to 70.3% as of May 1, 2019.
- The primary factor in the decrease in the System's funded status was an overall actuarial loss of \$13.2 million.
 - During the year ended April 30, 2019, the System's assets returned 4.56% on a market value basis. The return on the actuarial asset value (i.e. incorporating asset smoothing) was 6.31% (as compared to 7.25% assumed). This resulted in an actuarial loss on investments of \$5.0 million. In addition, the system experienced a loss of \$4.2 million due to the difference between actual and recommended contributions as a result of payroll and timing differences as well as the five-year phase-in of the assumption changes.
 - On the liability side, the System experienced an actuarial loss of \$4.0 million.
- As of May 1, 2019 the actuarial value of assets exceeded the market value by \$4.6 million. The System will recognize this difference as deferred asset losses and gains over the next four years.

This report does not include disclosures required by GASB Statements No. 67 and 68. Statement No. 67 is effective for the plan year ending April 30, 2015 and Statement No. 68 is effective for the employer fiscal year ending April 30, 2016. Please refer to the separate report issued by Cheiron for accounting and financial disclosure information under GASB Statements No. 67 and No 68.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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SECTION I – BOARD SUMMARY

The following is Table I-1 which summarizes all the key results of the valuation with respect to System membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior plan years.

Table I-1			
City of Kansas City, Missouri Firefighters' Pension System			
Summary of Principal Plan Results			
Valuation as of:	May 1, 2018	May 1, 2019	% Change
<u>Participant Counts</u>			
Active Participants	981	993	1.2%
Non-duty Disabled Participants *	5	4	(20.0%)
Duty Disabled Participants *	103	111	7.8%
Retirees and Beneficiaries *	816	817	0.1%
Terminated Vested Participants	7	8	14.3%
Inactive Participants	6	8	33.3%
Total	1,918	1,941	1.2%
Annual Salaries of Active Members	\$ 66,264,508	\$ 68,246,790	3.0%
Annual Retirement Allowances for Retired Members and Beneficiaries	\$ 38,129,136	\$ 39,630,013	3.9%
<u>Assets and Liabilities</u>			
Actuarial Liability (AL)	\$ 756,950,736	\$ 791,841,017	4.6%
Actuarial Value of Assets	535,935,199	556,897,913	3.9%
Unfunded Actuarial Liability (UAL)	\$ 221,015,537	\$ 234,943,104	6.3%
Funded Ratio (AVA)	70.8%	70.3%	
Funded Ratio (MVA)	71.4%	69.7%	
Present Value of Accrued Benefits (PVAB)	\$ 689,724,925	\$ 727,683,657	5.5%
Market Value of Assets	540,393,237	552,265,610	2.2%
Unfunded PVAB	\$ 149,331,688	\$ 175,418,047	17.5%
Accrued Benefit Funding Ratio	78.3%	75.9%	
<u>Contributions as a Percentage of Payroll under Board's Funding Policy **</u>			
	Fiscal Year 2020	Fiscal Year 2021	
Normal Cost Contribution	13.87%	14.11%	
Administrative Expense Rate	0.39%	0.41%	
Unfunded Actuarial Liability Contribution	<u>18.28%</u>	<u>20.62%</u>	
Total Contribution	32.54%	35.14%	
Actuarially Determined Contribution (GASB)	\$21,562,471	\$23,981,922	11.2%

* Disabled participants that were eligible for voluntary retirement at the time of their disability are valued as Retirees. The number of such participants was 280 at May 1, 2018 and 288 at May 1, 2019.

** Fiscal Year 2020 and 2021 contribution rate and ADC reflect the 5-year phase-in of the 2017 assumption changes

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ACTUARIAL VALUATION AS OF MAY 1, 2019

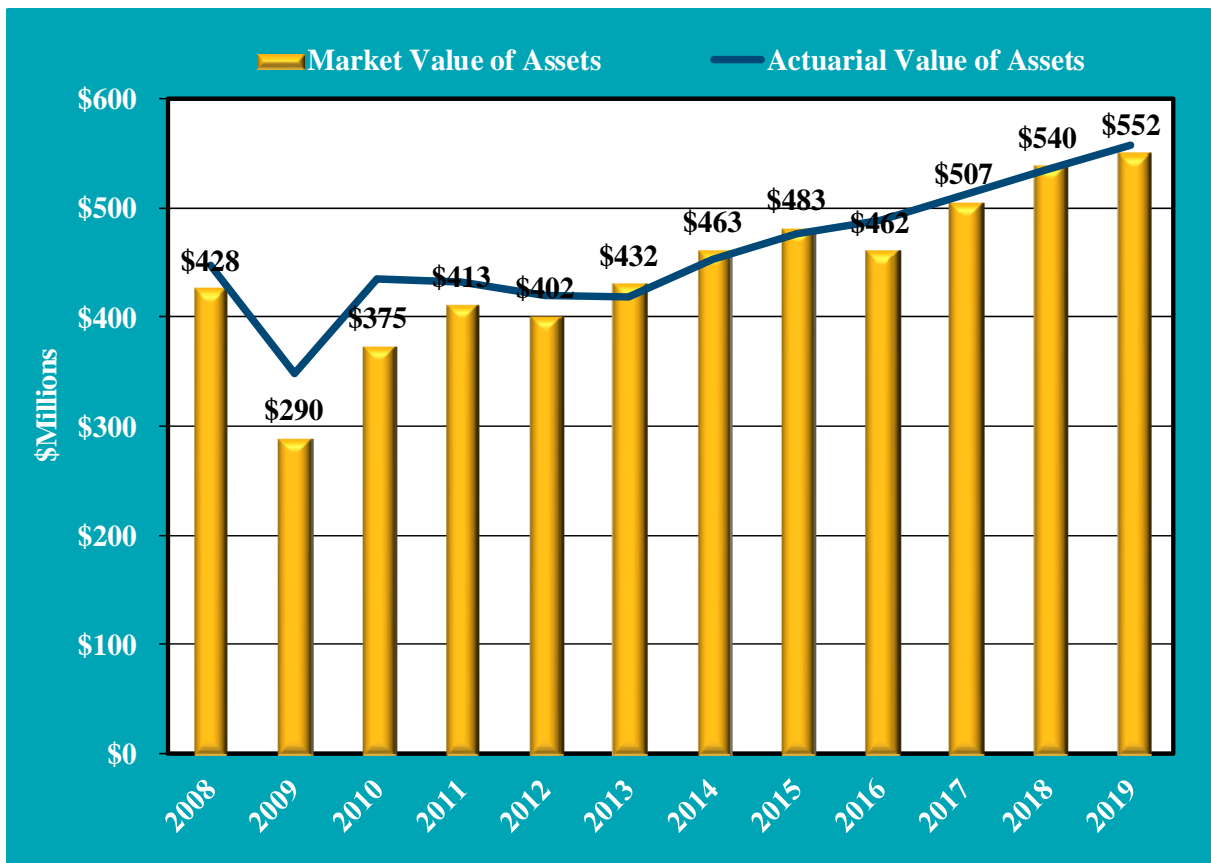
SECTION I – BOARD SUMMARY

C. Historical Trends

Despite the fact that for most retirement systems, the greatest attention is given to the current valuation results and in particular the size of the current unfunded actuarial liability and the City's contribution, it is important to remember that each valuation is merely a snapshot in the long-term progress of a pension fund. It is more important to judge a current year's valuation result relative to historical trends, as well as trends expected into the future. Significant prior volatility is exhibited within these trend charts. This volatility helps to illustrate the risks to the System which are discussed more fully in Section II of this report.

System Assets

The chart below shows the market value of assets and the actuarial value of assets over the last twelve years. The numbers above the bars represent the value (in millions) of the market value of assets.



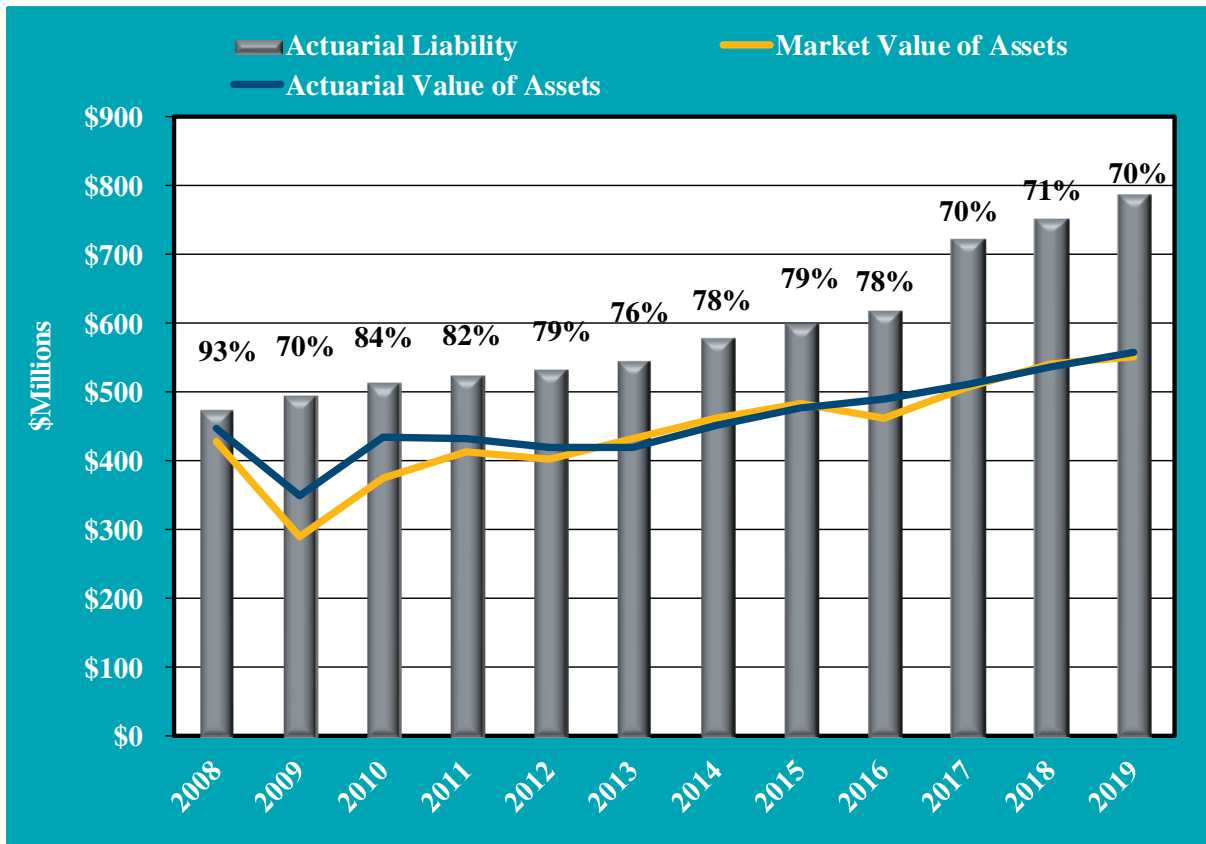
The market value of assets (MVA) returned 4.56% in 2019 compared to an assumed rate of 7.25%. With the asset smoothing method in place, the actuarial value of assets has tracked a slightly smoother path through the volatility of the market value of assets.

CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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Assets and Liabilities

The chart below compares the market value of assets, the actuarial value of assets, and the actuarial liabilities, as well as the funded ratio (actuarial value of assets / actuarial liability), sometimes referred to as the benefit security ratio. This chart shows that in 2009, the System had its lowest funded ratio in the past 11 years, but has since fluctuated, with 2017 being the largest decrease as a result of the changes to actuarial assumptions, and with the 2019 funded ratio approaching close to the 2009 ratio.



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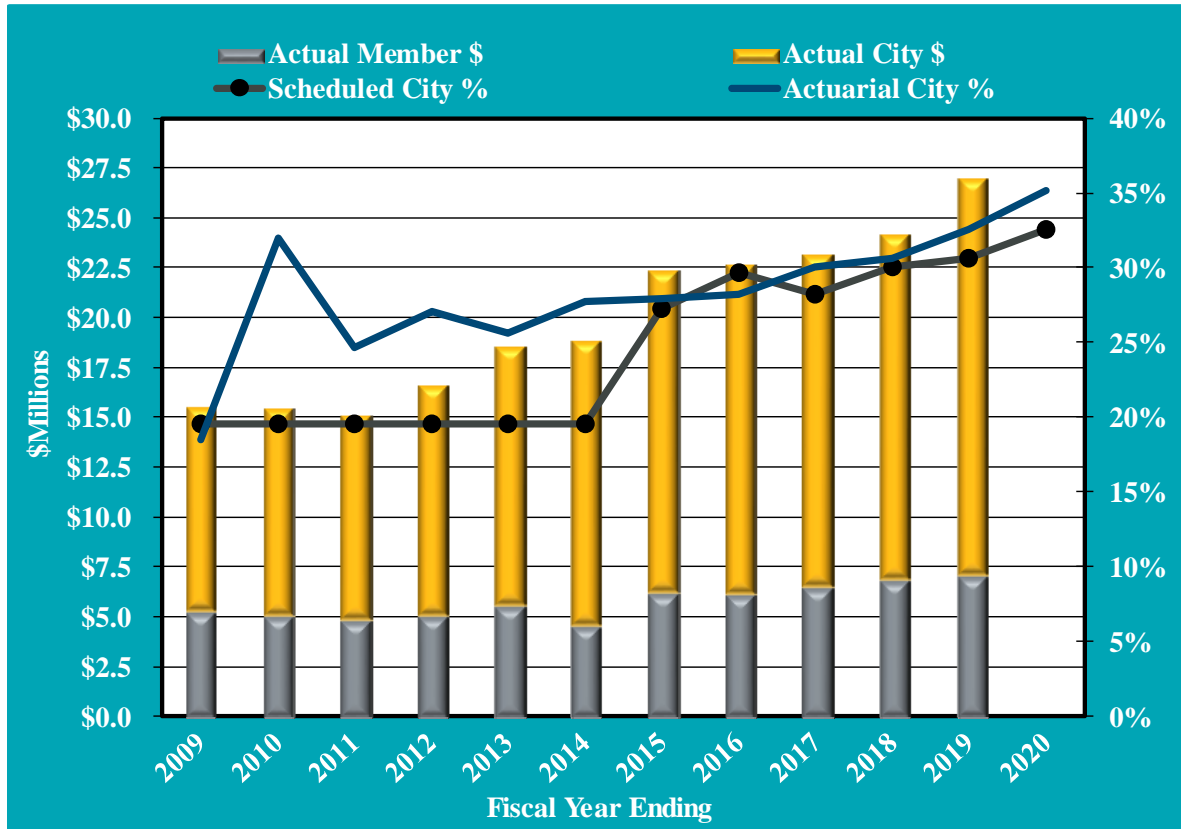
SECTION I – BOARD SUMMARY

Contribution Rates

The stacked bars in this graph show the dollar amount of contributions made by the City and the members (depicted on the left hand scale) since Fiscal Year Ending 2009. The blue line shows the City's actuarial contribution rate under the Board's funding policy as a percent of payroll (depicted on the right hand scale). The black line shows the City's scheduled contribution rate as a percent of payroll (depicted on the right hand scale).

The member contribution rate is set by City law at 9.55% of payroll prior to April 20, 2014 and 10.55% of payroll effective April 20, 2014.

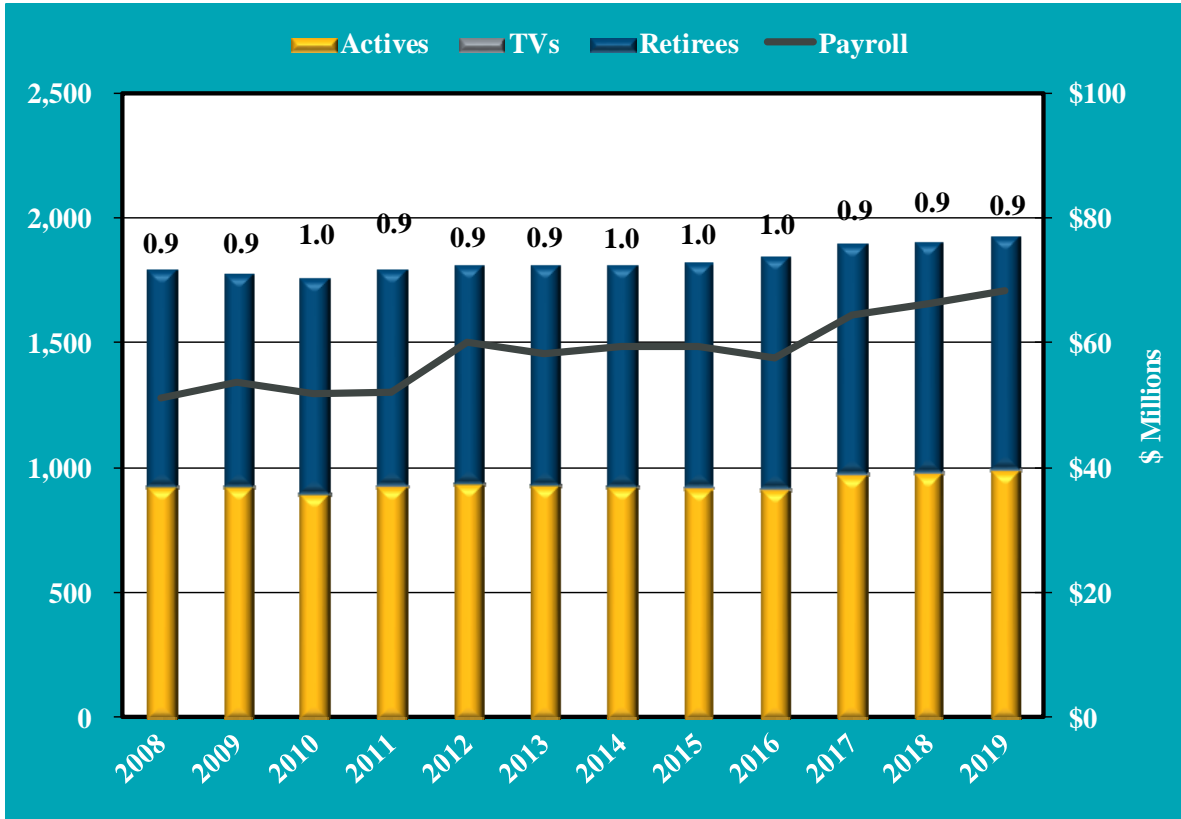
For fiscal years ending 2014 and earlier, the City contribution rate was scheduled to be 19.60% of payroll. As determined under the City's funding policy, for fiscal years ending 2015 and later, the scheduled City contribution rate is set as the actuarial contribution rate in the prior year's actuarial valuation. The actuarial contribution rate under the Board's funding policy increased from 32.54% of payroll in 2018 to 35.14% of payroll in 2019 reflecting the phase-in of changes in actuarial assumptions. For the fiscal year ending 2020, the City is contributing 32.54% of payroll.



**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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SECTION I – BOARD SUMMARY

Participant Trends



The above chart provides a measure for the maturity in the System, by comparing the ratio of inactive members (retirees and terminated-vesteds) to active members. The System’s inactive-to-active ratio remained fairly consistent over the last 12 years. The black line shows the total active participating payroll for each valuation year (depicted on the right hand scale).

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SECTION I – BOARD SUMMARY

D. Future Expected Financial Trends

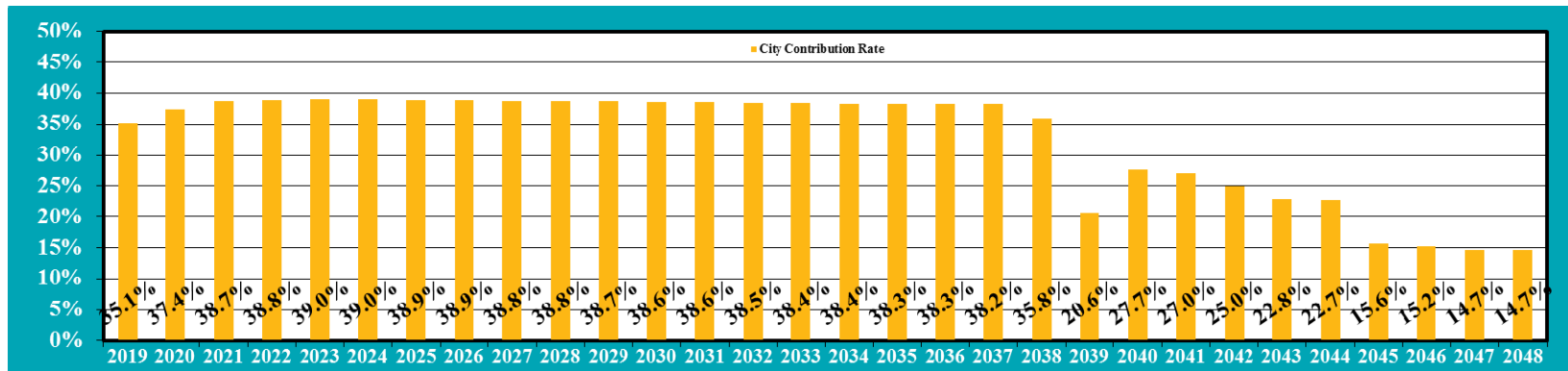
The analysis of projected financial trends is perhaps the most important component of this valuation. In this Section, we present the implications of the May 1, 2019 valuation results in terms of (1) the projected City’s contributions and (2) projected System’s funded status (ratio of assets over liabilities). For each projection set, we assume three future different investment return scenarios: baseline returns of 7.25%, optimistic returns of 8.75%, and pessimistic returns of 5.75%. The projections also assume that all other assumption in the valuation are met and that the City makes contributions equal to the prior year’s actuarially determined contribution rate under the Board’s funding policy. The differences in projected contribution levels and funded ratios under each of the scenarios help to illustrate the investment risk faced by the System.

1. Contribution Rate Projections (Board Funding Policy)

The first set of charts show the expected City contribution rate. The years shown in the charts are plan years beginning May 1.

Baseline Returns of 7.25%

Assuming that the fund earns the assumed investment rate of 7.25% on a market value basis and that the City continues to contribute the current scheduled contribution rate equal to the prior year’s actuarially determined contribution rate, the contribution rate will increase over the next five years as the 2016 and 2019 investment losses are recognized and the revised actuarial assumptions become fully phased-in, and then remain fairly constant until 2038. The large decrease in the rate in 2039 reflects the full amortization of the 30-year loss base established in 2009.

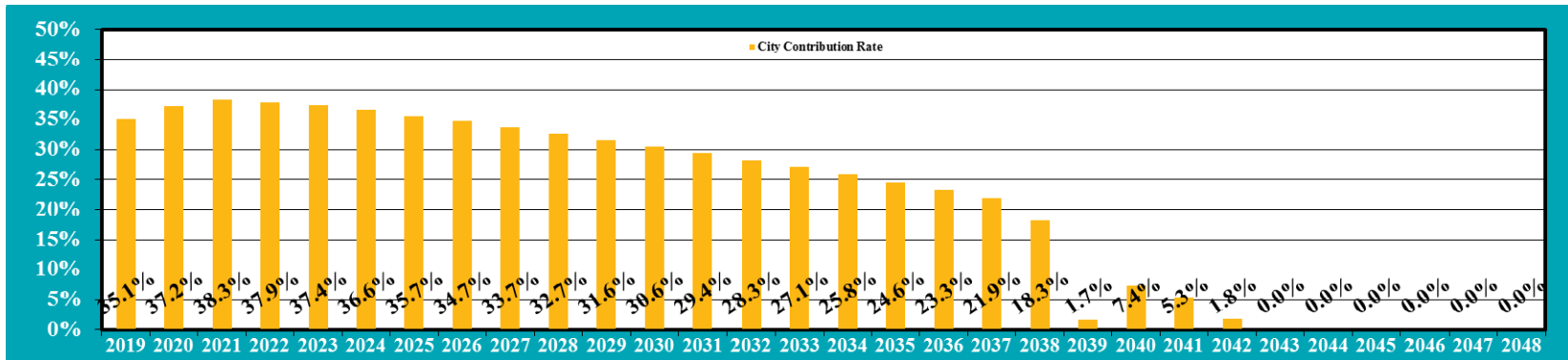


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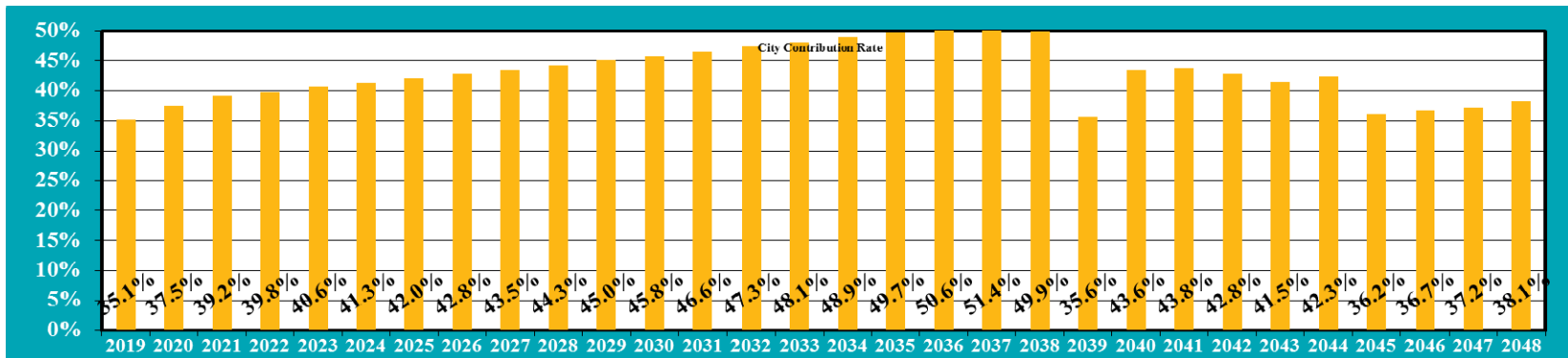
Optimistic Returns of 8.75%

If the fund earns 1.50% greater than the assumed rate, all of the future contribution rates will be lower than if the fund earns the assumed rate of 7.25%. The contribution rate decreases significantly for 2039 due to the full amortization of the 2009 loss, then increases for two years and would become zero for 2043 and later.



Pessimistic Returns of 5.75%

If the fund earns 1.50% less than the assumed rate, all of the future contribution rates will be greater than if the fund earns the assumed rate of 7.25%.



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SECTION I – BOARD SUMMARY

The following table shows the corresponding contribution dollar amounts of the percentages in the prior charts.

City of Kansas City, Missouri Firefighters' Pension System Projection Based on April 30, 2019 Actuarial Valuation Current Amortization Schedule Discount Rate of 7.25% Amounts in thousands				
Valuation as of April 30,	Dollar Amount of ADC at Various Investment Returns			
	7.25%	8.75%	5.75%	
2019	\$ 23,982	\$ 23,982	\$ 23,982	
2020	26,257	26,162	26,351	
2021	28,051	27,725	28,373	
2022	28,971	28,270	29,659	
2023	29,980	28,751	31,173	
2024	30,844	28,930	32,685	
2025	31,724	29,052	34,262	
2026	32,626	29,126	35,908	
2027	33,558	29,152	37,632	
2028	34,513	29,122	39,431	
2029	35,492	29,028	41,307	
2030	36,498	28,869	43,268	
2031	37,531	28,638	45,315	
2032	38,592	28,332	47,454	
2033	39,685	27,947	49,692	
2034	40,806	27,472	52,025	
2035	41,960	26,906	54,466	
2036	43,154	26,250	57,023	
2037	44,387	25,494	59,701	
2038	42,897	21,867	59,739	
2039	25,401	2,079	43,863	
2040	35,120	9,342	55,295	
2041	35,275	6,868	57,263	
2042	33,704	2,488	57,606	
2043	31,672	-	57,591	
2044	32,414	-	60,459	
2045	22,983	-	53,268	
2046	23,036	-	55,680	
2047	22,938	-	58,066	
2048	23,572	-	61,315	
2049	22,433	-	62,924	

Projections assume a constant population and no actuarial gains and losses



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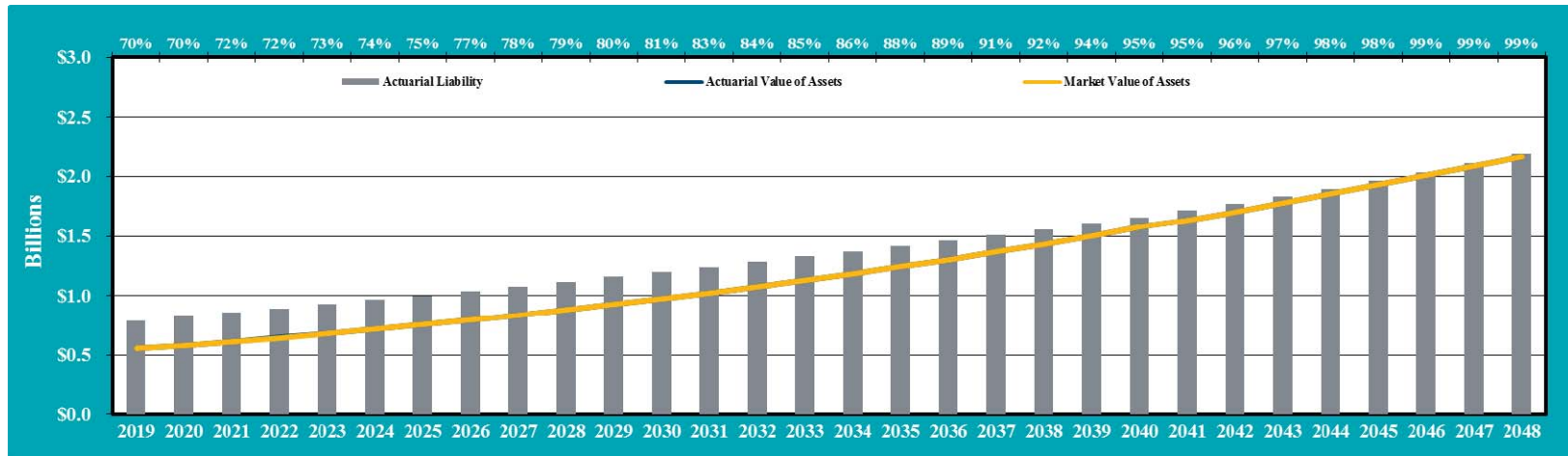
SECTION I – BOARD SUMMARY

2. Asset and Liability Projections (Board Funding Policy)

This next set of projection charts compares the market value of assets (gold line) and the actuarial or smoothed value of assets (blue line) to the System's actuarial liabilities (gray bars). The top of each chart also portrays the System's funded ratio (ratio of actuarial value of assets to actuarial liabilities). The years shown in the charts are plan years beginning May 1.

Baseline Returns of 7.25%

If the fund earns the assumed investment rate of 7.25% and the City continues to contribute the current scheduled contribution rate equal to the prior year's actuarially determined contribution rate, the funded ratio will increase gradually to 99% over the next 30 years.

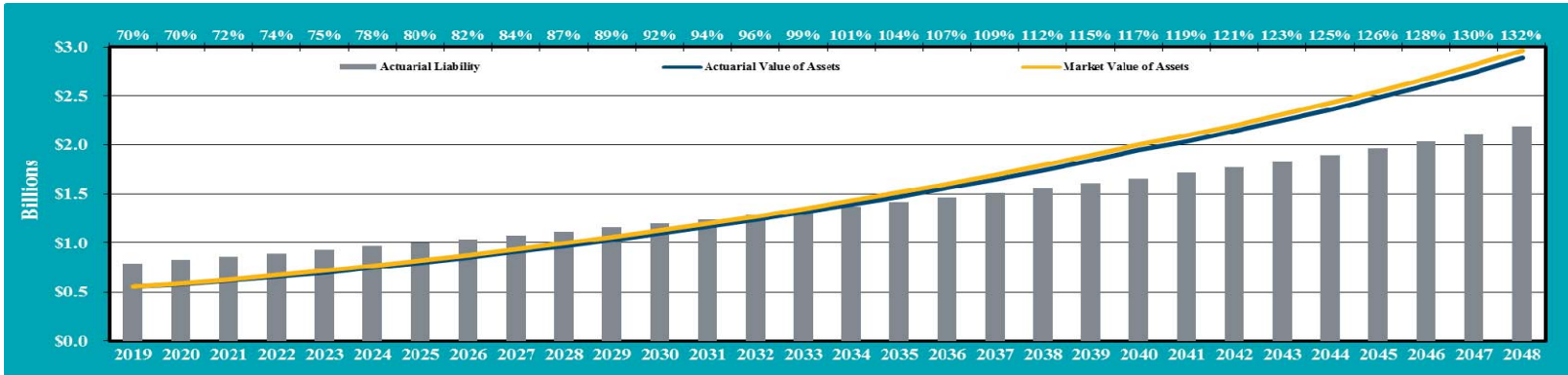


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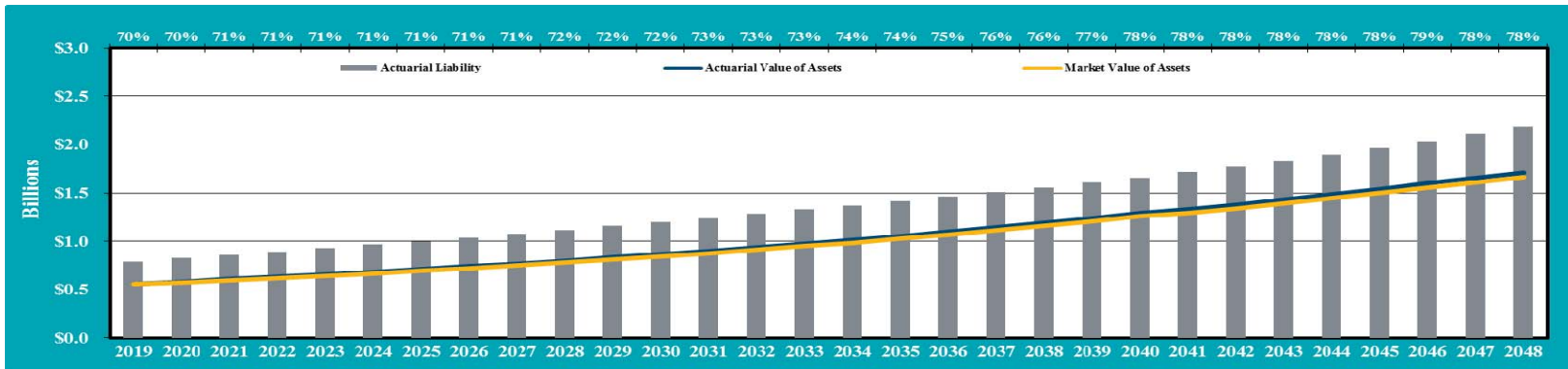
Optimistic Returns of 8.75%

If the fund earns 1.50% greater than the assumed rate of return, the funded ratio will increase to 132% over the next 30 years.



Pessimistic Returns of 5.75%

If the fund earns 1.50% less than the assumed rate of return, the funded ratio will only increase to 78% over the next 30 years.



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SECTION I – BOARD SUMMARY

3. 30-Year Projections Based on City Contribution Policy:

The following chart shows a 30-year cost projection under a 30-year closed amortization policy beginning May 1, 2014 which is the current City contribution policy. For the purpose of these projections, it has been assumed that the active population remains constant and the fund earns the assumed return of 7.25% per year on market value.

City of Kansas City, Missouri Firefighters' Pension System Projection Based on April 30, 2019 Actuarial Valuation 30-Year Closed Amortization from May 1, 2014 Interest at 7.25% Amounts in thousands														
Valuation as of April 30, (1)	Employer Contribution Rate (2)	Member Contribution Rate (3)	Compensation at Valuation (4)	Employer Contribution (5)	Actuarial Accrued Liability (AAL) (6)	Actuarial Value of Assets (AVA) (7)	Unfunded AAL (8)	UAL Amortization Payment Rate (9)	Normal Cost Rate (10)	Administrative Expense Rate (11)	Employer ADC (12)	Dollar Amount of ADC (13)	Funded Ratio Using AVA (14)	
2019	32.54%	10.55%	\$ 68,247	\$ 22,208	\$ 791,841	\$ 556,898	\$ 234,943	19.35%	14.11%	0.41%	33.87%	\$ 23,115	70.3%	
2020	33.87%	10.55%	\$ 70,294	\$ 23,809	\$ 824,118	\$ 579,293	\$ 244,825	21.43%	14.35%	0.43%	36.21%	\$ 25,453	70.3%	
2021	36.21%	10.55%	\$ 72,403	\$ 26,217	\$ 857,312	\$ 612,191	\$ 245,121	22.65%	14.59%	0.45%	37.69%	\$ 27,289	71.4%	
2022	37.69%	10.55%	\$ 74,575	\$ 28,107	\$ 891,384	\$ 643,361	\$ 248,022	22.86%	14.54%	0.45%	37.85%	\$ 28,229	72.2%	
2023	37.85%	10.55%	\$ 76,812	\$ 29,073	\$ 926,373	\$ 674,880	\$ 251,493	23.17%	14.49%	0.45%	38.11%	\$ 29,276	72.9%	
2024	38.11%	10.55%	\$ 79,117	\$ 30,151	\$ 962,277	\$ 710,776	\$ 251,500	23.22%	14.43%	0.45%	38.10%	\$ 30,144	73.9%	
2025	38.10%	10.55%	\$ 81,490	\$ 31,048	\$ 999,117	\$ 748,413	\$ 250,704	23.24%	14.38%	0.45%	38.07%	\$ 31,023	74.9%	
2026	38.07%	10.55%	\$ 83,935	\$ 31,954	\$ 1,036,885	\$ 787,643	\$ 249,242	23.26%	14.33%	0.45%	38.04%	\$ 31,926	76.0%	
2027	38.04%	10.55%	\$ 86,453	\$ 32,887	\$ 1,075,700	\$ 828,636	\$ 247,064	23.28%	14.27%	0.45%	38.01%	\$ 32,859	77.0%	
2028	38.01%	10.55%	\$ 89,047	\$ 33,847	\$ 1,115,532	\$ 871,431	\$ 244,101	23.31%	14.22%	0.45%	37.98%	\$ 33,818	78.1%	
2029	37.98%	10.55%	\$ 91,718	\$ 34,834	\$ 1,156,262	\$ 915,988	\$ 240,274	23.33%	14.16%	0.45%	37.94%	\$ 34,801	79.2%	
2030	37.94%	10.55%	\$ 94,470	\$ 35,842	\$ 1,197,860	\$ 962,362	\$ 235,498	23.36%	14.10%	0.45%	37.91%	\$ 35,815	80.3%	
2031	37.91%	10.55%	\$ 97,304	\$ 36,888	\$ 1,240,198	\$ 1,010,507	\$ 229,691	23.39%	14.04%	0.45%	37.88%	\$ 36,858	81.5%	
2032	37.88%	10.55%	\$ 100,223	\$ 37,964	\$ 1,283,259	\$ 1,060,513	\$ 222,747	23.42%	13.98%	0.45%	37.85%	\$ 37,932	82.6%	
2033	37.85%	10.55%	\$ 103,229	\$ 39,072	\$ 1,327,104	\$ 1,112,545	\$ 214,559	23.45%	13.92%	0.45%	37.82%	\$ 39,042	83.8%	
2034	37.82%	10.55%	\$ 106,326	\$ 40,213	\$ 1,371,482	\$ 1,166,465	\$ 205,017	23.48%	13.86%	0.45%	37.79%	\$ 40,184	85.1%	
2035	37.79%	10.55%	\$ 109,516	\$ 41,386	\$ 1,416,425	\$ 1,222,431	\$ 193,995	23.52%	13.80%	0.45%	37.77%	\$ 41,365	86.3%	
2036	37.77%	10.55%	\$ 112,802	\$ 42,605	\$ 1,462,186	\$ 1,280,824	\$ 181,362	23.56%	13.75%	0.45%	37.76%	\$ 42,594	87.6%	
2037	37.76%	10.55%	\$ 116,186	\$ 43,872	\$ 1,508,997	\$ 1,342,023	\$ 166,974	23.61%	13.70%	0.45%	37.76%	\$ 43,872	88.9%	
2038	37.76%	10.55%	\$ 119,671	\$ 45,188	\$ 1,557,118	\$ 1,406,449	\$ 150,669	23.67%	13.65%	0.45%	37.77%	\$ 45,204	90.3%	
2039	37.77%	10.55%	\$ 123,261	\$ 46,556	\$ 1,607,013	\$ 1,474,741	\$ 132,272	23.74%	13.61%	0.45%	37.81%	\$ 46,602	91.8%	
2040	37.81%	10.55%	\$ 126,959	\$ 48,003	\$ 1,658,971	\$ 1,547,372	\$ 111,599	23.84%	13.58%	0.45%	37.87%	\$ 48,075	93.3%	
2041	37.87%	10.55%	\$ 130,768	\$ 49,522	\$ 1,713,446	\$ 1,625,028	\$ 88,419	23.97%	13.55%	0.45%	37.97%	\$ 49,651	94.8%	
2042	37.97%	10.55%	\$ 134,691	\$ 51,142	\$ 1,771,032	\$ 1,708,536	\$ 62,496	24.19%	13.52%	0.45%	38.16%	\$ 51,401	96.5%	
2043	38.16%	10.55%	\$ 138,732	\$ 52,940	\$ 1,831,785	\$ 1,798,233	\$ 33,552	24.72%	13.50%	0.45%	38.67%	\$ 53,641	98.2%	
2044	38.67%	10.55%	\$ 142,894	\$ 55,257	\$ 1,896,115	\$ 1,894,919	\$ 1,196	0.86%	13.48%	0.45%	14.78%	\$ 21,125	99.9%	
2045	14.78%	10.55%	\$ 147,180	\$ 21,753	\$ 1,963,828	\$ 1,999,159	\$ (35,331)	-24.54%	13.46%	0.45%	0.00%	\$ -	101.8%	
2046	0.00%	10.55%	\$ 151,596	\$ -	\$ 2,035,081	\$ 2,074,294	\$ (39,213)	-26.44%	13.45%	0.45%	0.00%	\$ -	101.9%	
2047	0.00%	10.55%	\$ 156,144	\$ -	\$ 2,109,804	\$ 2,130,030	\$ (20,227)	-13.24%	13.45%	0.45%	0.66%	\$ 1,026	101.0%	
2048	0.66%	10.55%	\$ 160,828	\$ 1,061	\$ 2,188,413	\$ 2,187,634	\$ 779	0.50%	13.44%	0.45%	14.39%	\$ 23,140	100.0%	
2049	14.39%	10.55%	\$ 165,653	\$ 23,837	\$ 2,271,433	\$ 2,248,557	\$ 22,876	14.11%	13.44%	0.45%	28.01%	\$ 46,392	99.0%	

Projections assume a constant population and no actuarial gains and losses



SECTION II – DISCLOSURES RELATED TO RISK

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to KCFPS, provide some background information about those risks, and provide an assessment of those risks. Some of the charts within this section compare measures calculated for KCFPS to plans within the Public Plans Database. Information regarding this data can be found at <https://publicplansdata.org/>.

Identification of Risks

The fundamental risk to KCFPS is that the contributions needed to pay the benefits become unaffordable. While there are a number of factors that could lead to contribution amounts becoming unaffordable, we believe the primary risks are:

- Investment risk,
- Interest rate risk,
- Longevity and other demographic risks, and
- Assumption change risk.

Other risks that we have not identified may also turn out to be important.

Assessing Costs and Risks

The fundamental risk to KCFPS is that the contributions needed to fund the benefits become unaffordable. Assessing this risk, however, is complex because there is no bright line of what is unaffordable and the contribution amounts themselves are affected not just by the experience of KCFPS, but also by the interaction of that experience and decisions by the Board related to assumptions, asset smoothing methods, and amortization periods.

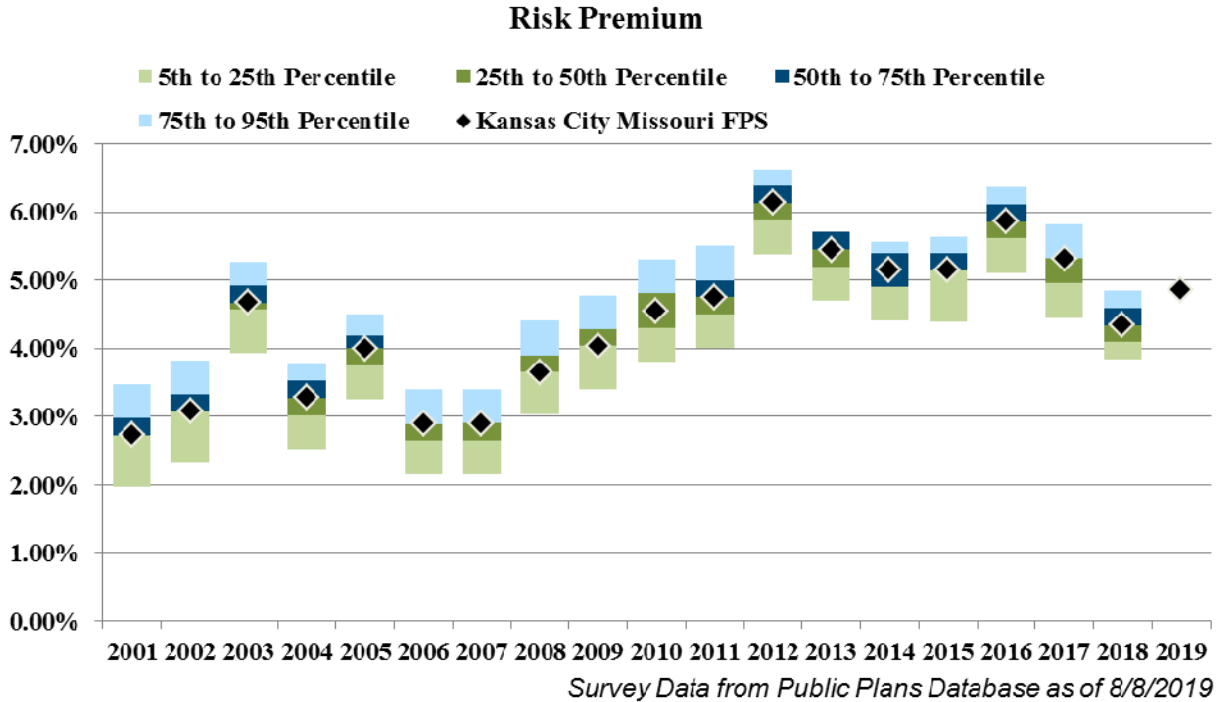
Investment Risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the unfunded actuarial liability necessitating higher contributions in the future unless there are other gains that offset these investment losses. The potential volatility of future investment returns is determined by KCFPS's asset allocation and the affordability of the investment risk is determined by the amount of assets invested relative to the size of the plan sponsor or other contribution base. The chart on page 20 shows the effect that investment volatility has had on changes in the UAL, as the AVA Investment (G)/L.

Interest rate risk is the potential for interest rates to be different than expected. For public plans, short term fluctuations in interest rates have little or no effect as the plan's liability is usually measured based on the expected return on assets. Longer-term trends in interest rates however can have a powerful effect. The amount of a plan's investment risk can be defined as the risk premium. The risk premium is the excess of a plan's assumed interest rate over a risk-free interest rate. The chart below shows the historical risk premium taken by plan sponsors (defined as the excess of a plan's interest rate over a 10-year Treasury security). As interest rates have

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SECTION II – DISCLOSURES RELATED TO RISK

declined, plans faced a choice: maintain the same level of risk and reduce the expected rate of return; maintain the same expected rate of return and take on more investment risk; or some combination of the two strategies. Over time, the risk premium for KCFPS has increased in absolute terms.



Longevity and other demographic risks are the potential for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time and are often dwarfed by other changes, particularly those due to investment returns. The next chart shows the demographic gains and losses over the last ten years compared to the total change in the UAL for each year. Note that the Demographic (G)/L is relatively small compared to other sources.

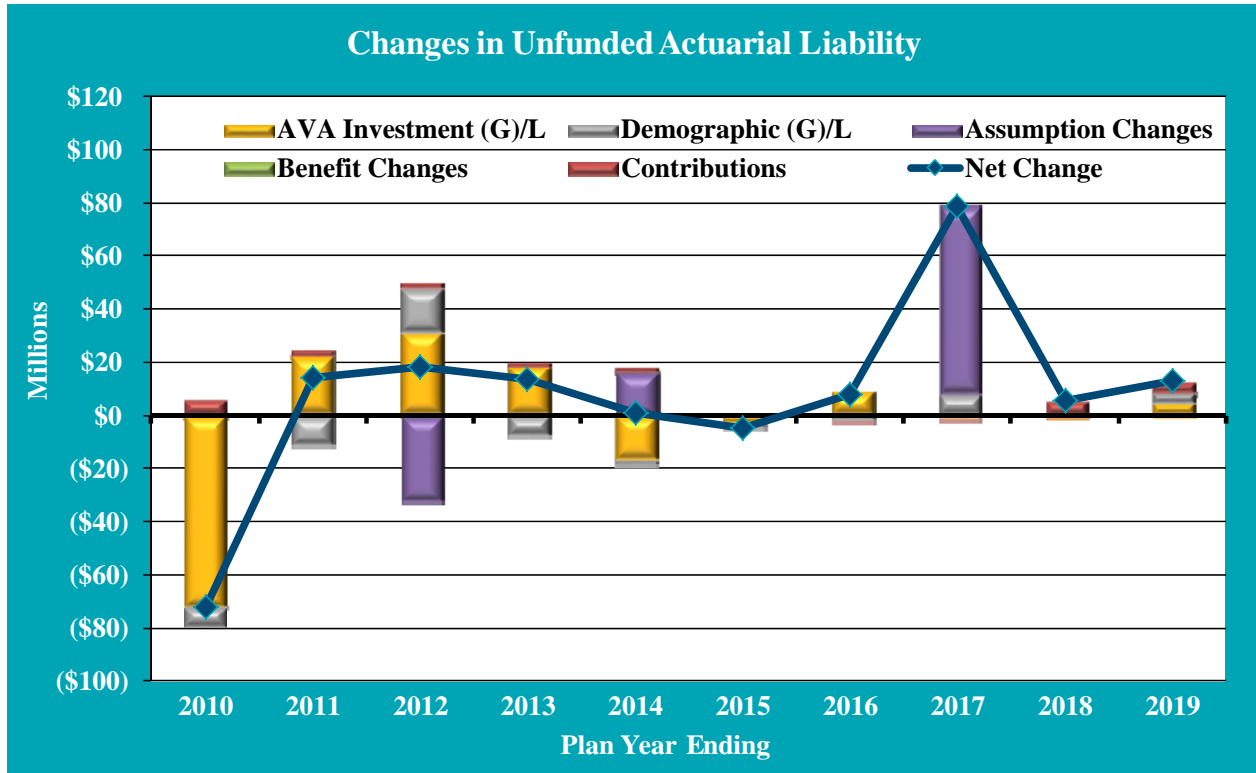
Assumption change risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. For example, declines in interest rates over the last three decades resulted in higher investment returns for fixed income investments, but lower expected future returns necessitating either a change in investment policy, a reduction in discount rate, or some combination of the two. Assumption change risk is an extension of the other risks identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable.

As shown in the next chart, changes in assumptions over the years have sometimes increased and sometimes decreased the UAL. It is important to note that these changes simply reflect revisions to estimates of future plan experience and ultimately costs will be determined by actual plan

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experience. The most recent assumption change increase in the UAL was primarily due to adopting new mortality tables. With the continued low interest rate environment, we are continuing to see investment consultants reduce their capital market assumptions. As a result, future expectations of investment returns may continue to decline necessitating further reductions in the discount rate and resulting increases in the UAL.



Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of KCFPS compared to other plans and how the maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic - the larger the plan is compared to the contribution or revenue base that supports it; the more sensitive the plan will be to risk. The following measures have been selected as the most important in understanding the primary risks identified for KCFPS.

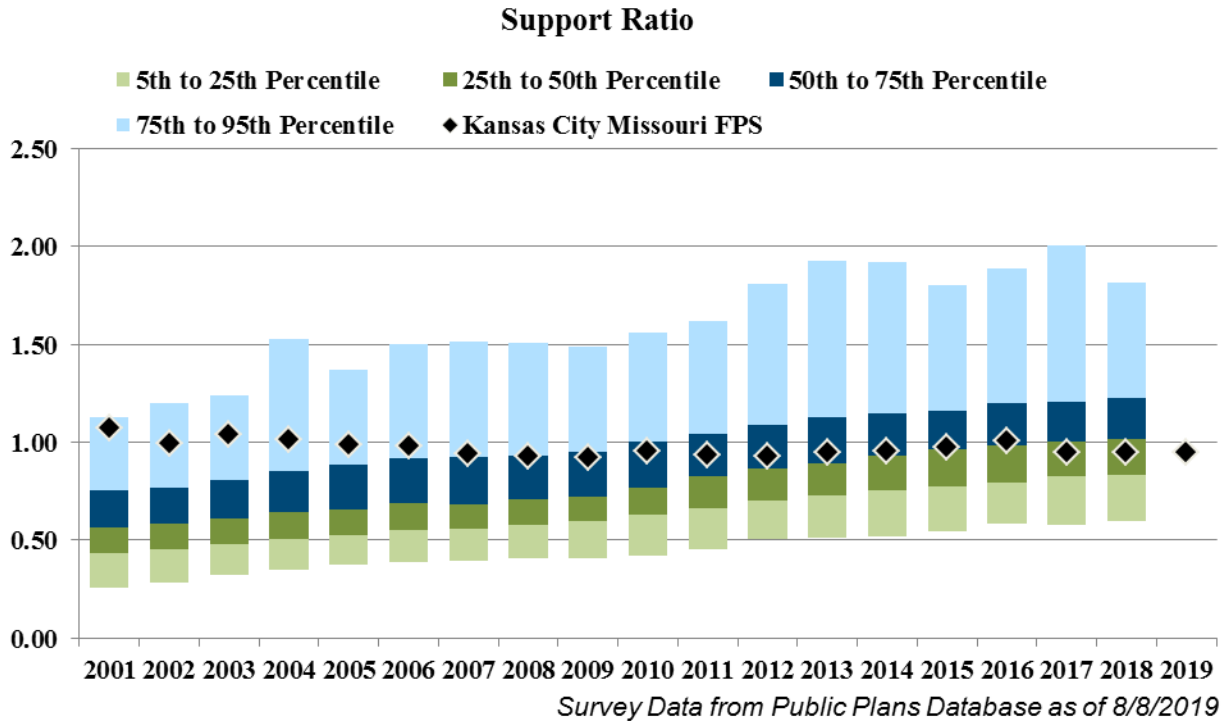
Support Ratio (Inactives per Active)

One simple measure of plan maturity is the ratio of the number of inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members. The

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revenue base supporting the plan is usually proportional to the number of active members, so a relatively high number of inactive members compared to actives indicate a larger plan relative to its revenue base as well. Details regarding the KCFPS support ratio are shown in the chart on page 9.



The chart above shows the distribution from the 5th percentile to the 95th percentile of support ratios for the plans in the Public Plan Database. The black diamond shows how KCFPS compares to the plans in the Public Plans Database. KCFPS is now in the lower quartiles of plans in the Public Plans Database. Also, whereas the support ratios for other plans in the data base have been increasing during the period shown, the support ratio for KCFPS has remained relatively constant. This means relative to other plans in the database, KCFPS may be able to better handle risks since it is relatively less mature.

Leverage Ratios

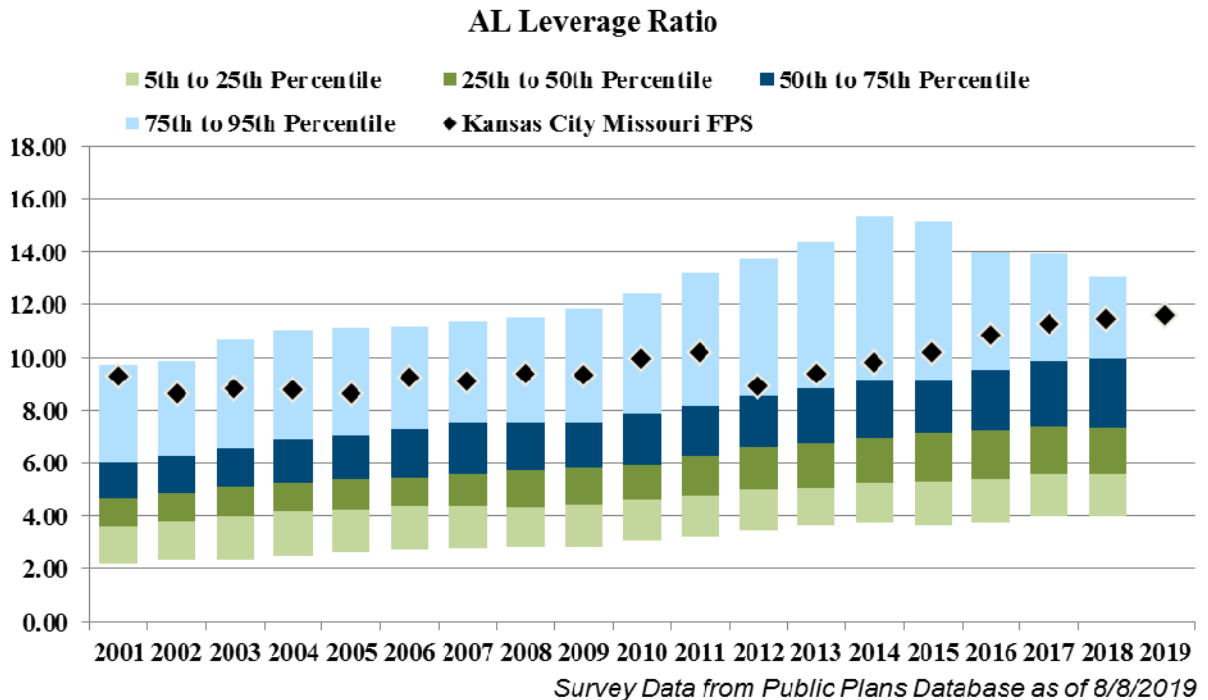
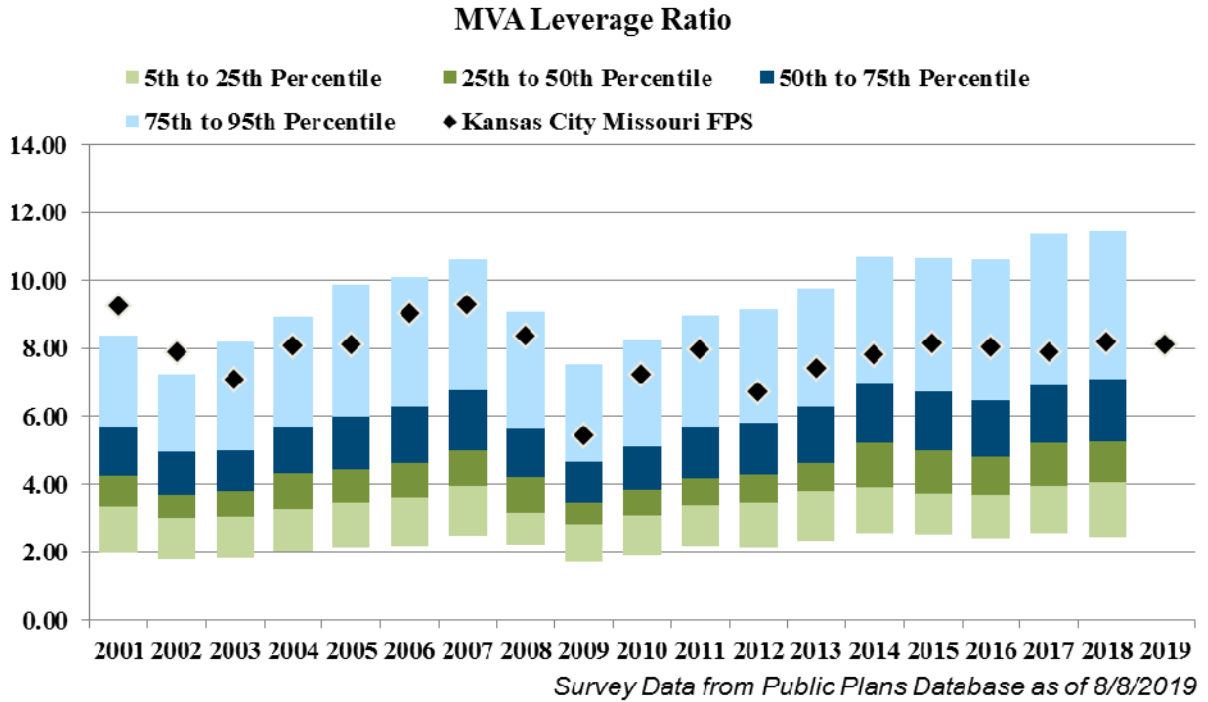
Leverage or volatility ratios measure the size of the plan compared to its revenue base more directly. An asset leverage ratio of 5.0, for example, means that if KCFPS experiences a 10% loss on assets compared to the expected return, the loss would be equivalent to 50% of payroll. The same investment loss for a plan with an asset leverage ratio of 10.0 would be equivalent to 100% of payroll.

As KCFPS becomes better funded, the asset leverage ratio will increase, and if it was 100% funded, the leverage ratio would equal the Actuarial Liability (AL) leverage ratio. The AL

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leverage ratio also indicates how sensitive KCFPS is to experience gains and losses or assumption changes. For example, an assumption change that increases the AL by 5% would add a liability equivalent to about 50% of payroll if the AL leverage ratio is 10.0.



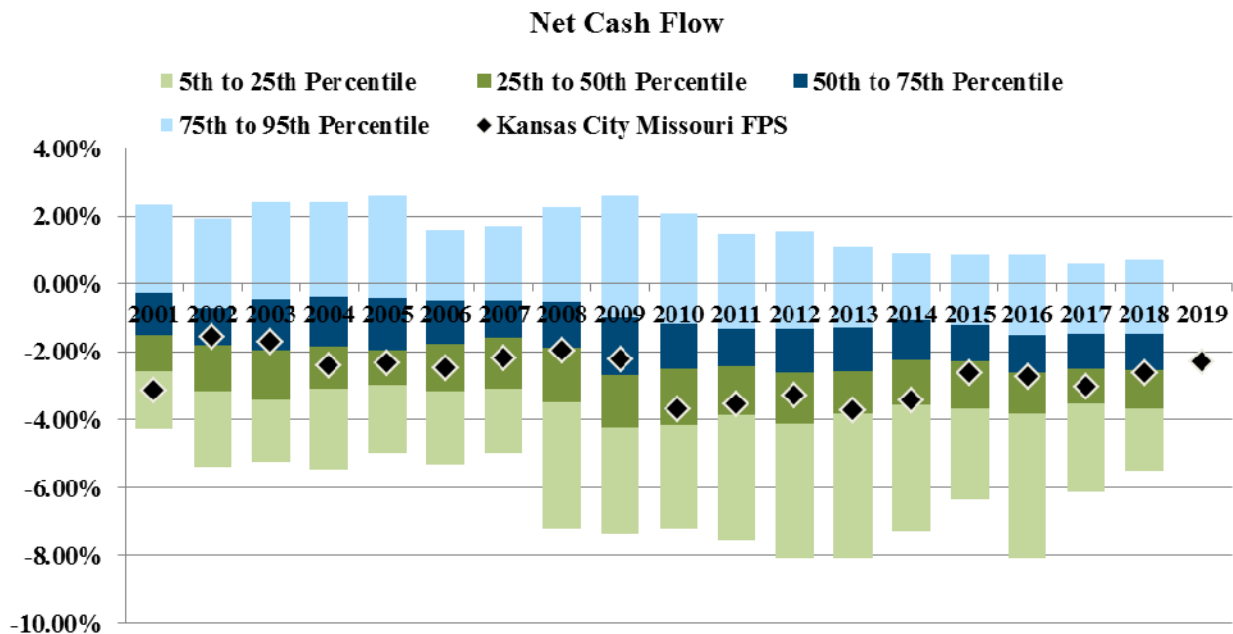
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The previous charts show the distribution from the 5th percentile to the 95th percentile of Market Value of Assets and Actuarial Liability leverage ratios for the plans in the Public Plan Database. The black diamond shows how the KCFPS plan compares to the plans in the Public Plans Database. Since the black diamond is in the 75th to 95th percentile, this measure indicates a higher degree of risk for KCFPS compared to the majority of plans in the database.

Net Cash Flow

The net cash flow of the plan as a percentage of the beginning of year assets indicates the sensitivity of the plan to short-term investment returns. Net cash flow is equal to contributions less benefit payments and administrative expenses. Mature plans can have large amounts of benefit payments compared to contributions, particularly if they are well funded. Investment losses in the short-term are compounded by the net withdrawal from the plan leaving a smaller asset base to try to recover from the investment losses. Large negative cash flows can also create liquidity issues.



Survey Data from Public Plans Database as of 8/8/2019

The chart above shows the distribution from the 5th percentile to the 95th percentile of Net Cash Flow for the plans in the Public Plan Database. In this case a lower number (larger negative value) means the plan is more mature and is more susceptible to the impact of volatility on the asset returns. The black diamond shows how the KCFPS plan compares to the plans in the Public Plans Database, which is generally below the median.

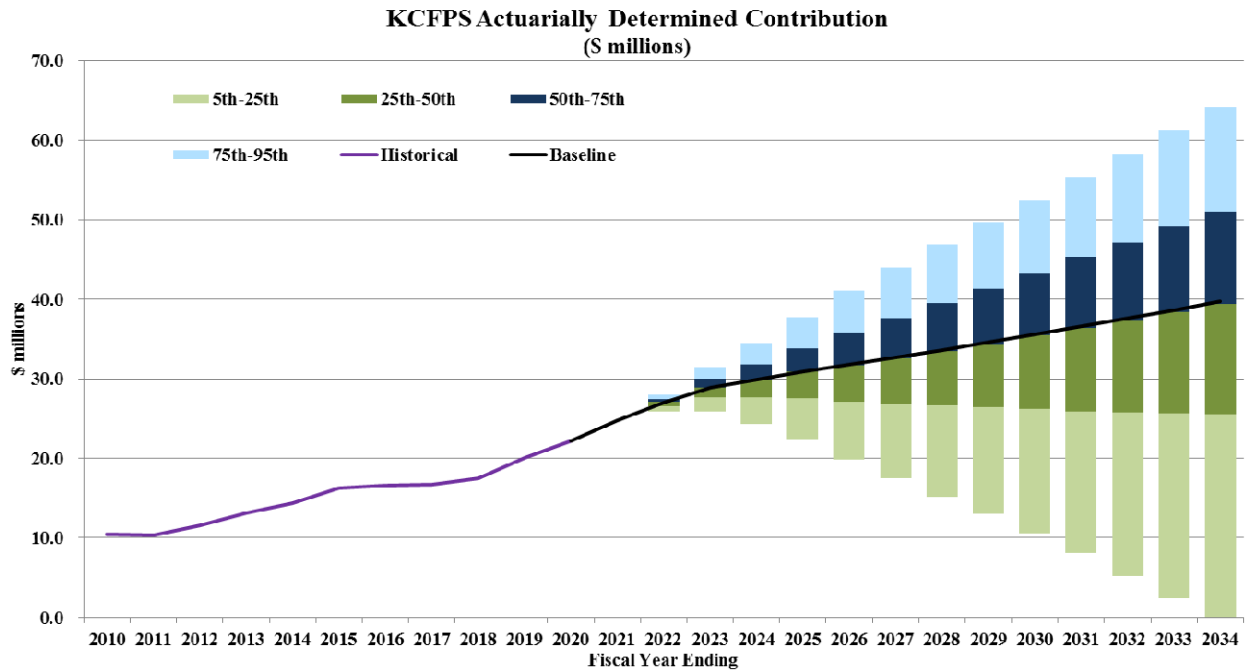
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SECTION II – DISCLOSURES RELATED TO RISK

Stochastic Projections

If experience has taught us anything, it is that there is a significant level of uncertainty in projections of the future. The largest source of uncertainty is the projection of investment returns. In order to better understand the potential impact of investment returns on KCFPS, we have included a stochastic projection of future actuarially determined contributions in this section of the report. The stochastic projections assume a geometric return of 7.25% and a standard deviation of 10.10% (based on ACG's capital market assumptions for KCFPS's target investment portfolio). Each projection contains 10,000 trials that are 15 years in length.

The chart below shows the historical and stochastic projection of contribution amounts for KCFPS. The purple line represents the amounts paid historically, and the black line shows the projected contribution amount for each year if all assumptions are met. The colored ranges represent different percentiles of the 10,000 trials. This range is intended to convey the degree of uncertainty in the projections based on future investment returns.



The chart shows a wide range of potential contributions depending on actual investment returns. The range between the 5th and 95th percentile produced from the 2034 valuation is from a contribution of \$0 million to a contribution of over \$64 million. This range is largely driven by the standard deviation of the investment portfolio of 10.10%. It should be noted that if we used ACG's median expected return of 6.80% based on their capital market assumptions, rather than KCFPS's assumption of 7.25%, each of these contribution ranges would be considerably higher.

SECTION II – DISCLOSURES RELATED TO RISK

More Detailed Assessment

Risk is a complex topic and the analysis above was limited by the scope of our assignment. We have not performed a more detailed assessment, however we believe such an assessment would enhance the KCFPS's understanding of these risks significantly, enabling more informed judgments about how to manage these risks.

A total plan review was recently performed by the KCFPS investment consultant. Therefore, a further analysis may not be warranted at this time.

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SECTION III – ASSETS

Pension System assets play a key role in the financial operation of the System and in the decisions the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact benefit levels, City contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on the System's assets including:

- **Disclosure** of the System's assets as of April 30, 2018 and April 30, 2019,
- Statement of the **changes** in market values during the year,
- Development of the **Actuarial Value of Assets**,
- An assessment of **investment performance**, and
- A projection of the System's expected **cash flow** for the next 10 years.

Disclosure

There are two types of asset values disclosed in the valuation, the market value of assets and the actuarial value of assets. The market value represents "snap-shot" or "cash-out" values that provide the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. As a result, market values are usually not as suitable for year-to-year budgeting as are the actuarial value of assets which reflect smoothing of annual investment returns.

Table III-1 below discloses and compares each asset value as of April 30, 2018 and April 30, 2019.

Table III-1			
Statement of Assets at Market Value as of April 30,			
Assets	2018	2019	% Change
Cash	\$ 6,902,566	\$ 10,405,729	50.8%
Stock and Collective Trusts	536,533,305	543,980,642	1.4%
Accounts Receivable	1,049,035	1,373,258	30.9%
Interest and Dividends Receivable	165,939	194,772	17.4%
Contributions Receivable	1,214,111	1,421,855	17.1%
Expenses Payable	(966,412)	(671,845)	(30.5%)
Purchase of Investments	(842,447)	(834,809)	(0.9%)
Health Assets	(3,662,860)	(3,603,992)	(1.6%)
Market Value of Assets	\$ 540,393,237	\$ 552,265,610	2.2%

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SECTION III – ASSETS

Changes in Market Value

Table III-2 below shows the components of change between the market value of assets as of April 30, 2018 and April 30, 2019.

Table III-2 Changes in Market Values	
Value of Assets – April 30, 2018	\$ 540,393,237
<u>Additions</u>	
Member Contributions	\$ 7,109,128
Employer Contributions	20,015,327
Interest and Dividends	4,832,809
Investment Return	22,064,812
Total Additions	\$ 54,022,076
<u>Deductions</u>	
Benefit Payments	\$ (39,168,957)
Investment Expenses	(2,565,656)
Administrative Expenses	(415,090)
Total Deductions	\$ (42,149,703)
Value of Assets – April 30, 2019	\$ 552,265,610

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SECTION III – ASSETS

Actuarial Value of Assets

The next table, Table III-3, shows how the actuarial value of assets is developed.

A preliminary actuarial value of assets is calculated as the sum of the beginning of the year actuarial value of assets, the net new money and the expected return on an actuarial basis. The gains and losses over the last four years are recognized over the next five-year period. The gain or loss of each year is the excess of market value of assets over the preliminary value of assets, minus the sum of the unrecognized gains and losses from each of the four years. Finally, an adjustment is made so that the final actuarial value of assets is at least 80% but no more than 120% of the market value.

Table III-3 Development of Actuarial Value of Assets			
1. Actuarial Value of Assets at May 1, 2018			\$ 535,935,199
2. Employer and Employee Contributions			27,124,455
3. Benefit Payments and Administrative Expenses			(39,584,047)
4. Net Cash Flow (2+3)			\$ (12,459,592)
5. Expected Value of investment return at 7.25%			38,411,544
6. Actual investment return on Market Value			24,331,965
7. Investment gain/(loss) for the year (6-5)			\$ (14,079,579)
8. Investment gain/(loss) from current and prior years to be recognized in the plan year ending April 30, 2019			
	Total Gain/ (Loss)	Deferral Percentage	Deferred to Future Years
Plan Year End			
April 30, 2019	\$ (14,079,579)	80%	\$ (11,263,663)
April 30, 2018	10,360,755	60%	6,216,453
April 30, 2017	22,500,733	40%	9,000,293
April 30, 2016	(42,926,929)	20%	(8,585,386)
April 30, 2015	(801,169)	0%	0
Total	\$ (24,946,189)		\$ (4,632,303)
9. Market Value of Assets for Year ending April 30, 2019			\$ 552,265,610
10. Preliminary Actuarial Value of Assets on May 1, 2019 (9 - 8 deferred)			556,897,913
11. 120% of MV, Upper Limit for Actuarial Value			\$ 662,718,732
12. 80% of MV, Lower Limit for Actuarial Value			441,812,488
13. Actuarial Value of Assets on May 1, 2019			\$ 556,897,913

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SECTION III – ASSETS

Investment Performance

The market value of assets (MVA) returned 4.56% during the plan year ending 2019, which is lower than the assumed 7.25% return. The actuarial value of assets (AVA) returned 6.31% during the plan year ending 2019.

The following table shows a history of the annual asset returns.

Table III-4 Historical Asset Returns			
Fiscal Year Ending April 30,	Return on Market Value	Return on Actuarial Value	Assumed Return
2010	33.37%	28.48%	7.75%
2011	13.88%	2.42%	7.75%
2012	0.86%	0.33%	7.75%
2013	11.27%	3.27%	7.75%
2014	10.73%	11.79%	7.75%
2015	7.16%	8.12%	7.50%
2016	-1.61%	5.50%	7.50%
2017	12.89%	7.71%	7.50%
2018	9.40%	7.36%	7.25%
2019	4.56%	6.31%	7.25%

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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SECTION III – ASSETS

Projection of Plan's Future Cash Flows

Table III-5 Projection of Plan's Expected Cash Flows (\$ thousands)				
Year Beginning May 1,	Benefits and Expenses	Expected Contributions*	Net Cash Flow	
2019	\$ (41,782)	\$ 29,408	\$ (12,374)	
2020	(43,653)	32,117	(11,536)	
2021	(45,648)	34,681	(10,967)	
2022	(47,663)	36,758	(10,905)	
2023	(49,762)	37,945	(11,817)	
2024	(51,915)	39,226	(12,689)	
2025	(54,158)	40,370	(13,788)	
2026	(56,366)	41,531	(14,835)	
2027	(58,694)	42,725	(15,969)	
2028	(61,222)	43,962	(17,260)	

* *Expected contributions include City contributions and Member contributions. City contributions are projected under the Board's funding policy assuming future market value returns of 7.25% as shown in the graph on page 10.*

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SECTION IV – LIABILITIES

In this section, we present detailed information on the System's liabilities including:

- **Disclosure** of the System's liabilities at May 1, 2018 and May 1, 2019,
- Statement of **changes** in these liabilities during the year.

Disclosure

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of Future Benefits:** Used for measuring all future System obligations, represents the amount of money needed today to fund all benefits of the System both earned as of the valuation date and those to be earned in the future by current plan participants, under the current plan provisions.
- **Actuarial Liability:** Used for funding calculations, this liability is calculated taking the present value of benefits and subtracting the present value of future member contributions and future employer normal costs under an acceptable actuarial funding method. This method is referred to as the **Entry Age Normal** funding method.
- **Present Value of Accrued Benefits:** Used for communicating the current level of liabilities, this liability represents the total amount of money needed today to fund the current accrued obligations of the System, assuming no future accruals of benefits.

None of these liabilities are appropriate for measuring the cost of settlement of plan liabilities either by purchase of annuities or payment of lump sums.

Table IV-1 which follows, discloses each of these liabilities for the current and prior valuations. With respect to each disclosure, a subtraction of the appropriate value of plan assets yields, for each respective type, a **net surplus**, or an **unfunded liability**.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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SECTION IV – LIABILITIES

Table IV-1		
Liabilities Net (Surplus)/Unfunded		
	May 1, 2018	May 1, 2019
<u>Present Value of Future Benefits</u>		
Active Participant Benefits	\$ 472,762,592	\$ 493,907,619
Retiree and Inactive Benefits	453,879,670	468,765,928
Present Value of Future Benefits (PVB)	\$ 926,642,262	\$ 962,673,547
<u>Actuarial Liability</u>		
Present Value of Future Benefits (PVB)	\$ 926,642,262	\$ 962,673,547
Present Value of Future Normal Costs (PVFNC)	169,691,526	170,832,530
Actuarial Liability (AL = PVB – PVFNC)	756,950,736	791,841,017
Actuarial Value of Assets (AVA)	535,935,199	556,897,913
Net (Surplus)/Unfunded (AL – AVA)	\$ 221,015,537	\$ 234,943,104
<u>Present Value of Accrued Benefits</u>		
Present Value of Future Benefits (PVB)	\$ 926,642,262	\$ 962,673,547
Present Value of Future Benefit Accruals (PVFBA)	236,917,337	234,989,890
Present Value of Accrued Benefits (PVAB = PVB – PVFBA)	689,724,925	727,683,657
Market Value of Assets (MVA)	540,393,237	552,265,610
Net Unfunded/(Surplus)	\$ 149,331,688	\$ 175,418,047

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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SECTION IV – LIABILITIES

Changes in Liabilities

Each of the Liabilities disclosed in the prior table are expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation
- Benefits accrued since the last valuation
- Plan amendments increasing benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method

Unfunded liabilities will change because of all of the above, and also due to changes in system assets resulting from:

- Employer contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure system assets

In each valuation, we report on those elements of change, which are of particular significance, potentially affecting the long-term financial outlook of the System. Below we present key changes in liabilities since the last valuation.

In the table that follows, we show the components of change in the actuarial liability between May 1, 2018 and May 1, 2019.

Table IV-2	
	Actuarial Liability
Liabilities May 1, 2018	\$ 756,950,736
Liabilities May 1, 2019	791,841,017
Liability Increase/(Decrease)	34,890,281
Change Due to:	
Plan Changes	0
Assumption Changes	0
Actuarial (Gain)/Loss	3,952,169
Benefits Accumulated and Other Sources	30,938,112

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SECTION IV – LIABILITIES

In addition, we breakdown the change in actuarial liability further by showing the total actuarial (gain)/loss by source, as shown in Table IV-3 below. A history of the (gain)/loss by source is shown in Table IV-4 below.

Table IV-3 (Gain)/Loss by Source as of May 1, 2019	
Turnover	\$ 44,000
Retirement	(70,000)
Disability	3,580,000
Pre-retirement mortality	72,000
Post-retirement mortality	1,965,000
Salary increase more/(less) than expected for continuing actives	(1,307,000)
New entrants	203,000
Data Composition & Miscellaneous changes	<u>(535,000)</u>
Total (Gain)/Loss	\$ 3,952,000

Table IV-4 Historical Liability (Gains)/Losses (\$ Millions)					
Change due to:	2015	2016	2017	2018	2019
Turnover	\$ (0.1)	\$ (1.4)	\$ 0.0	\$ (0.8)	\$ 0.0
Retirement	2.1	2.8	1.8	0.7	\$ (0.1)
Disability	(0.6)	0.6	1.8	1.1	\$ 3.6
Pre-retirement mortality	(0.4)	0.0	(0.9)	0.0	\$ 0.1
Post-retirement mortality	1.7	3.7	0.0	(4.2)	\$ 2.0
Salary change	(5.4)	(7.7)	6.0	2.0	\$ (1.3)
New entrants	0.2	0.2	0.9	0.3	\$ 0.2
Miscellaneous	<u>0.9</u>	<u>0.4</u>	<u>(1.3)</u>	<u>1.0</u>	<u>\$ (0.5)</u>
Total (Gain)/Loss	\$ (1.6)	\$ (1.4)	\$ 8.3	\$ 0.1	\$ 4.0

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION V – CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the System. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For this System, the funding method employed is the **Entry Age Actuarial Cost Method**. Under this method, there are three primary components to the total contribution: the **normal cost rate (employee and employer)**, the **administrative expense rate**, and the **unfunded actuarial liability rate** (UAL rate). The normal cost rate is determined by taking the value, as of entry age into the System, of each member's projected future benefits. This value is then divided by the value, also at entry age, of each member's expected future salary. The normal cost rate is multiplied by current salary to determine each member's normal cost rate. Finally, the total normal cost rate is reduced by the member contribution rate to produce the employer normal cost rate. The difference between the Entry Age actuarial liability and the actuarial value of assets is the unfunded actuarial liability.

Contributions are calculated on two bases:

- Under the Board's funding policy for calculating the Actuarially Determined Contribution, the unfunded actuarial liability is amortized using a 30-year layered amortization method – level percent of pay. Under the layered approach, the May 1, 2008 unfunded actuarial liability is written down over a 30-year period and all future changes to the unfunded actuarial liability establish new 30-year amortization periods. Payroll is expected to increase 3.0% per year.
- Under the City ordinance, the City's contributions are to be based upon a 30-year closed amortization of the entire unfunded liability from May 1, 2014 as a level percent of pay. Payroll is expected to increase 3.0% per year.

For both calculations, the increase in contribution rates due to the May 1, 2017 actuarial assumption changes is phased-in over five years.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION V – CONTRIBUTIONS

Table V-1 below presents and compares the employer contribution rates for the System for this valuation and the prior one using both the current Board funding policy amortization method and using a 30-year closed amortization method.

Table V-1		
Employer Contribution Rate		
	May 1, 2018	May 1, 2019
<u>Current Board Funding Policy *</u>		
Entry Age Normal Cost Rate	13.87%	14.11%
Administrative Expense Rate	0.39%	0.41%
Amortization Payment	18.28%	20.62%
Actuarially Determined Contribution	32.54%	35.14%
<u>30-Year Closed Amortization Method *</u>		
Entry Age Normal Cost Rate	13.87%	14.11%
Administrative Expense Rate	0.39%	0.41%
Amortization Payment	16.92%	19.35%
Actuarially Determined Contribution	31.18%	33.87%

** Rates reflect the 5-year phase-in of the 2017 assumption changes*

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION V – CONTRIBUTIONS

Table V-2 below presents the May 1, 2019 employer contribution rates for the System. The employer contribution rate is based on the amortization schedule shown in Table V-3. The employer contribution rates are then compared to what the City is expected to contribute for the current plan year. The current expected City contribution rate for all employees for the year ending April 30, 2020 is 32.54% of payroll.

Table V -2 Development of Plan Contribution Rate as of May 1, 2019		As % of Payroll*
1. Normal Cost (Monthly):		
a. Total Normal Cost		25.25%
b. Administrative Expense		0.45%
c. Expected Members Contribution		10.55%
d. Employer Paid Normal Cost (a) + (b) - (c)		15.15%
2. Amortization of Unfunded Liability		
a. Actuarial Liability	\$ 791,841,017	
b. Actuarial Value of Assets	556,897,913	
c. Unfunded Liability (a) - (b)	234,943,104	
d. Amortization of Unfunded Liability		23.04%
3. Actuarially Determined Employer Contribution Rate before phase-in (1d) + (2d)		38.19%
4. Increase due to change in 2017 assumptions		7.63%
5. Actuarially Determined Employer Contribution Rate after phase-in (3) - (40% x (4))		35.14%
6. Scheduled City Contributions (Prior Year's ADC)**		32.54%

* Total payroll is \$68,246,790, and the Actuarially Determined Contribution for plan year ending April 30, 2021 is \$23,981,922 based on the total employer contribution rate.

** Determined in the May 1, 2018 valuation.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION V – CONTRIBUTIONS

Under Board funding policy, for purposes of calculating the Actuarially Determined Contribution under GASB, the Unfunded Actuarial Liability is amortized in accordance with the schedule below:

Initial unfunded actuarial liability (as of May 1, 2008) 30 years
Changes to the UAL on and after May 1, 2009 30 years

Table V-3							
Unfunded Actuarial Liability Amortization Schedule							
Item	Date Created	Initial Years	Initial Balance	Remaining Years	Outstanding Balance	Amortization Payment	Amortization Factor
Initial UAL	5/1/2008	30	\$ 31,525,386	19	\$ 33,283,770	\$ 2,514,223	13.238
(Gain)/Loss*	5/1/2009	30	119,805,172	20	127,114,790	9,283,868	13.692
(Gain)/Loss*	5/1/2010	30	(72,293,282)	21	(76,888,306)	(5,442,327)	14.128
(Gain)/Loss*	5/1/2011	30	14,027,641	22	14,920,845	1,025,742	14.546
(Gain)/Loss*	5/1/2012	30	50,231,264	23	53,324,922	3,567,274	14.948
Assumption Change	5/1/2012	30	(32,090,739)	23	(34,067,152)	(2,278,988)	14.948
(Gain)/Loss*	5/1/2013	30	13,322,268	24	14,088,548	918,754	15.334
(Gain)/Loss*	5/1/2014	30	(15,478,970)	25	(16,278,705)	(1,036,520)	15.705
Assumption Change	5/1/2014	30	16,120,179	25	16,953,041	1,079,457	15.705
Plan Amendment	5/1/2014	30	212,181	25	223,144	14,208	15.705
(Gain)/Loss*	5/1/2015	30	(4,602,806)	26	(4,802,621)	(299,020)	16.061
(Gain)/Loss*	5/1/2016	30	7,691,151	27	7,951,411	484,749	16.403
(Gain)/Loss*	5/1/2017	30	7,063,910	28	7,227,048	431,941	16.732
Assumption Change**	5/1/2017	30	71,577,266	28	73,230,314	4,376,780	16.732
(Gain)/Loss*	5/1/2018	30	5,448,133	29	5,513,613	323,437	17.047
(Gain)/Loss*	5/1/2019	30	13,148,442	30	13,148,442	757,843	17.350
Total			\$ 225,707,196		\$ 234,943,104	\$ 15,721,422	

*Also included differences between the Actuarially Determined Contribution and the actual contributions made.

** Results do not reflect the 5 year phase-in of the 2017 assumption changes

Under the City ordinance, amortization payments are calculated using a 30-year closed amortization method. The amortization payment as of May 1, 2019 is shown in the table below.

Table V-4			
Unfunded Actuarial Liability Amortization Schedule			
UAL	Remaining Years *	Amortization Payment **	Amortization Factor
\$234,943,104	25	\$14,959,616	15.705

*30-year closed amortization period began 5/1/2014

** Results do not reflect the 5 year phase-in of the 2017 assumption changes

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION VI – FINANCIAL STATEMENT INFORMATION

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in a public retirement system's Comprehensive Annual Financial Report (CAFR) in order to receive recognition for excellence in financial reporting. Although the Kansas City Firefighters' Pension System does not issue a CAFR under GFOA guidelines, we have included certain schedules in this section for possible inclusion within the System's audited financial statements.

Tables VI-1 through VI-5 are exhibits which could be used with the CAFR report. Table VI-1 is the Note to Required Supplementary Information, Table VI-2 is a history of gains and losses in actuarial liability, Table VI-3 is the Schedule of Funded Liabilities by Type which shows the portion of actuarial liability covered by assets, Table VI-4 shows historical Actuarially Determined Contribution information, compared to what the City actually contributed, and Table VI-5 is the Schedule of Funding Progress.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION VI – FINANCIAL STATEMENT INFORMATION

**Table VI-1
Note To Required Supplementary Information**

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the date indicated. Additional information as of the latest actuarial valuation follows.

Valuation date	May 1, 2019
Actuarial cost method	Entry age
Amortization method	30-year layered amortization, level percent of pay for changes to the UAL on or after 5/1/2008
Remaining amortization period for the UAL	Weighted average of 23.0 years
Asset valuation method	5-year smoothed market
Actuarial assumptions:	
Investment rate of return	7.25%
Projected salary increases	Ranges from 8.0% to 3.0%
Cost-of-living adjustments	3.0% simple
Inflation	2.5%

The actuarial assumptions used have been based upon recommendations by the actuary and adopted by the System's Board of Trustees. The most recent actuarial experience study was performed for the period May 1, 2011 through April 30, 2016.

The rate of employer actuarially determined contributions to the System is composed of the normal cost, expected administrative expenses, and an amortization of the unfunded actuarial liability. The normal cost is a level percent of payroll cost which, along with member contributions, will pay for projected benefits at retirement for the average plan participant. The actuarial liability is that portion of the present value of projected benefits that will not be paid by future employer normal costs or member contributions. The difference between this liability and the actuarial value of assets as of the same date is the unfunded actuarial liability. The contribution rate change as a result of the revised assumptions adopted as of May 1, 2017 is phased-in over five years.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION VI – FINANCIAL STATEMENT INFORMATION

Table VI-2

Analysis Of Financial Experience
Gain and Loss in Actuarial Liability During Years Ended April 30
Resulting from Differences Between Assumed Experience and Actual Experience
Gain (or Loss) for Year ending April 30,
(expressed in thousands)

Type of Activity	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Investment Income *	\$ 64,430	\$ (25,060)	\$(33,605)	\$ (20,446)	\$ 14,074	\$ 3,033	\$ (9,103)	\$ 1,263	\$ (5,369)	\$ (9,196)
Combined Liability Experience	<u>7,863</u>	<u>11,032</u>	<u>(16,627)</u>	<u>7,124</u>	<u>1,405</u>	<u>1,570</u>	<u>1,412</u>	<u>(8,327)</u>	<u>(79)</u>	<u>(3,952)</u>
Gain/(or Loss) during Year from Financial Experience	\$ 72,293	\$ (14,028)	\$(50,232)	\$ (13,322)	\$ 15,479	\$ 4,603	\$ (7,691)	\$ (7,064)	\$ (5,448)	\$ (13,148)
Non-Recurring Gain/(or Loss) Items	<u>0</u>	<u>0</u>	<u>32,091</u>	<u>0</u>	<u>(16,332)</u>	<u>0</u>	<u>0</u>	<u>(71,577)</u>	<u>0</u>	<u>0</u>
Composite Gain/(or Loss) during Year	\$ 72,293	\$ (14,028)	\$(18,141)	\$ (13,322)	\$ (853)	\$ 4,603	\$ (7,691)	\$ (78,641)	\$ (5,448)	\$ (13,148)

* Investment experience includes the differences in actual and recommended contributions.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION VI – FINANCIAL STATEMENT INFORMATION

**Table VI-3
Schedule of Funded Liabilities by Type
Aggregate Actuarial Liabilities for
(expressed in thousands)**

Valuation Date May 1,	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active	Actuarial Value of Reported Assets	Portion of Actuarial Liabilities Covered by Reported Assets		
			Member Employer Financed Contributions (3)		(1)	(2)	(3)
2010	\$57,842	\$297,377	\$161,381	\$435,428	100%	100%	50%
2011	\$66,618	\$309,207	\$152,656	\$432,541	100%	100%	37%
2012	\$70,049	\$311,907	\$153,259	\$420,337	100%	100%	25%
2013	\$69,614	\$333,764	\$144,410	\$418,712	100%	100%	11%
2014	\$75,288	\$346,493	\$161,387	\$452,378	100%	100%	19%
2015	\$78,243	\$363,896	\$161,279	\$476,356	100%	100%	21%
2016	\$79,606	\$388,599	\$156,039	\$488,879	100%	100%	13%
2017	\$84,135	\$437,176	\$205,226	\$512,041	100%	98%	0%
2018	\$87,775	\$453,880	\$215,296	\$535,935	100%	99%	0%
2019	\$93,552	\$468,766	\$229,523	\$556,898	100%	99%	0%

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION VI – FINANCIAL STATEMENT INFORMATION

Table VI-4 Schedule of City Contributions			
Plan Year Ended April 30	Actuarially Determined Contribution	Actual Contribution	Percentage Contributed
2011	\$12,827,773 *	\$10,297,638	80.3%
2012	\$14,045,886 *	\$11,603,818	82.6%
2013	\$15,400,040 *	\$13,120,169	85.2%
2014	\$16,182,139 *	\$14,344,958	88.6%
2015	\$16,182,139 **	\$16,258,533	100.5%
2016	\$16,581,464 **	\$16,631,844	100.3%
2017	\$16,726,994 **	\$16,754,798	100.2%
2018	\$17,316,499 **	\$17,435,993	100.7%
2019	\$19,747,524 **	\$20,015,327	101.4%
2020	\$21,562,471 **	--	--

**The actuarially determined contribution for the plan years ended April 30, 2011 through April 30, 2014 is based on the actuarially computed contribution for the valuation year.*

***For plan years ended April 30, 2015 and later, the actuarially determined contribution is based on the calculation for the prior valuation year using estimated valuation payroll. The actuarially computed contribution for the current valuation year is described in Section V, Table V-2.*

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

SECTION VI – FINANCIAL STATEMENT INFORMATION

**Table VI-5
Schedule of Funding Progress**

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Liability (b)	Unfunded Actuarial Liability (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAL as a Percentage of Covered Payroll* [(b) - (a)] / (c)
5/1/2010	\$435,427,953	\$516,599,916	\$81,171,963	84.29%	\$51,934,305	156.30%
5/1/2011	\$432,540,955	\$528,481,037	\$95,940,082	81.85%	\$51,983,293	184.56%
5/1/2012	\$420,336,845	\$535,215,109	\$114,878,264	78.54%	\$60,062,558	191.26%
5/1/2013	\$418,711,963	\$547,787,899	\$129,075,936	76.44%	\$58,356,072	221.19%
5/1/2014	\$452,378,238	\$583,167,922	\$130,789,684	77.57%	\$59,410,476	220.15%
5/1/2015	\$476,356,399	\$603,417,753	\$127,061,354	78.94%	\$59,294,555	214.29%
5/1/2016	\$488,878,575	\$624,244,469	\$135,365,894	78.32%	\$57,625,619	234.91%
5/1/2017	\$512,040,758	\$726,537,707	\$214,496,949	70.48%	\$64,492,241	332.59%
5/1/2018	\$535,935,199	\$756,950,736	\$221,015,537	70.80%	\$66,264,508	333.54%
5/1/2019	\$556,897,913	\$791,841,017	\$234,943,104	70.33%	\$68,246,790	344.26%

* Not less than zero.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension System			
Table of Plan Coverage			
	5/1/2018	5/1/2019	% Change
Active Members in Valuation			
<u>Tier 1</u>			
Number	787	756	-3.94%
Average Age	43.06	44.00	2.18%
Average Service	16.88	17.84	5.69%
Total Payroll	\$ 57,442,161	\$ 57,116,093	-0.57%
Average Anticipated Payroll	\$ 72,989	\$ 75,550	3.51%
Account Balance	\$ 86,108,383	\$ 90,747,022	5.39%
Eligible to Retire on:			
Voluntary Pension	115	140	21.74%
Deferred Pension	<u>528</u>	<u>493</u>	-6.63%
Total Active Vested Members	643	633	-1.56%
<u>Tier 2</u>			
Participant Count	194	237	22.16%
Average Age	28.06	28.78	2.57%
Average Service	1.91	2.50	30.89%
Total Payroll	\$ 8,822,347	\$ 11,130,696	26.16%
Average Anticipated Payroll	\$ 45,476	\$ 46,965	3.27%
Account Balance	\$ 1,666,343	\$ 2,804,978	68.33%
Eligible to Retire on:			
Voluntary Pension	0	0	N/A
Deferred Pension	<u>0</u>	<u>0</u>	N/A
Total Active Vested Members	0	0	N/A
<u>Total</u>			
Count	981	993	1.22%
Average Age	40.09	40.37	0.70%
Average Service	13.92	14.18	1.87%
Total Payroll	\$ 66,264,508	\$ 68,246,790	2.99%
Average Anticipated Payroll	\$ 67,548	\$ 68,728	1.75%
Account Balance	\$ 87,774,726	\$ 93,552,000	6.58%
Eligible to Retire on:			
Voluntary Pension	115	140	21.74%
Deferred Pension	<u>528</u>	<u>493</u>	-6.63%
Total Active Vested Members	643	633	-1.56%

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension System Table of Plan Coverage (cont.)			
	5/1/2018	5/1/2019	% change
Vested Terminated Members	7	8	14.29%
Deaths During the Plan Year	48	35	-27.08%
Pensioners:			
Number in Pay Status*			
Retirees	570	570	0.00%
Duty Disabled Retirees	103	111	7.77%
Non-duty Disabled Retirees	<u>5</u>	<u>4</u>	-20.00%
Total	678	685	1.03%
Average Age	67.55	67.44	-0.17%
Average Monthly Benefit***	\$ 4,071	\$ 4,188	2.88%
Beneficiaries in Pay Status**	246	247	0.41%
Members Due Refunds	6	8	33.33%
New Disabilities	7	10	42.86%

* Disabled participants that were eligible for voluntary retirement at the time of their disability are valued as Retirees

**Widows, QDROs, and Children

***The monthly benefit does not include the health insurance subsidy benefits

CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019

APPENDIX A – MEMBERSHIP INFORMATION

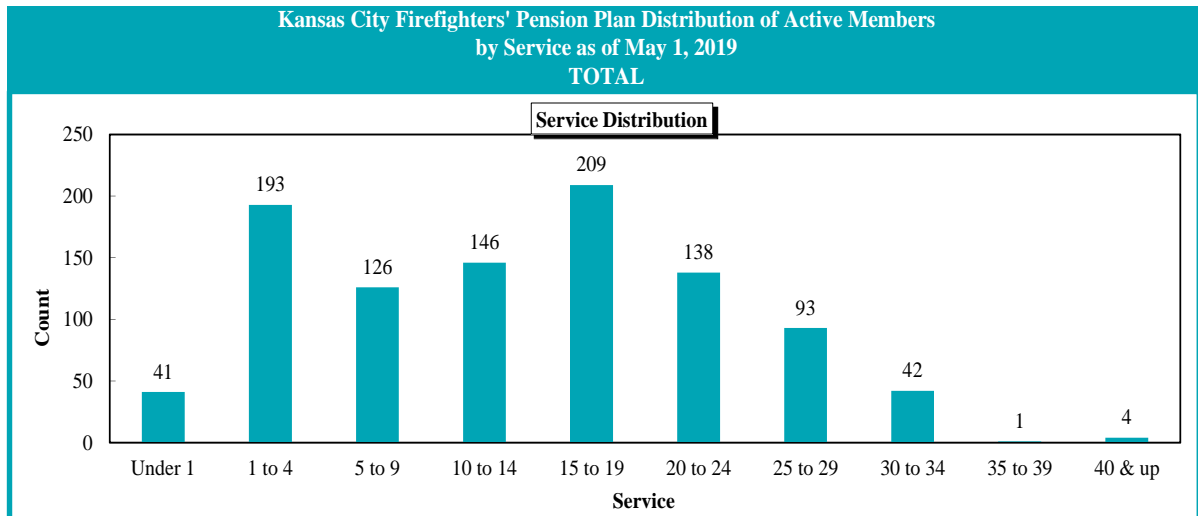
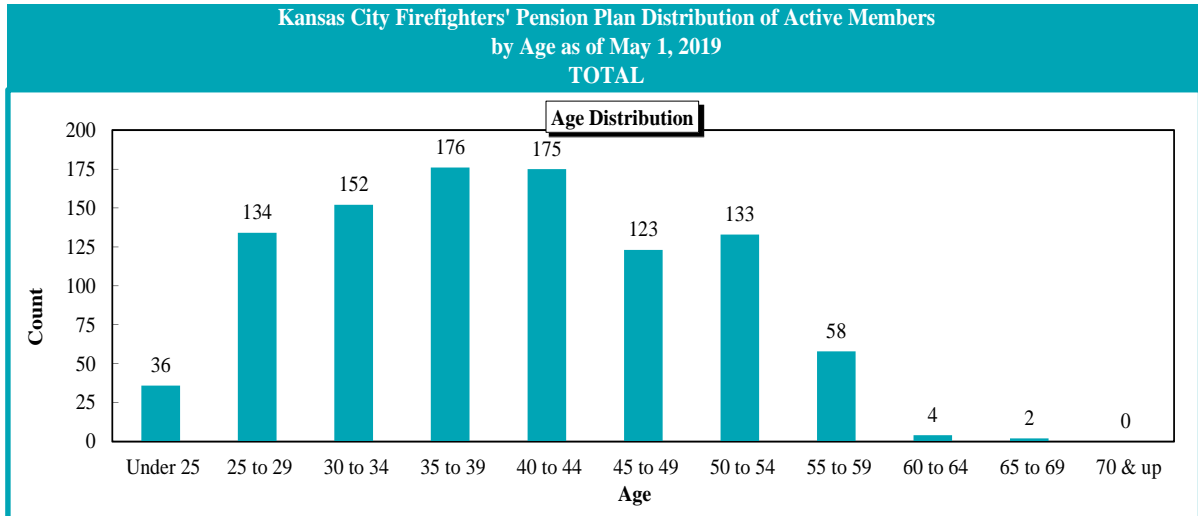
Kansas City Firefighters' Pension Plan Table of Plan Coverage (cont.)			
	May 1, 2018	May 1, 2019	% Change
<u>Active Members in Valuation</u>			
Count			
Males	952	962	1.05%
Females	<u>29</u>	<u>31</u>	6.90%
Total	981	993	1.22%
Average Current Age			
Males	40.08	40.34	0.65%
Females	<u>40.55</u>	<u>41.22</u>	1.65%
Total	40.09	40.37	0.70%
Average Service			
Males	13.96	14.21	1.79%
Females	<u>12.48</u>	<u>13.40</u>	7.37%
Total	13.92	14.18	1.87%
<u>Vested Terminated Members</u>			
Count			
Males	4	6	50.00%
Females	<u>3</u>	<u>2</u>	-33.33%
Total	7	8	14.29%
Average Current Age			
Males	44.65	42.54	-4.73%
Females	<u>47.02</u>	<u>47.63</u>	1.30%
Total	45.67	43.81	-4.06%
<u>Pensioners</u>			
Count			
Males	662	669	1.06%
Females	<u>16</u>	<u>16</u>	0.00%
Total	678	685	1.03%
Average Current Age			
Males	67.84	67.70	-0.21%
Females	<u>55.67</u>	<u>56.67</u>	1.80%
Total	67.55	67.44	-0.16%

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension Plan Distribution of Active Members
by Age and Service as of May 1, 2019
TOTAL
COUNTS BY AGE/SERVICE

Age	Service										Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	
Under 25	15	21	0	0	0	0	0	0	0	0	36
25 to 29	22	98	14	0	0	0	0	0	0	0	134
30 to 34	4	62	66	20	0	0	0	0	0	0	152
35 to 39	0	11	44	67	54	0	0	0	0	0	176
40 to 44	0	1	2	57	89	26	0	0	0	0	175
45 to 49	0	0	0	2	43	52	26	0	0	0	123
50 to 54	0	0	0	0	21	47	47	18	0	0	133
55 to 59	0	0	0	0	2	12	20	23	1	0	58
60 to 64	0	0	0	0	0	0	0	1	0	3	4
65 to 69	0	0	0	0	0	1	0	0	0	1	2
70 & up	0	0	0	0	0	0	0	0	0	0	0
Total	41	193	126	146	209	138	93	42	1	4	993



**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

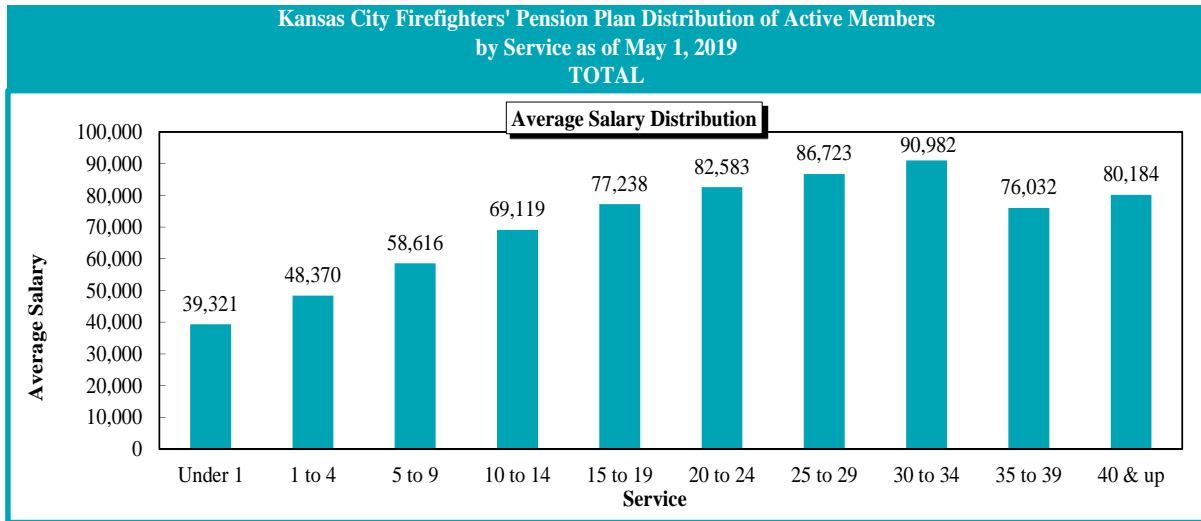
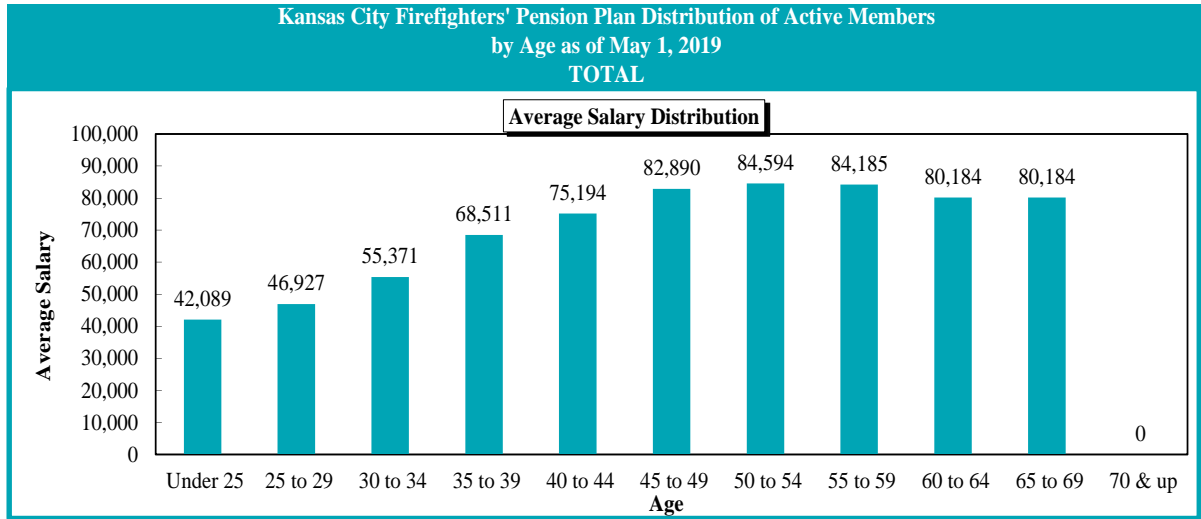
APPENDIX A – MEMBERSHIP INFORMATION

**Kansas City Firefighters' Pension Plan Distribution of Active Members
by Age and Service as of May 1, 2019**

TOTAL

AVERAGE SALARY BY AGE/SERVICE

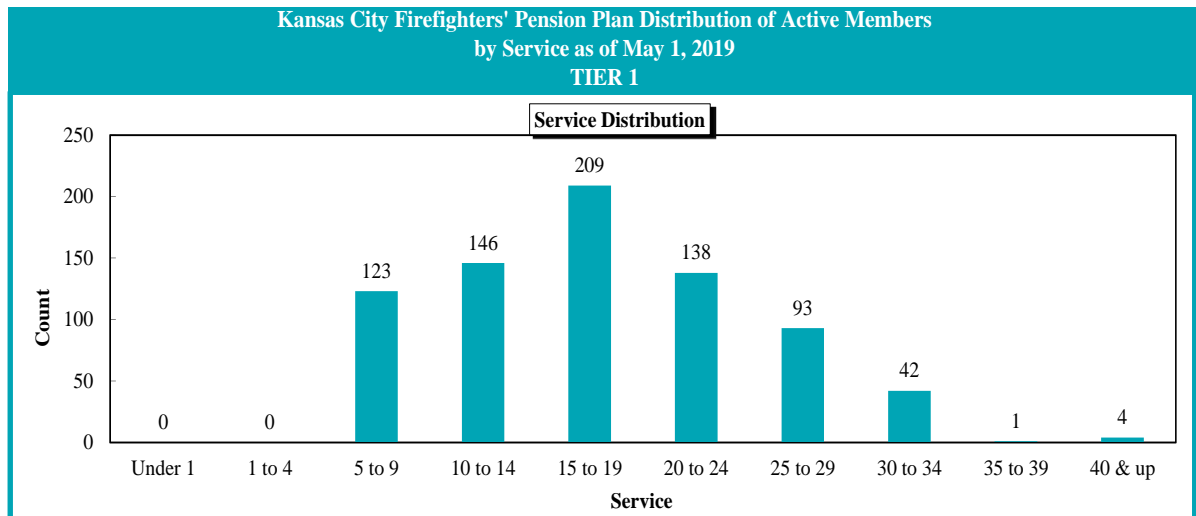
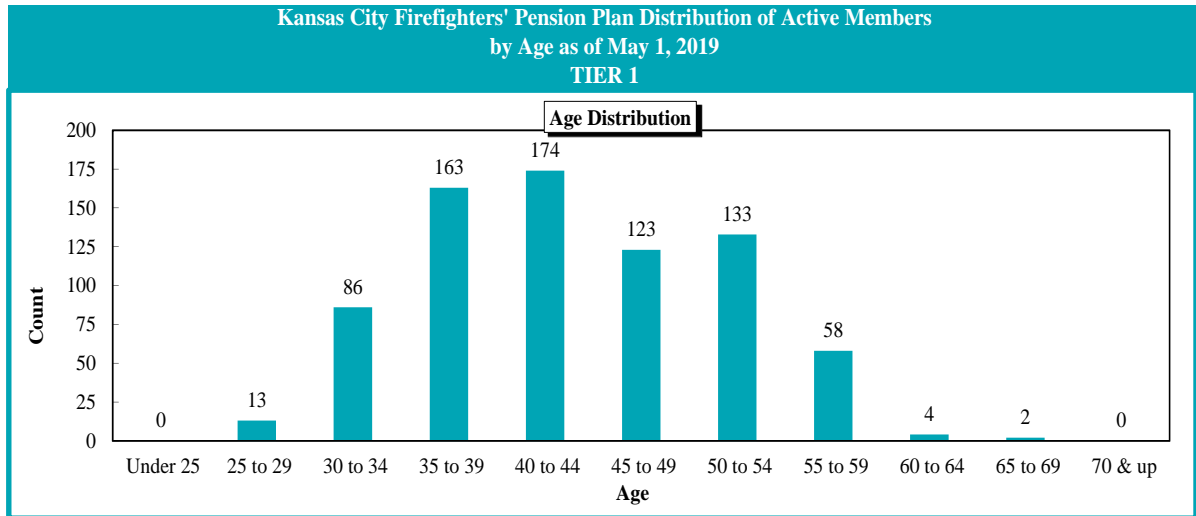
Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	39,412	44,001	0	0	0	0	0	0	0	0	0	42,089
25 to 29	39,286	47,237	56,764	0	0	0	0	0	0	0	0	46,927
30 to 34	39,174	49,698	57,959	67,654	0	0	0	0	0	0	0	55,371
35 to 39	0	59,656	59,507	68,824	77,262	0	0	0	0	0	0	68,511
40 to 44	0	44,616	73,632	69,927	77,257	80,973	0	0	0	0	0	75,194
45 to 49	0	0	0	70,632	77,734	83,979	90,181	0	0	0	0	82,890
50 to 54	0	0	0	0	76,149	83,033	87,460	91,037	0	0	0	84,594
55 to 59	0	0	0	0	76,464	78,800	80,497	91,228	76,032	0	0	84,185
60 to 64	0	0	0	0	0	0	0	84,336	0	78,800	0	80,184
65 to 69	0	0	0	0	0	76,032	0	0	0	84,336	0	80,184
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
Total	39,321	48,370	58,616	69,119	77,238	82,583	86,723	90,982	76,032	80,184	0	68,728



**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension Plan Distribution of Active Members by Age and Service as of May 1, 2019												
TIER 1												
COUNTS BY AGE/SERVICE												
Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	0	0	0	0	0	0	0	0	0	0	0	0
25 to 29	0	0	13	0	0	0	0	0	0	0	0	13
30 to 34	0	0	66	20	0	0	0	0	0	0	0	86
35 to 39	0	0	42	67	54	0	0	0	0	0	0	163
40 to 44	0	0	2	57	89	26	0	0	0	0	0	174
45 to 49	0	0	0	2	43	52	26	0	0	0	0	123
50 to 54	0	0	0	0	21	47	47	18	0	0	0	133
55 to 59	0	0	0	0	2	12	20	23	1	0	0	58
60 to 64	0	0	0	0	0	0	0	1	0	3	0	4
65 to 69	0	0	0	0	0	1	0	0	0	1	0	2
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	123	146	209	138	93	42	1	4	0	756

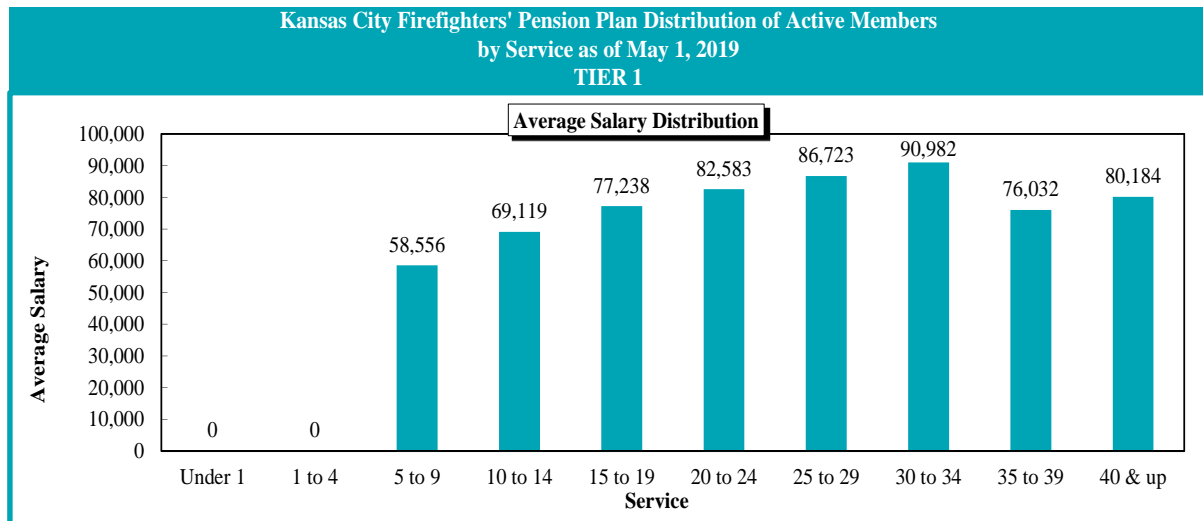
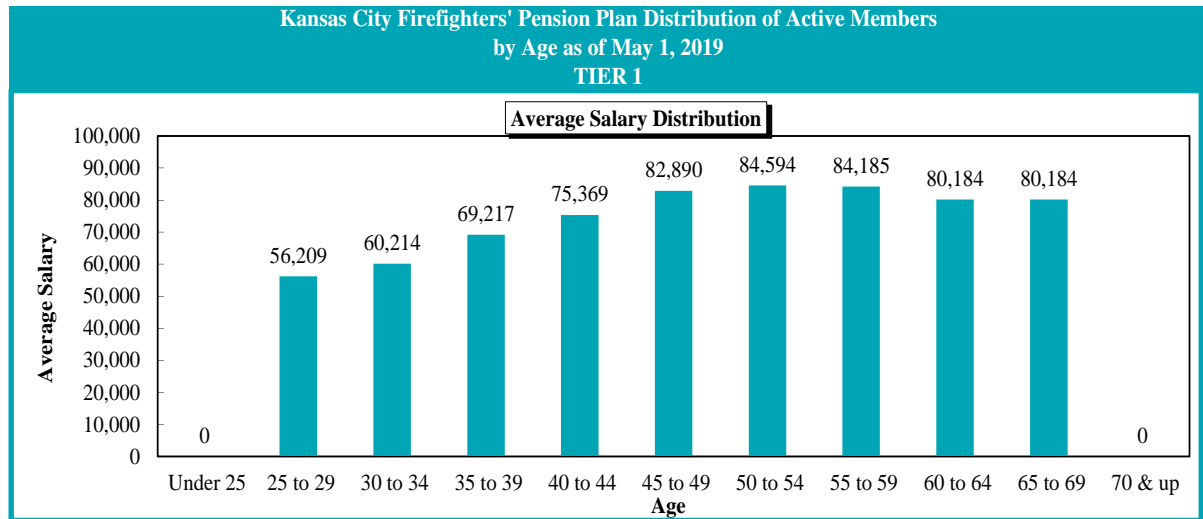


**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension Plan Distribution of Active Members
by Age and Service as of May 1, 2019
TIER 1
AVERAGE SALARY BY AGE/SERVICE

Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	0	0	0	0	0	0	0	0	0	0	0	0
25 to 29	0	0	56,209	0	0	0	0	0	0	0	0	56,209
30 to 34	0	0	57,959	67,654	0	0	0	0	0	0	0	60,214
35 to 39	0	0	59,502	68,824	77,262	0	0	0	0	0	0	69,217
40 to 44	0	0	73,632	69,927	77,257	80,973	0	0	0	0	0	75,369
45 to 49	0	0	0	70,632	77,734	83,979	90,181	0	0	0	0	82,890
50 to 54	0	0	0	0	76,149	83,033	87,460	91,037	0	0	0	84,594
55 to 59	0	0	0	0	76,464	78,800	80,497	91,228	76,032	0	0	84,185
60 to 64	0	0	0	0	0	0	0	84,336	0	78,800	0	80,184
65 to 69	0	0	0	0	0	76,032	0	0	0	84,336	0	80,184
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	58,556	69,119	77,238	82,583	86,723	90,982	76,032	80,184	0	75,550

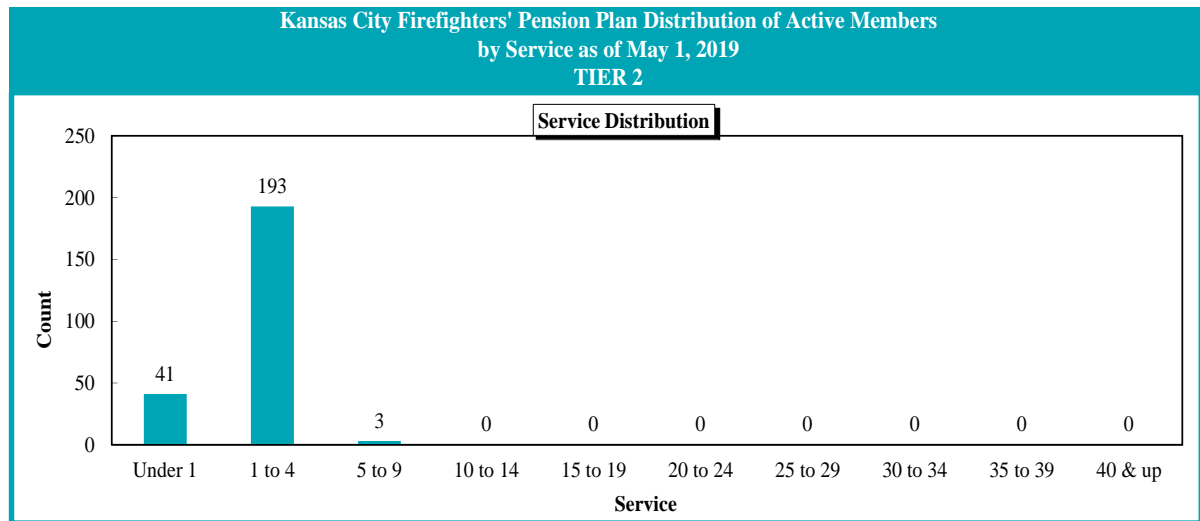
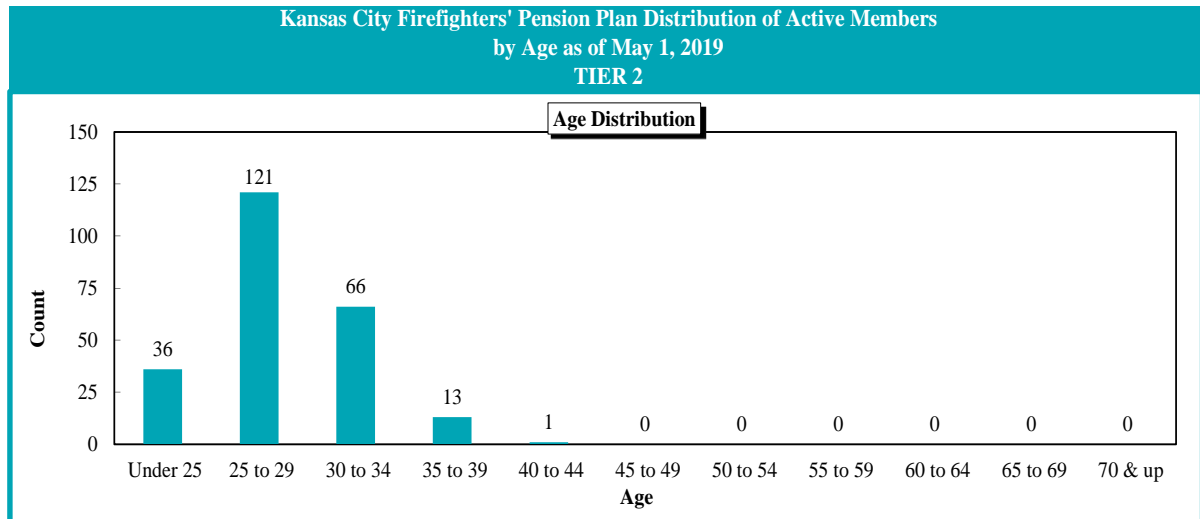


**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

**Kansas City Firefighters' Pension Plan Distribution of Active Members
by Age and Service as of May 1, 2019
TIER 2
COUNTS BY AGE/SERVICE**

Age	Service										Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	
Under 25	15	21	0	0	0	0	0	0	0	0	36
25 to 29	22	98	1	0	0	0	0	0	0	0	121
30 to 34	4	62	0	0	0	0	0	0	0	0	66
35 to 39	0	11	2	0	0	0	0	0	0	0	13
40 to 44	0	1	0	0	0	0	0	0	0	0	1
45 to 49	0	0	0	0	0	0	0	0	0	0	0
50 to 54	0	0	0	0	0	0	0	0	0	0	0
55 to 59	0	0	0	0	0	0	0	0	0	0	0
60 to 64	0	0	0	0	0	0	0	0	0	0	0
65 to 69	0	0	0	0	0	0	0	0	0	0	0
70 & up	0	0	0	0	0	0	0	0	0	0	0
Total	41	193	3	0	0	0	0	0	0	0	237

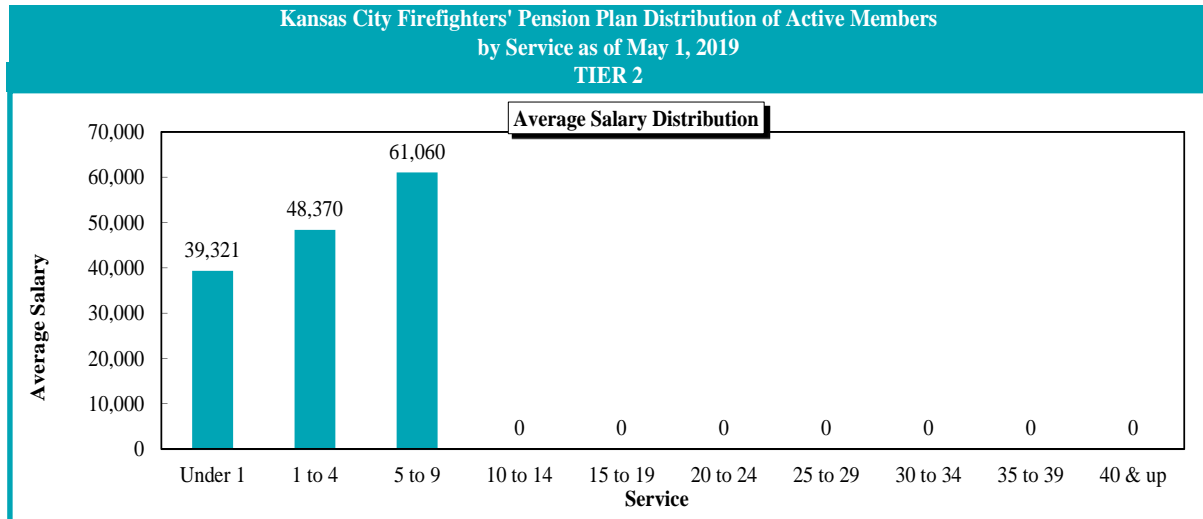
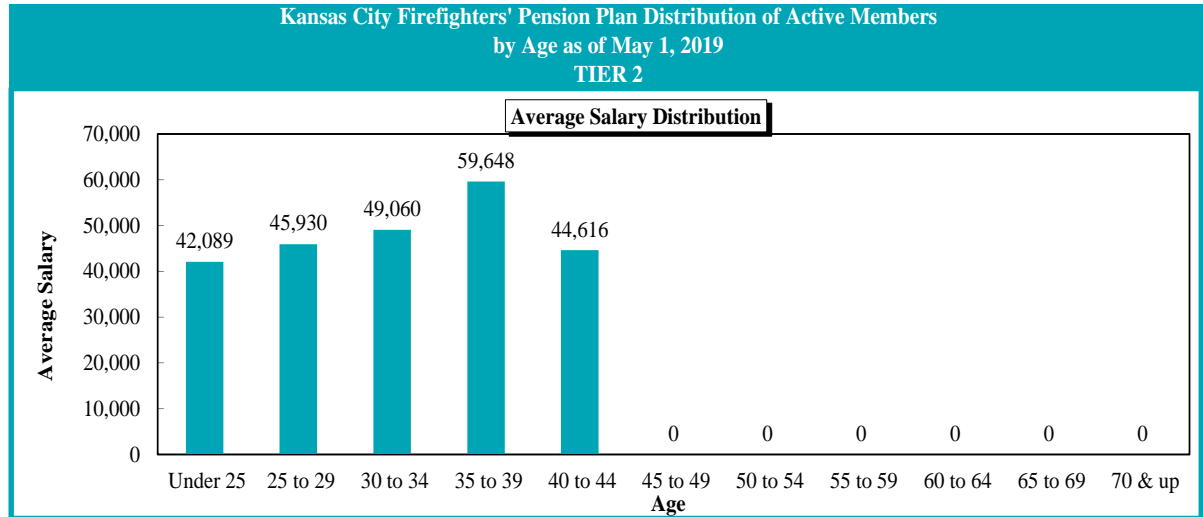


**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

**Kansas City Firefighters' Pension Plan Distribution of Active Members
by Age and Service as of May 1, 2019
TIER 2
AVERAGE SALARY BY AGE/SERVICE**

Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	39,412	44,001	0	0	0	0	0	0	0	0	0	42,089
25 to 29	39,286	47,237	63,972	0	0	0	0	0	0	0	0	45,930
30 to 34	39,174	49,698	0	0	0	0	0	0	0	0	0	49,060
35 to 39	0	59,656	59,604	0	0	0	0	0	0	0	0	59,648
40 to 44	0	44,616	0	0	0	0	0	0	0	0	0	44,616
45 to 49	0	0	0	0	0	0	0	0	0	0	0	0
50 to 54	0	0	0	0	0	0	0	0	0	0	0	0
55 to 59	0	0	0	0	0	0	0	0	0	0	0	0
60 to 64	0	0	0	0	0	0	0	0	0	0	0	0
65 to 69	0	0	0	0	0	0	0	0	0	0	0	0
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
Total	39,321	48,370	61,060	0	0	0	0	0	0	0	0	46,965



**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension System Pensions in Payment Status by Type and Monthly Amount as of May 1, 2019						
Monthly Amount	Total	Voluntary	Vested	Disability	Widows & Children	QDROs
Total	932	547	23	115	227	20
Under \$500	27	0	3	0	19	5
\$500-1,000	58	1	4	2	46	5
1,000-1,500	56	3	2	5	43	3
1,500-2,000	68	11	1	11	41	4
2,000-2,500	62	19	3	5	34	1
2,500-3,000	53	31	5	2	15	0
3,000-3,500	70	55	2	5	8	0
3,500-4,000	108	90	2	9	5	2
4,000-4,500	182	108	0	68	6	0
4,500-5,000	85	76	0	7	2	0
5,000-5,550	67	62	0	0	5	0
5,500-6,000	52	51	0	0	1	0
6,000-6,500	12	8	1	1	2	0
6,500-7,000	7	7	0	0	0	0
7,000 & over	25	25	0	0	0	0

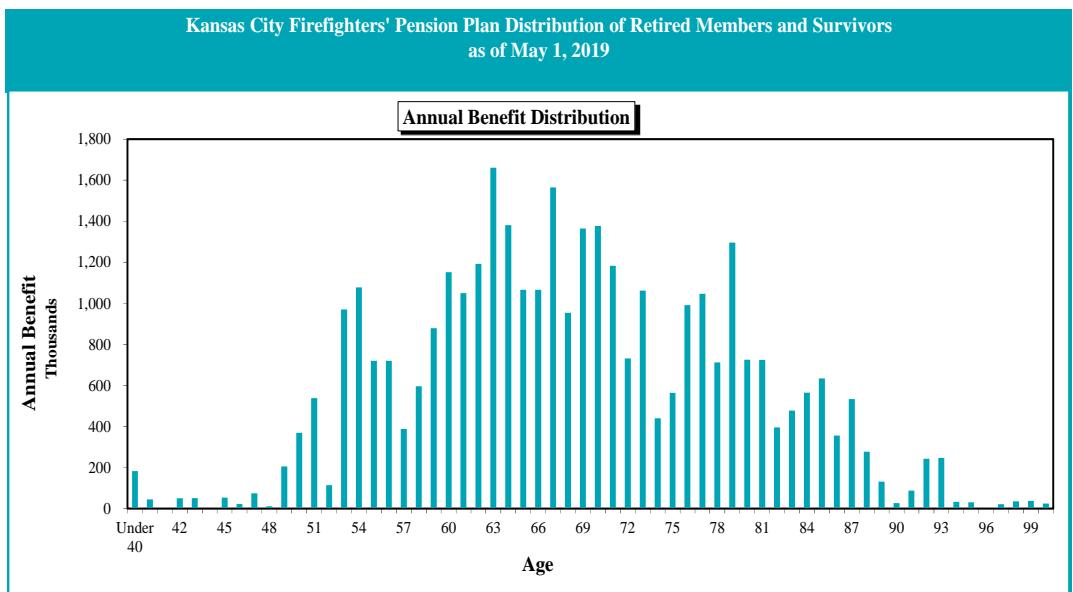
During the year ended April 30, 2019 there were 41 new pensions awarded (16 Voluntary, 0 Vested, 10 Disabled, and 15 Widows, QDROs, and Children)

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension Plan Distribution of Retired Members and Survivors as of May 1, 2019								
Age	Count	Annual Benefit	Age	Count	Annual Benefit	Age	Count	Annual Benefit
<25	16	\$54,038	57	7	\$387,224	89	6	\$131,044
25	0	0	58	13	595,562	90	4	26,491
26	0	0	59	17	879,009	91	7	87,816
27	0	0	60	21	1,150,510	92	12	242,803
28	0	0	61	21	1,048,549	93	7	246,603
29	0	0	62	20	1,191,357	94	2	32,018
30	0	0	63	30	1,659,625	95	2	30,557
31	0	0	64	25	1,380,316	96	0	0
32	0	0	65	21	1,065,545	97	1	21,538
33	0	0	66	20	1,065,170	98	1	34,877
34	1	22,794	67	26	1,563,693	99	3	35,913
35	1	7,211	68	18	953,228	100	2	23,845
36	2	26,274	69	27	1,364,500	101	1	11,360
37	1	22,264	70	26	1,376,050	102	1	17,581
38	0	0	71	22	1,182,531	103	1	25,910
39	1	49,443	72	18	730,749	104	1	36,566
40	2	44,635	73	25	1,061,460	105	0	0
41	0	0	74	11	438,921	106	2	15,987
42	1	49,443	75	16	564,036	107	0	0
43	1	50,222	76	26	991,079	108	1	15,896
44	0	0	77	26	1,046,290	109	1	20,574
45	1	52,155	78	19	710,927	110	0	0
46	1	21,729	79	30	1,296,019	111	0	0
47	1	73,679	80	18	724,554	112	0	0
48	2	10,912	81	22	723,723	113	0	0
49	4	204,549	82	15	395,205	114	0	0
50	8	368,899	83	14	477,064	115	0	0
51	10	538,188	84	17	564,638	116	0	0
52	4	114,034	85	22	633,539	117	0	0
53	18	969,838	86	15	355,118	118	0	0
54	20	1,077,422	87	20	532,634	119	0	0
55	14	719,308	88	11	276,859	120	0	0
56	14	719,437						
Totals							817	\$34,639,537

The above counts include 288 persons who elected disability retirement after becoming eligible for voluntary retirement.

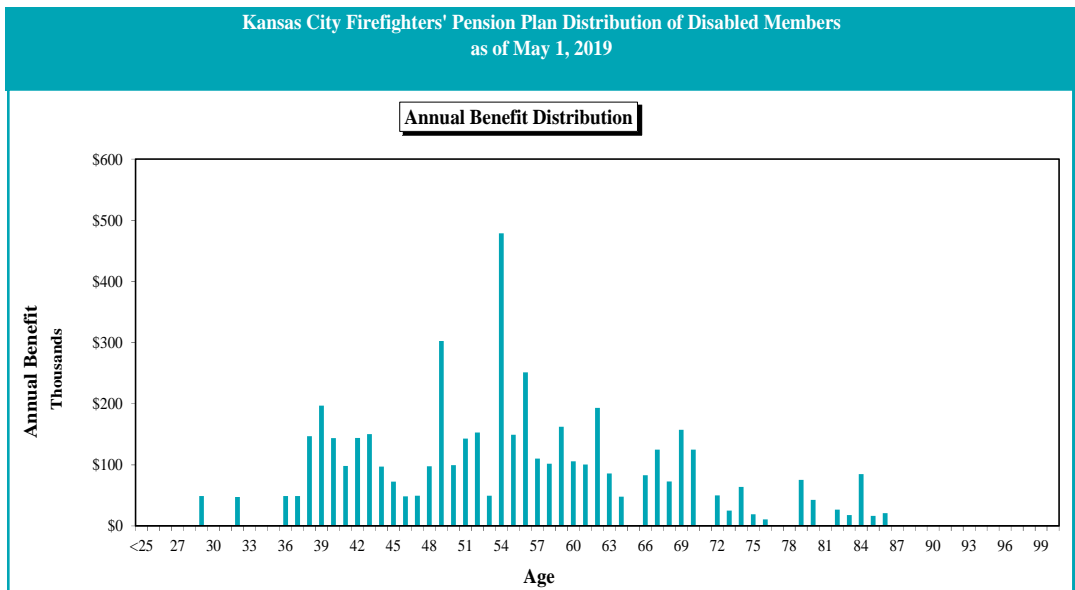


**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension Plan Distribution of Disabled Members as of May 1, 2019								
Age	Count	Annual Benefit	Age	Count	Annual Benefit	Age	Count	Annual Benefit
<25	0	\$0	57	2	\$110,050	89	0	\$0
25	0	0	58	2	101,787	90	0	0
26	0	0	59	3	162,347	91	0	0
27	0	0	60	2	105,570	92	0	0
28	0	0	61	2	100,586	93	0	0
29	1	48,946	62	5	193,059	94	0	0
30	0	0	63	2	85,960	95	0	0
31	0	0	64	1	48,114	96	0	0
32	1	47,520	65	0	0	97	0	0
33	0	0	66	2	83,210	98	0	0
34	0	0	67	3	124,769	99	0	0
35	0	0	68	2	72,768	100	0	0
36	1	48,946	69	5	157,537	101	0	0
37	1	49,083	70	3	124,773	102	0	0
38	3	146,890	71	0	0	103	0	0
39	4	196,772	72	1	49,968	104	0	0
40	3	143,738	73	1	25,223	105	0	0
41	2	98,029	74	2	63,741	106	0	0
42	3	143,995	75	1	19,431	107	0	0
43	3	150,120	76	1	10,570	108	0	0
44	2	97,233	77	0	0	109	0	0
45	2	72,499	78	0	0	110	0	0
46	1	48,559	79	3	75,639	111	0	0
47	1	49,401	80	2	42,608	112	0	0
48	2	97,693	81	0	0	113	0	0
49	6	302,457	82	1	26,779	114	0	0
50	2	99,411	83	1	17,737	115	0	0
51	3	143,095	84	4	84,709	116	0	0
52	3	152,846	85	1	16,420	117	0	0
53	1	49,572	86	1	20,859	118	0	0
54	9	478,747	87	0	0	119	0	0
55	3	149,166	88	0	0	120	0	0
56	5	251,544						
Totals							115	\$4,990,476

The above counts exclude 288 persons who elected disability retirement after becoming eligible for voluntary retirement.



**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX A – MEMBERSHIP INFORMATION

Kansas City Firefighters' Pension System Change in Plan Membership							
Tier 1							
Vested							
	Actives	Terminations	Refund Due	Disabilities	Retirees	Beneficiaries*	Total
May 1, 2018	787	7	5	108	570	246	1,723
New Entrants	0	0	0	0	0	0	0
Rehires	2	(1)	(1)	0	0	0	0
Vested Terminations	(2)	2	0	0	0	0	0
Terminated with Refund Due	0	0	0	0	0	0	0
Return of Contributions	(2)	0	(4)	0	0	0	(6)
Disabilities	(8)	0	0	8	0	0	0
Retirements	(16)	0	0	0	16	0	0
Deaths	0	0	0	(3)	(16)	(14)	(33)
New Survivor	0	0	0	0	0	15	15
Benefit Ceased	0	0	0	0	0	0	0
Miscellaneous Adjustments	(5)	0	0	0	0	0	(5)
May 1, 2019	756	8	0	113	570	247	1,694
Tier 2							
Vested							
	Actives	Terminations	Refund Due	Disabilities	Retirees	Beneficiaries*	Total
May 1, 2018	194	0	1	0	0	0	195
New Entrants	44	0	3	0	0	0	47
Rehires	0	0	0	0	0	0	0
Vested Terminations	0	0	0	0	0	0	0
Terminated with Refund Due	(4)	0	4	0	0	0	0
Return of Contributions	0	0	0	0	0	0	0
Disabilities	(2)	0	0	2	0	0	0
Retirements	0	0	0	0	0	0	0
Deaths	0	0	0	0	0	0	0
New Survivor	0	0	0	0	0	0	0
Benefit Ceased	0	0	0	0	0	0	0
Miscellaneous Adjustments	5	0	0	0	0	0	5
May 1, 2019	237	0	8	2	0	0	247
Total							
Vested							
	Actives	Terminations	Refund Due	Disabilities	Retirees	Beneficiaries*	Total
May 1, 2018	981	7	6	108	570	246	1,918
New Entrants	44	0	3	0	0	0	47
Rehires	2	(1)	(1)	0	0	0	0
Vested Terminations	(2)	2	0	0	0	0	0
Terminated with Refund Due	(4)	0	4	0	0	0	0
Return of Contributions	(2)	0	(4)	0	0	0	(6)
Disabilities	(10)	0	0	10	0	0	0
Retirements	(16)	0	0	0	16	0	0
Deaths	0	0	0	(3)	(16)	(14)	(33)
New Survivor	0	0	0	0	0	15	15
Benefit Ceased	0	0	0	0	0	0	0
Miscellaneous Adjustments	0	0	0	0	0	0	0
May 1, 2019	993	8	8	115	570	247	1,941

*Widows, QDROs, and Children



**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

1. Net Investment Return

7.25% net of investment fees, including inflation at 2.50%

2. Mortality Rates

Non-annuitant mortality: RP-2000 Combined Healthy Non-Annuitant Mortality Table projected using a modified Scale MP-2015 on a generational basis.

Healthy annuitant mortality: RP-2000 Combined Healthy Annuitant Mortality Table set forward one year for males and females, projected using a modified Scale MP-2015 on a generational basis.

Disabled annuitant mortality: RP-2000 Combined Disabled Mortality Table projected using a modified Scale MP-2015 on a generational basis.

Modified Projection Scale: Modified Scale MP-2015 using the Society of Actuaries' model implementation tool with rates converging to the ultimate rate in 2019 (instead of 2029) and an ultimate rate improvement of 0.85% (instead of 1.0%) up to age 85 decreasing to 0.7% (instead of 0.85%) at age 95.

3. Percentage of Deaths that are Duty Related

5.00%

4. Disability Rates

Disability Rates before Retirement	
Age	Disability*
20 - 29	0.01%
30 - 34	0.15%
35 - 39	0.30%
40 - 44	0.50%
45 - 49	1.00%
50 - 64	0.50%
65 and up	---

** Disability rates are set to zero once 25 years of service is earned for Tier 1 members and 27 years of service is earned for Tier 2.*

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

5. Percentage of Disability Retirements that are Duty Related

Disability Retirement Rates (Duty Related)	
Age	Annual Rate
20 - 29	95.0%
30 – 34	90.0%
35 – 44	85.0%
45 and up	80.0%

6. Termination Rates

Termination Rates before Retirement Termination*		
Service	Tier 1	Tier 2
0	3.00%	3.00%
1	2.75%	2.75%
2	2.45%	2.45%
3	2.15%	2.15%
4	1.85%	1.85%
5	1.55%	1.55%
6	1.40%	1.40%
7	1.32%	1.32%
8	1.24%	1.24%
9	1.16%	1.16%
10	1.08%	1.08%
11	1.00%	1.00%
12	0.92%	0.92%
13	0.84%	0.84%
14 – 24	0.75%	0.75%
25 – 26	---	0.75%
27 and up	---	---

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

7. Retirement Rates for Active Employees

Years of Service	Rates of Active Employees	
	Tier 1	Tier 2
25	10.00%	---
26	10.00	---
27	10.00	10.00%
28	10.00	10.00
29	20.00	20.00
30	27.50	27.50
31	35.00	35.00
32	35.00	35.00
33	35.00	35.00
34	35.00	35.00
35 years, or age 65 if earlier	100.00	100.00

8. Retirement Age for Inactive Vested Members

50

9. Unknown Data for Members

Same as those exhibited by members with similar known characteristics

10. Percent Married

80% of active male participants and 50% for active female participants

11. Age of Spouse

Males three-years older than females

12. Eligible Children

None

13. Administrative Expenses

0.45% of payroll is added to the normal cost of the system for expected administrative expenses.

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

14. Salary Increase

Total Wage Growth: 3.00%, including inflation at 2.50%. Total assumed salary increase including step and promotional increases are based upon years of service and shown in the table below.

Service	Rate
0	8.00%
1	7.70%
2	7.40%
3	7.10%
4	6.80%
5	6.50%
6	6.20%
7	5.90%
8	5.60%
9	5.30%
10	5.00%
11	4.85%
12	4.70%
13	4.55%
14	4.40%
15	4.25%
16	4.10%
17	3.95%
18	3.80%
19	3.65%
20 to 24	3.50%
25 and up	3.00%

15. Cost-of-Living Adjustments for Tier 2 Members

For purposes of valuing future Cost-of-Living Adjustments for Tier 2 members, it is assumed that the percentage increase in the Consumer Price Index will equal or exceed 2.5% and that the funded ratio will equal or exceed 80% at the time that such adjustments would be applied.

16. Interest on Employee Contributions

3.00% per year, compounded annually

17. Change in Assumptions

None

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

B. Rationale for Assumptions

1. Economic Assumptions

The investment return assumption of 7.25% was selected based upon an analysis that included (a) capital market assumptions provided by the investment consultant, (b) the asset allocation of the fund, and (c) investment return assumptions of other public retirement systems.

The inflation assumption of 2.5% was selected based upon an analysis that included (a) input from the investment consultant, (b) historical inflation as measured by the Consumer Price Index, and (c) implied inflation in long-term government bonds.

The long-term wage growth assumption of 3.0% was based upon the inflation assumption of 2.5% plus a real wage growth assumption of 0.5% that was derived from an analysis of historical increases in Social Security Average earnings.

2. Demographic Assumptions

The demographic assumptions are based upon the most recent experience study covering the period 2011-2016.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

C. Actuarial Methods

1. Funding Method

Entry Age Normal Actuarial Cost Method: Entry age is the age at the time the participant commenced employment. Normal cost and actuarial liability are calculated on an individual basis and are allocated by salary, with normal cost determined as if the current benefit accrual rate had always been in effect.

2. Actuarial Value of Assets

A preliminary actuarial value of assets is calculated as the sum of the beginning of the year actuarial value of assets, the net new money, and the expected return on an actuarial basis. The gains and losses over the last four years are recognized over the next five-year period. The gain or loss of each year is the excess of market value of assets over the preliminary value of assets, minus the sum of the unrecognized gains and losses from each of the four years. Finally, an adjustment is made so that the final actuarial value of assets is at least 80% but no more than 120% of the market value.

3. Amortization of Unfunded Actuarial Liability/(Surplus)

- i. Board Funding Policy: 30-year layered amortization method – level percent of pay. Under the layered approach, the May 1, 2008 unfunded actuarial liability is written down over a 30-year period and all future changes to the unfunded actuarial liability establish new 30-year amortization periods. Payroll is expected to increase 3.0% per year.
- ii. City Contribution Policy: Under the Ordinance, the City's contribution will be based on a closed 30-year amortization period from May 1, 2014, level percent of pay. Payroll is expected to increase 3.0% per year.
- iii. Contribution rate changes as a result of revised assumptions adopted as of May 1, 2017 are phased-in over five years.

4. Changes in Methods

None

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
ACTUARIAL VALUATION AS OF MAY 1, 2019**

APPENDIX C – SUMMARY OF PLAN PROVISIONS

1. Plan Year

May 1 through April 30.

2. Membership

Tier 1: All Firefighters hired prior to April 20, 2014 become members as a condition of employment.

Tier 2: All Firefighters hired on or after April 20, 2014 become members as a condition of employment.

Membership begins on the first day of employment.

3. Creditable Service

Total creditable service is defined as the sum of the service as a Firefighter after becoming a member after July 1, 1953, plus any service earned prior to July 1, 1953, if continuous.

4. Contributions

Pension System: Members contributed 9.55% of base salary prior to April 20, 2014. Effective April 20, 2014, the member contribution rate increased to 10.55%. For the year beginning May 1, 2019, the City is contributing 32.54% of payroll, which is the actuarially determined Board contribution rate for the prior year. Future City contributions will be determined through the City's budgeting process.

Interest on Employee Contributions: Determined by the Board of Trustees, not to exceed 3.00%, compounded annually.

Health Insurance Subsidy: Effective January 1, 2001, the City contribution is 2% of base salary and the employee contribution is 1% of base salary.

Contributions and benefits for the Health Insurance Subsidy are separately accounted for under the Plan. The assets, liabilities, contributions, and benefits of the Health Insurance Subsidy are excluded from this valuation.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

5. Voluntary Retirement

Eligibility requirements: Tier 1: 25 years of service.
Tier 2: 27 years of service

Amount: The base pension is 2.5% of average final compensation per year of creditable service to a maximum of 80%. Average final compensation is defined as the average of the two highest years of base compensation in the last 10 years. The minimum retirement benefit is \$600 per month.

6. Duty Disability Benefit

Age Requirement: None

Service Requirement: None

Amount: The pension is 62.5% of average final compensation at disability with a minimum 62.5% of the current maximum salary payable to the rank of a firefighter. The current maximum monthly salary as of May 1, 2019 is \$6,463.

7. Non-duty Disability

Age Requirement: Less than 65

Service Requirement: 10 years of service

Amount: The pension is 25% of the average final compensation plus 2.5% of average final compensation per year of creditable service in excess of 10 years, not to exceed 80% of average final compensation, with a minimum of \$600 per month.

8. Vesting

Age Requirement: None

Service Requirement: 10 years of service

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

Amount: 2.5% of average final compensation per year of creditable service, not to exceed 62.5% of average final compensation, payable at age 50.

If the employee dies in a deferred status, before age 50, the beneficiary receives a lump-sum equal to member contributions with interest. If such death occurs after age 50, the widow and children receive the same benefits as for pre-retirement non-duty death, but reduced by the ratio of the member's service to 25 years if in Tier 1, and 27 years if in Tier 2.

9. Withdrawal (Refund) Benefits

Age Requirement: None

Service Requirement: Less than 10 years of creditable service

Amount: If an employee terminates before becoming eligible for a deferred pension, he or she receives a return of member contributions with interest. This benefit is reduced by a service charge of 10%, 8%, 6%, 4% or 2% if employee withdraws with less than one year, two years, three years, four years, or five years of employment respectively.

10. Pre-Retirement Duty Death Benefits

Age Requirement: None

Service Requirement: None

Funeral Benefit A lump-sum payment of \$2,000

Surviving Spouse Benefit: 100% of the accrued pension is paid with a minimum of 62.5% of the member's average final compensation. The minimum benefit payable is 62.5% of the maximum salary payable to the rank of a firefighter. The current maximum monthly salary as of May 1, 2019 is \$6,463. The surviving spouse's benefit for spouses of active firefighters eligible for a service pension is 100% of the regular pension reduced for the election of optional 100% joint and survivor coverage. The minimum benefit is \$275 per month.

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

- Child's Benefit:** If there is no surviving spouse or the spouse dies or remarries, the spouse's benefit is divided equally to the children and paid until age 18 (or 21 if a student). If a surviving spouse exists, \$100 per month is paid until age 18 (or age 21 if a student).
- Return of Contribution:** A return of accumulated contributions and interest is guaranteed. If there is no surviving spouse or dependent children the accumulated contributions and interest or the unpaid balance thereof shall be paid to the Estate or to a named beneficiary.

11. Pre-Retirement Non-duty Death Benefits

- Age Requirement:** None
- Service Requirement:** None
- Funeral Benefit:** A lump-sum payment of \$2,000
- Surviving Spouse Benefit:** 50% of the accrued pension is paid with a minimum of 25% of average final compensation payable for the life of the surviving spouse. The surviving spouse's benefit for active firefighters eligible for a voluntary pension is 100% of the regular pension, reduced for the election of optional 100% joint and survivor coverage. The minimum benefit is \$275 per month.
- Child's Benefit:** If no surviving spouse or the spouse dies, the spouse's benefit is divided equally to the children and paid until age 18 (or 21 if a student). If a surviving spouse exists, \$100 per month is paid until age 18 (or 21 if a student).
- Return of Contributions:** A return of accumulated contributions and interest is guaranteed. If there is no surviving spouse or dependent children the accumulated contributions and interest or the unpaid balance thereof shall be paid to the Estate or to a named beneficiary.

12. Post-Retirement Death Benefit

- Age Requirement:** None
- Service Requirement:** None
- Amount:** If married to the same person at retirement and death, pension benefits are paid in the form of a Joint and 50% Survivor annuity

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APPENDIX C – SUMMARY OF PLAN PROVISIONS

or in any other available optional form elected by the member and spouse in an actuarially equivalent amount, not less than 25% of the retiree's final average compensation per month. The minimum benefit is \$275. Payments equal to the amount of the member's accumulated contributions and interest are guaranteed. In addition, a lump-sum funeral benefit of \$2,000 is paid.

13. Cost-of-Living Adjustment (COLA)

Tier 1: An increase of 3.00% of the original pension will be made annually. This does not apply to funeral benefits.

Tier 2: COLA will only be payable if the prior year's funding ratio is greater than or equal to 80% and will be equal to the percentage increase in the consumer price index, up to a maximum of 2.50%, payable at the 27th anniversary of date of hire.

Members must retire on or before January 1, in order to receive a COLA in the next year.

14. Changes since Last Valuation

None

**CITY OF KANSAS CITY, MISSOURI FIREFIGHTERS' PENSION SYSTEM
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APPENDIX D – GLOSSARY OF TERMS

1. Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

2. Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a Normal Cost and an Actuarial Liability.

3. Actuarial Gain/(Loss)

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

4. Actuarial Liability

The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

5. Actuarial Present Value (Present Value)

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe \$100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you will not be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is:

$$\begin{array}{ccccccc} \text{Amount} & & \text{Probability of} & & \text{1/(1+Investment Return)} & & \\ & & \text{Payment} & & & & \\ & & (1 - .01) & \times & 1/(1+.1) & = & \$90 \\ \$100 & \times & & & & & \end{array}$$

6. Actuarial Valuation

The determination, as of a specified date, of the Normal Cost, Actuarial Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

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APPENDIX D – GLOSSARY OF TERMS

7. Actuarial Value of Assets

The value of cash, investments, and other property belonging to a pension plan as used by the actuary for the purpose of an Actuarial Valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

8. Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

9. Amortization Payment

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

10. Entry Age Normal Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages.

11. Funded Percentage

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

12. Investment Return Assumption

The assumed interest rate used for projecting dollar related values in the future.

13. Mortality Table

A set of percentages which estimate the probability of death at a particular point in time. Typically, the rates are annual and based on age and sex.

14. Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

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APPENDIX D – GLOSSARY OF TERMS

15. Projected Benefits

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

16. Unfunded Actuarial Liability

The excess of the Actuarial Liability over the Actuarial Value of Assets.