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Police Retirement System of Kansas City, Missouri

Actuarial Valuation Report
as of April 30, 2019

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TABLE OF CONTENTS

Cavanaugh Macdonald
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September 13, 2019

The Board of Trustees
Police Retirement System of Kansas City, Missouri
9701 Marion Park Drive B
Kansas City, MO 64137

Dear Members of the Board:

At your request, we have performed the annual actuarial valuation of the Police Retirement System of Kansas City, Missouri as of April 30, 2019 for the purpose of determining the actuarial required contribution for the fiscal year ending in 2021. The major findings of the valuation are contained in this report, which reflects the benefit provisions in effect as of April 30, 2019. There were no changes in the benefit provisions or actuarial methods since the prior valuation, but there were several changes to the actuarial assumptions used in this valuation as a result of the completion of an experience study in December 2018. All of the recommended assumptions from the experience study were adopted by the Board of Trustees and are first used in this valuation. The net impact of the assumption changes was an increase in both the unfunded actuarial accrued liability and the actuarial contribution.

In preparing this report, we relied, without audit, on information (some oral and some written) supplied by the System's staff. This information includes, but is not limited to, plan provisions, member data and financial information. Although we found this information to be reasonably consistent and comparable with information reported in prior years, the data has not been audited by Cavanaugh Macdonald. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for the System have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer our best estimate of anticipated experience affecting the System.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provision or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. While we find the actuarial assumptions to be reasonable, the Board of Trustees has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix C.

Actuarial computations presented in this report are for purposes of determining the recommended funding amounts for the System. The calculations in the enclosed report have been made on a basis consistent with our understanding of the System's funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes. For example, actuarial computations for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standards No. 67 and No. 68 are provided in separate reports.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

We would like to express our appreciation to the System's staff, who gave substantial assistance in supplying the data on which this report is based.

We herewith submit the following report and look forward to discussing it with you.

Respectfully submitted,

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior Actuary

OVERVIEW

This report presents the results of the actuarial valuation of the Police Retirement System of Kansas City, Missouri as of April 30, 2019. The primary purposes of performing a valuation are to:

- Determine the employer contribution required to fund the System on an actuarial basis,
- Disclose asset and liability measures as of the valuation date,
- Assess and disclose the key risks associated with funding the System,
- Determine the experience of the System since the last valuation date, and
- Analyze and report on trends in System contributions, assets, and liabilities over the past several years.

The benefit provisions and actuarial methods are unchanged from the last actuarial valuation. However, there were several changes to the actuarial assumptions used in this valuation as a result of the completion of an experience study in December 2018. All of the recommended changes from the experience study were adopted by the Board of Trustees and are first used in this valuation. They include:

- Decreasing the investment return assumption from 7.50% to 7.45%. Contingent on Board approval, the assumption will decrease by 0.05% per year until reaching the ultimate rate of 7.25% in 2023;
- Decreasing the price inflation assumption from 3.00% to 2.50%;
- Decreasing the general wage increase assumption from 3.75% to 3.00%;
- Decreasing the payroll growth assumption from 3.75% to 3.00%;
- Increasing the administrative expense assumption from 0.40% to 0.60%;
- Adjusting the retirement rates to better reflect observed experience;
- Changing the mortality improvement scale prospectively from Scale AA to the ultimate projection scale of MP-2017;
- Adjusting the disability rates to better reflect observed experience and increasing the percentage of disabilities that are assumed to be duty-related; and
- Adjusting termination rates to better reflect observed experience.

The April 30, 2019 valuation results, including the calculation of the actuarial value of assets, were first prepared using the same set of assumptions as were used in the April 30, 2018 valuation (including a 7.50% investment return assumption). The liability results and actuarial contribution rate were then recalculated using the new set of assumptions, adopted by the Board. The changes to the actuarial assumptions increased the actuarial accrued liability by $6.5 million and the employer contribution amount for the fiscal year 2021 by $1.0 million (see table on the following page). Although a number of assumptions were changed, the most significant cost impact was due to lowering the investment return assumption from 7.50% to 7.45%. The impact of the assumption changes on the April 30, 2019 valuation results is summarized in the table on the following page ($ millions):

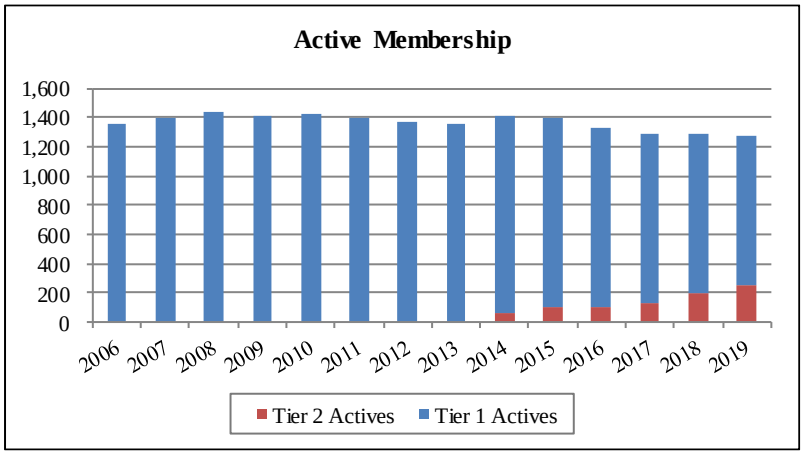
	Previous Assumptions	New Assumptions	Difference
Actuarial Accrued Liability (AAL)	$1,204.7	$1,211.2	$6.5
Actuarial Value of Assets (AVA)	913.9	913.9	0.0
Unfunded AAL (UAAL)	$ 290.8	$ 297.3	$6.5
Funded Ratio	76%	75%	(1%)
Total Normal Cost	25.83%	25.25%	(0.58%)
Member Contribution Rate	(11.55%)	(11.55%)	0.00%
Amortization of UAAL	16.90%	18.90%	2.00%
Employer Contribution Rate	31.18%	32.60%	1.42%
Employer Contribution for FY 2021	$31.8	$32.8	$1.0

The valuation results provide a "snapshot" view of the System's financial condition on April 30, 2019. The unfunded actuarial accrued liability (UAAL) increased from the last valuation by $22 million (from $275 million to $297 million). The investment return on the market value of assets for fiscal year 2019 was 4.0%, but due to the asset smoothing method and deferred investment experience, the return on the actuarial value of assets was 5.8%. Since this is less than the assumed rate of return (7.5% for FY 2018), there was an experience loss on assets of $15.2 million. Net demographic experience resulted in a gain of $3.6 million on liabilities, primarily due to cost of living increases that were lower than expected based on the assumption. A detailed analysis of the change in the UAAL from April 30, 2018 to April 30, 2019 is shown on page 5.

MEMBERSHIP

As the graph on the following page shows, the number of active members in the valuation has generally decreased over the past ten years. When the number of active members declines, the actuarial contribution rate is negatively impacted. While the normal cost rate is unaffected, the contribution rate for the amortization of the unfunded actuarial accrued liability assumes that covered payroll will increase 3.00% each year (3.75% in 2018). A decline in the number of active members usually results in lower covered payroll than the assumed increase. As a result, the UAAL amortization payment is divided by a smaller payroll amount and the UAAL contribution rate increases. However, the dollar amount of the UAAL payment is unchanged. The number of active members in the 2019 valuation decreased slightly, from 1,284 in the 2018 valuation to 1,279 in the current valuation.

The 2013 session of the Missouri General Assembly passed legislation that modified the benefit provisions for members hired on or after August 28, 2013 (called Tier II). As a result, the normal cost rate for this group of members is lower than the normal cost rate for members hired before that date. As of April 30, 2019, there were 258 members in Tier II out of a total of 1,279 active members (about 20% of total actives). The Tier II portion of total estimated payroll was slightly lower at 14% of total payroll. Over time, as the Tier I members retire or leave covered employment and are replaced by members covered by the Tier II benefit structure, the normal cost rate for the System is expected to decline. How quickly the decrease unfolds depends on the turnover in the active group and the number of active members. To the extent the size of the active group declines, it will take longer for the cost savings to materialize. The decrease in the number of new hires in recent years has reduced the number of members in Tier II and the related cost savings compared to the expected results when the legislation was passed.



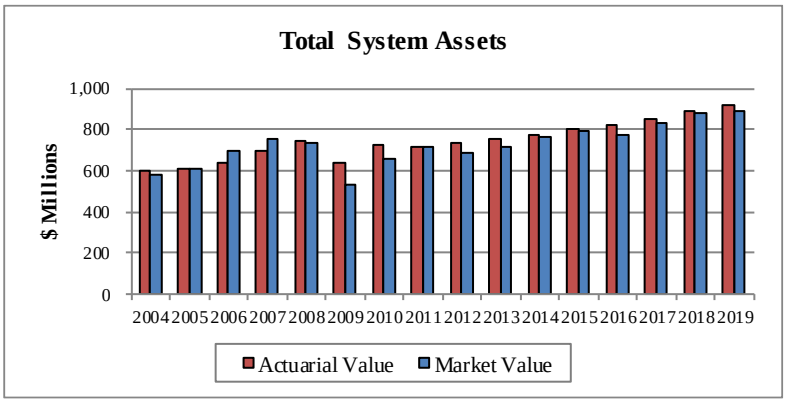
ASSETS

As of April 30, 2019, the System had total assets, when measured on a market value basis, of $891 million. This was an increase of $12 million from the April 30, 2018 value of $879 million. The market value of assets is not used directly in the calculation of the actuarial contribution and funded status. An asset valuation method which smooths the effect of market fluctuations is used to determine the value of assets used in the valuation, called the "actuarial value of assets." The current smoothing method recognizes the difference between the actual and expected return on the market value of assets evenly over a five-year period.

A summary of the asset experience follows:

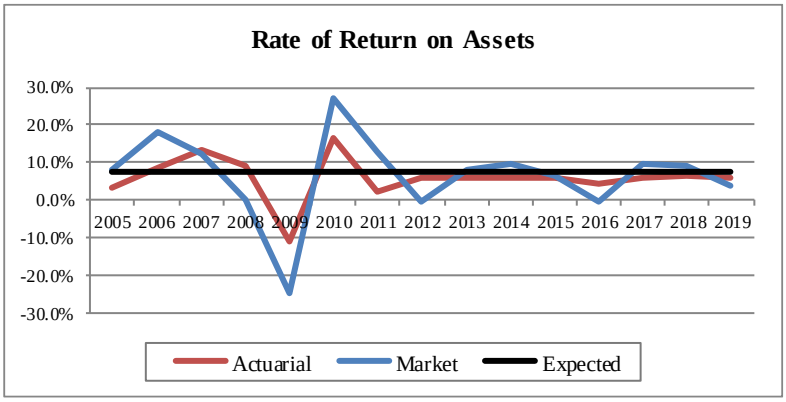
	Market Value ($M)	Actuarial Value ($M)
Assets, April 30, 2018	$879.5	$886.7
• City and Member Contributions	43.7	43.7
• Benefit Payments and Refunds	(66.1)	(66.1)
• Administrative Expenses	(0.8)	(0.8)
• Investment Income (net of expenses)	34.9	50.4
Assets, April 30, 2019	$891.2	$913.9
Estimated Net Rate of Return	4.0%	5.8%

The annualized dollar-weighted rate of return, measured on the market value of assets, was 4.0%. However, due to the use of an asset smoothing method, the rate of return on the actuarial value of assets was 5.8%. Since the return on the actuarial value of assets was less than 7.5% (the assumed rate of return for 2018) there was an actuarial loss of about $15.2 million, which increased the unfunded actuarial accrued liability. Historical asset information is shown in the following two graphs:



The actuarial value of assets has been both above and below the market value during this period. This is to be expected when using an asset smoothing method.

Note: Results for years before 2011 were prepared by the prior actuary.



Rates of return on the market value of assets have been very volatile. The return on actuarial value of assets has lagged the assumed rate of return in the last decade.

Note: Results for years before 2011 were prepared by the prior actuary.

LIABILITIES

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future employer normal costs or member contributions. The difference between this liability and the asset value at the same date is referred to as the unfunded actuarial accrued liability (UAAL), if the actuarial accrued liability exceeds the asset value. The unfunded actuarial accrued liability will be reduced if the employer's contributions exceed the employer normal cost for the year, after allowing for interest on the previous balance of the unfunded actuarial accrued liability. Benefit improvements, experience gains and losses, and changes in actuarial assumptions and methods will also impact the total actuarial accrued liability and the unfunded portion thereof.

The Actuarial Accrued Liability and Unfunded Actuarial Accrued Liability for the System as of April 30, 2019 are:

Actuarial Accrued Liability	$1,211,216,028
Actuarial Value of Assets	(913,895,177)
Unfunded Actuarial Accrued Liability	$ 297,320,851

Between April 30, 2018 and April 30, 2019, the change in the unfunded actuarial accrued liability for the System was as follows (in millions):

	$ millions
UAAL, April 30, 2018	275.1
• effect of contributions less than actuarial rate	0.0
• expected change due to amortization method	5.2
• loss from investment return on actuarial assets	15.2
• demographic experience[1]	(3.6)
• assumption changes	6.5
• all other experience	(1.1)
UAAL, April 30, 2019	297.3

[1] Liability gain is 0.29% of total actuarial accrued liability

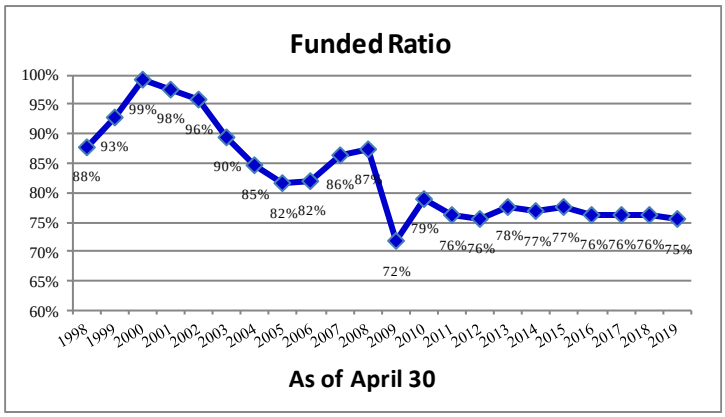
The net experience for the plan year was a loss of $11.7 million, the combined result of an actuarial loss of $15.2 million on System assets (actuarial value) and a liability gain of $3.6 million. The liability gain was primarily the result of cost of living increases that were lower than expected, based on the assumption.

Analysis of the unfunded actuarial accrued liability strictly as a dollar amount can be misleading. Another way to evaluate the unfunded actuarial accrued liability and the progress made in its funding is to track the funded status, the ratio of the actuarial value of assets to the actuarial accrued liability. This information for recent years is shown in the following table (in millions). Historical information is shown in the graph on the following page.

	4/30/2015	4/30/2016	4/30/2017	4/30/2018	4/30/2019
Actuarial Value of Assets ($M)	$803.7	$821.9	$853.3	$886.7	$913.9
Actuarial Accrued Liability ($M)	$1,037.3	$1,076.8	$1,118.9	$1,161.8	$1,211.2
Funded Ratio (Assets/Liability)	77%	76%	76%	76%	75%

The funded ratio does not indicate whether or not the System could settle current liabilities, nor does it, by itself, indicate what the future funding requirements will be. In addition, if the market value of assets was used, the funded ratios would be different.

The following graph illustrates the funded ratio over the last 20+ years. The funded ratio was near 100% in the early years of this period, but has declined due to benefit changes, assumption changes, actual experience that was less favorable than expected based on the actuarial assumptions, and contributions below the actuarial rate for many years. Over the more recent past, the funded ratio has stabilized and remained around 75%.



The decline in the funded ratio since 2000 is a reflection of actual contributions significantly below the actuarial required contribution, coupled with investment returns that were lower than the actuarial assumed rate. The System's funded status will continue to be heavily dependent on actual investment returns in the future as well as the City's contribution policy. Plan changes passed by the 2013 Missouri General Assembly, which included changes to both the benefit structure and the City contributions, are expected to improve the System's funded status over the long-term, if all actuarial assumptions are met. While these changes have improved the outlook for the long-term financial health of the System, the actual investment returns will continue to be a critical factor in the health of the System over time. Given the volatility inherent in the investments of the portfolio, there is a wide range of potential expected returns in any given year so the funded ratio and the actuarial contribution rate should be expected to change, perhaps significantly from year to year.

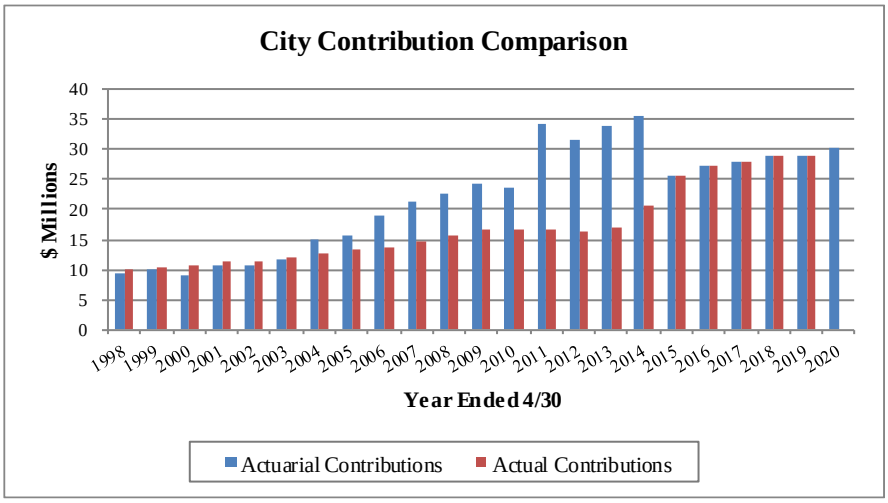
CONTRIBUTION RATES

Generally, contributions to the System consist of:

- A "normal cost" for the portion of projected liabilities allocated to service of members during the year following the valuation date, by the actuarial cost method, and administrative expenses,
- An "unfunded actuarial accrued liability contribution" for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

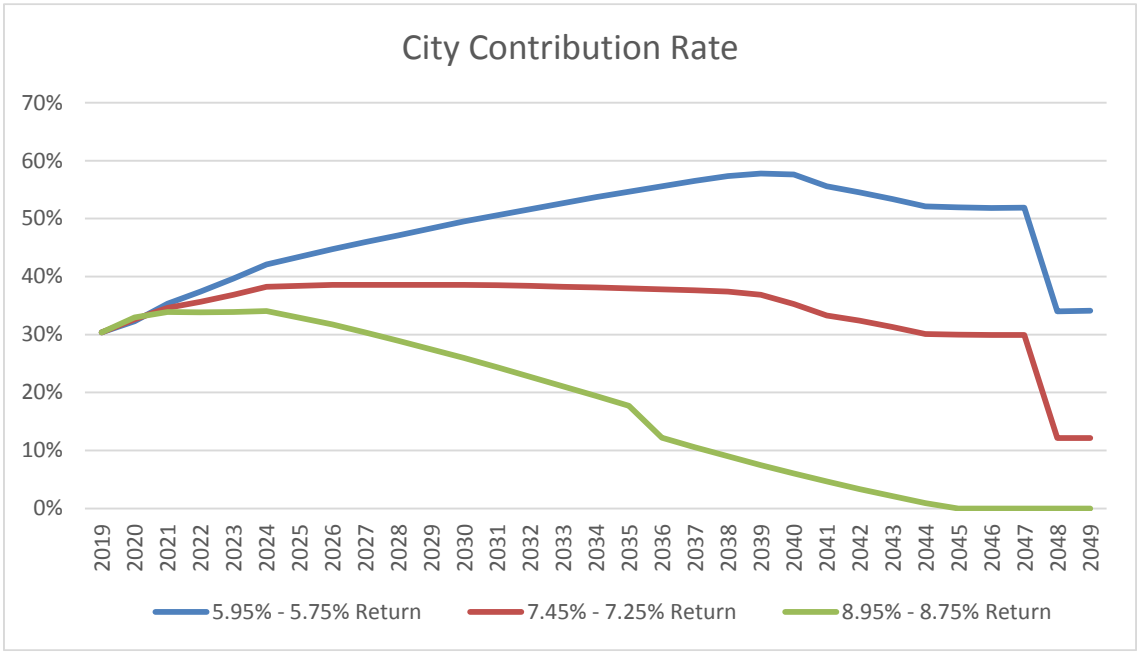
Contribution rates are computed with the objective of developing costs that are level as a percentage of covered payroll over time. The actuarial contribution rate for fiscal year end 2021 is computed based on the results of the April 30, 2019 actuarial valuation. The City's actuarial contribution rate equals the System's normal cost, including administrative expenses, and an amortization payment on the unfunded actuarial accrued liability. The City's actuarial contribution rate for FY 2021 is 32.60% of payroll (normal cost of 13.70% and an UAAL payment of 18.90%) or $32,797,288.

The following graph shows the actuarial contributions for the City compared to the amount actually contributed by the City in each year. With the legislative changes in 2013, the City has been contributing the full amount of the actuarially determined contribution. Effective with the April 30, 2017 valuation, the UAAL at April 30, 2017 is amortized over a closed 30-year period (28 years remaining as of April 30, 2019). Any new unfunded actuarial accrued liability generated as a result of actuarial experience in subsequent years or changes due to new assumptions is layered and amortized over a new, closed 20-year period. Under this funding policy, the System's funded ratio is expected to slowly improve from its current level and ultimately reach full funding at the end of the amortization period.



FINANCIAL PROJECTIONS

The April 30, 2019 valuation results indicate the System's financial status at a single point in time, but do not provide any insight into future trends in contributions or funded status. Projections that model a change in one key variable can provide insight into the longer term trend of projected City contributions; the funded status (ratio of actuarial assets over liabilities); and the unfunded actuarial accrued liability (actuarial accrued liability minus actuarial assets). Certain projections, using investment return scenarios selected for purposes of sensitivity analysis, are included in section 6 of this report. To illustrate the importance of actual investment returns, the following graph is included here. Please note that a 1.50% difference in the actual versus expected investment return over thirty years is a material difference and the significant impact on the City's contribution rate is not unexpected.



COMMENTS

As of April 30, 2019, the actuarial accrued liability was $1.211 billion and the actuarial value of assets was $914 million, resulting in an unfunded actuarial accrued liability (UAAL) of $297 million. The funded ratio decreased slightly from 76% in the 2018 valuation to 75% in 2019, and the UAAL increased by $22 million as a result of actual experience during FY 2019, as well as assumption changes.

Retirement plans use several mechanisms to create stability in the contribution rates. These mechanisms include an asset smoothing method, which averages the peaks and valleys of investment returns, and the amortization of actuarial gains or losses, including investment experience, over a number of years. The System utilizes an asset smoothing method that recognizes the difference between actual and expected return on the market value of assets evenly over a five-year period. The return on the market value of assets was 4.0%, but due to the asset smoothing method only part of the FY 2019 investment experience is recognized in the current valuation along with a portion of the investment experience in the prior four years. As a result, the return on the actuarial value of assets was 5.8%, which resulted in an increase in the UAAL since it was less than the assumed rate of return for FY 2018 of 7.5%. There was an actuarial gain from actual demographic experience that was more favorable than expected, based on the actuarial assumptions, largely due to actual cost of living increases that were lower than assumed.

A typical retirement plan faces many different risks. The term "risk" is most commonly associated with an outcome with undesirable results. However, in the actuarial world risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. Actuarial Standard of Practice Number 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions. Risk evaluation is an important part of managing a defined benefit plan. Please see Section 7 of this report for an in-depth discussion of the specific risks facing the Police Retirement System of Kansas City, Missouri.

The long-term financial health of this retirement system is heavily dependent on two key items: (1) investment returns and (2) contributions to the System. Over the last ten years, investment returns have been lower than the assumed rate of return and the actual contributions to the System have been below the actuarial contributions for part of that period. Beginning September 1, 2013, the City began to contribute the full dollar amount of the Actuarial Required Contribution as shown on Table 12. Based on the funding policy adopted by the Board in November, 2016, the UAAL at April 30, 2017 is amortized over a closed 30-year period (28 years remaining as of April 30, 2019). Any new unfunded actuarial accrued liability generated as a result of actuarial experience or assumption changes in subsequent years will be layered and amortized over a closed 20-year period. As a result, City contributions to the System will be sufficient to fully fund the UAAL over time and the System's funding status over the long-term is expected to improve.

The Board is currently evaluating the current Cost of Living Adjustment (COLA) Policy to determine if any changes are needed. Based on the Board's current policy, an *ad hoc* Cost of Living Adjustment (COLA) may be granted if the definition of "actuarial soundness," which requires at least one of the three following conditions, is met:

(1) The plan's funded ratio (actuarial value of assets/actuarial accrued liability), rounded to the nearest whole percentage, is 75% or greater.

(2) For each of the three most recently completed plan years, the plan has received a combination of employer and employee contributions that in total are, rounded to the nearest whole percentage, 90% or greater of the plan's total Actuarial Required Contributions.

(3) For at least three out of the last five completed plan years, the plan has received employer contributions that equal or exceed the plan's Actuarial Required Contribution Amount.

Based upon the results of the April 30, 2019 valuation (which indicates the funded ratio is 75% or greater), and the Board's current policy, an *ad hoc* COLA may be granted. However, there are other considerations the Board may want to evaluate before granting the COLA. These include:

- The scheduled decline in the investment return assumption will decrease the funded ratio over the next four years,
- Expected asset returns in the short-term (next 5 to 10 years) are expected to be significantly lower than the assumed rate of return which would cause the funded ratio to decline,
- There are currently net deferred investment losses (market value of assets is less than actuarial value) which will flow through the asset smoothing method over the next four years and decrease the funded ratio.

We have not reviewed any legal aspects related to granting the ad hoc COLA. We are not attorneys and cannot give legal advice on such issues. Therefore, we suggest that you review this policy with your legal counsel.

We conclude this Board Summary with the following exhibit which compares the principal results of the current and prior actuarial valuation.

SUMMARY OF PRINCIPAL RESULTS

1. MEMBER DATA	4/30/2019 Valuation	4/30/2018 Valuation	% Change
Number of:			
Active members			
- Tier 1	1,021	1,091	(6.4%)
- Tier 2	258	193	33.7%
- Total	1,279	1,284	(0.4%)
Retired Members and Beneficiaries	1,369	1,332	2.8%
Inactive Vested Members	38	33	15.2%
Total Members	2,686	2,649	1.4%
Annual Projected Salaries of Active Members	$ 97,674,929	$ 95,741,607	2.0%
Annual Retirement Payments for Retired Members and Beneficiaries*	$ 59,556,036	$ 56,724,656	5.0%
*Does not include supplemental benefits			
2. ASSETS AND LIABILITIES			
Total Actuarial Accrued Liability	$1,211,216,028	$1,161,788,502	4.3%
Market Value of Assets	891,225,734	879,496,868	1.3%
Actuarial Value of Assets	913,895,177	886,676,375	3.1%
Unfunded Actuarial Accrued Liability	$ 297,320,851	$ 275,112,127	8.1%
Funded Ratio (Actuarial Value)	75%	76%	(1.3%)
Funded Ratio (Market Value)	74%	76%	(2.6%)
3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL			
Total Normal Cost	25.25%	25.98%	(2.8%)
Member Contribution Rate	(11.55%)	(11.55%)	0.0%
Employer Normal Cost	13.70%	14.43%	(5.1%)
Amortization of Unfunded Actuarial Accrued Liability	18.90%	15.93%	18.6%
Employer Contribution Rate	32.60%	30.36%	7.4%
4. EMPLOYER CONTRIBUTION FOR FOLLOWING FISCAL YEAR	$ 32,797,288	$ 30,157,170	8.8%

SECTION 2 – SCOPE OF THE REPORT

This report, prepared at the request of the System's Board of Trustees, presents the results of the actuarial valuation of the Police Retirement System of Kansas City, Missouri as of April 30, 2019. There were no changes to the benefit provisions or the actuarial methods from those used in the prior valuation. However, there were several changes to the actuarial assumptions used in this valuation as a result of the completion of an Experience Study in December 2018.

Please pay particular attention to our cover letter, where the guidelines employed in the preparation of this report are outlined. We also comment on the sources and reliability of both the data and the actuarial assumptions upon which our findings are based. Those comments are the basis for our certification that this report is complete and accurate to the best of our knowledge and belief.

A summary of the findings, which result from this valuation, is presented in the previous section. Section 3 describes the assets and investment experience of the System. Sections 4 and 5 describe how the obligations of the System are to be met under the actuarial cost method in use. Section 6 includes 30-year financial projections of the System under various investment return scenarios. Section 7 discloses key maturity measurements and the key risks associated with funding the System. Section 8 includes other historical information.

This report includes several appendices:

- Appendix A Schedules of valuation data classified by various categories of members.
- Appendix B A summary of the current benefit structure, as determined by the provisions of governing law on April 30, 2019.
- Appendix C A summary of the actuarial methods and assumptions used to estimate liabilities and determine contribution rates.
- Appendix D A glossary of actuarial terms.

In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is April 30, 2019. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System (the present value of future expected benefit payments), which are generally in excess of assets. The actuarial process then leads to a method of determining the contributions needed by members and the employer in the future to balance the System assets and liabilities.

Market Value of Assets

The current market value represents the "snapshot" or "cash-out" value of System assets as of the valuation date. In addition, the market value of assets provides a basis for measuring investment performance from time to time. Table 1 is a comparison, at market values, of System assets as of April 30, 2019, and April 30, 2018, in total and by investment category. Table 2 summarizes the change in the market value of assets from April 30, 2018 to April 30, 2019.

Actuarial Value of Assets

Neither the market value of assets, representing a "cash-out" value of System assets, nor the book values of assets, representing the cost of investments, may be the best measure of the System's ongoing ability to meet its obligations.

To arrive at a suitable value of assets for the actuarial valuation, a technique for determining the actuarial value of assets is used which dampens swings in the market value while still indirectly recognizing market values. Under the current asset smoothing methodology, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. The method was implemented by resetting the actuarial value of assets at April 30, 2011 equal to the market value of assets.

TABLE 1

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

STATEMENT OF NET PLAN ASSETS AT MARKET VALUE

	Market Value	
	April 30, 2019	**April 30, 2018**
Cash & Equivalents	$17,846,973	$11,733,139
Receivables	3,947,517	2,662,495
Stocks:		
Common & Preferred Corporate	130,733,283	136,688,603
World Equities	127,619,491	133,627,879
Foreign	92,477,864	115,404,663
Bonds:		
U.S. Government	73,921,121	47,835,207
Corporate	92,137,574	81,377,562
Asset Backed Securities	5,145,659	6,132,050
Real Estate	125,751,726	119,561,923
Partnerships and Hedge Funds	223,989,003	226,726,806
Building and Other Property Used in Plan Operations	6,806	2,019
Total Assets	$893,577,017	$881,752,346
Accounts Payable	(2,351,283)	(2,255,478)
Net Assets Available for Benefits	$891,225,734	$879,496,868

TABLE 2

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

STATEMENT OF CHANGES IN NET ASSETS DURING YEAR ENDED APRIL 30, 2019

(Market Value)

1. Market Value of Assets as of April 30, 2018	$	879,496,868
2. Contributions:		
a. Members	$	11,412,617
b. City		29,083,743
c. City Supplemental Benefit		3,197,200
d. Miscellaneous		0
e. Total	$	43,693,560
3. Investment Income		
a. Interest and Dividends	$	21,110,150
b. Net Securities Lending Income		143,663
c. Investment Expenses		(5,232,551)
d. Net Appreciation (Depreciation) in Fair Value		18,894,758
e. Net Investment Income (Loss)	$	34,916,020
4. Deductions		
a. Refunds of Member Contributions	$	573,339
b. Benefits Paid:		
(1) Retirement Benefits		61,107,823
(2) City-paid Supplemental Benefit		3,197,200
(3) Death Benefits		26,000
(4) Partial Lump Sums		1,173,647
c. Administrative Expenses		802,705
d. Total	$	66,880,714
5. Net Change [2e] + [3e] - [4d]	$	11,728,866
6. Market Value of Assets as of April 30, 2019 [1] + [5]	$	891,225,734

TABLE 3

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

Under the current asset smoothing method, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. The method was implemented by resetting the actuarial value of assets at April 30, 2011 equal to the market value of assets.

	Plan Year End			
	4/30/2016	4/30/2017	4/30/2018	4/30/2019
1. Market Value of Assets, Beginning of Year	$ 793,880,318	$ 772,791,036	$ 827,347,041	$ 879,496,868
2. Contributions During Year	41,020,299	42,731,044	43,493,778	43,693,560
3. Benefits and Expenses During Year	59,150,352	60,806,452	65,446,603	66,880,714
4. Expected Net Investment Income	58,873,438	57,293,754	61,242,680	65,108,466
5. Expected Value of Assets, End of Year	834,623,703	812,009,382	866,636,896	921,418,180
6. Market Value of Assets, End of Year	772,791,036	827,347,041	879,496,868	891,225,734
7. Excess/(Shortfall) of Net Investment Income	$ (61,832,667)	$ 15,337,659	$ 12,859,972	$ (30,192,446)

TABLE 3
(continued)

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

1. Excess/(Shortfall) of Investment Income		
a. Year ending 4/30/2019	$	(30,192,446)
b. Year ending 4/30/2018		12,859,972
c. Year ending 4/30/2017		15,337,659
d. Year ending 4/30/2016		(61,832,667)
e. Total	$	(63,827,482)
2. Deferral of Excess/(Shortfall) of Investment Income		
a. Year ending 4/30/2019 (80%)	$	(24,153,957)
b. Year ending 4/30/2018 (60%)		7,715,983
c. Year ending 4/30/2017 (40%)		6,135,064
d. Year ending 4/30/2016 (20%)		(12,366,533)
e. Total	$	(22,669,443)
3. Market Value End of Year		891,225,734
4. Actuarial Value End of year (3) - (2e)		913,895,177
5. Ratio of Actuarial Value to Market Value		102.5%
6. Difference Between Actuarial & Market Value	$	22,669,443
7. Rate of Return on Actuarial Value of Assets		5.8%
8. Rate of Return on Market Value of Assets		4.0%

In the previous section, an actuarial valuation was compared with an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date, April 30, 2019. In this section, the discussion will focus on the commitments (future benefit payments) of the System, which are referred to as its liabilities.

Table 4 contains an analysis of the actuarial present value of all future benefits (PVFB) for contributing members, inactive members, retirees and their beneficiaries. The liabilities summarized in Table 4 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes the measurement of both benefits already earned and future benefits to be earned. For all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and for the lives of the surviving beneficiaries.

All liabilities reflect the benefit provisions in place as of April 30, 2019, with one exception. When certain criteria for the funded ratio and actual contributions are met, the Board has discretion to grant a COLA (it is not part of the statutory benefit structure). Even though the COLA is not guaranteed to be paid, the liabilities reflect a 2.5% annual "simple cost of living adjustment" for all future years as it better reflects the expected long-term liabilities.

Actuarial Accrued Liability

A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to the period in which benefits are earned, rather than to the period of benefit distribution. An actuarial cost method is a mathematical technique that allocates the present value of future benefits into annual costs. In order to do this allocation, it is necessary for the funding method to "breakdown" the present value of future benefits into two components:

(1) that which is attributable to the past and

(2) that which is attributable to the future.

Actuarial terminology calls the part attributable to the past the "past service liability" or the "actuarial accrued liability." The portion allocated to the future is known as the present value of future normal costs, with the specific piece of it allocated to the current year being called the "normal cost." Table 5 contains the calculation of actuarial accrued liability for the System. The Entry Age Normal actuarial cost method is used to develop the actuarial accrued liability.

TABLE 4

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

PRESENT VALUE OF FUTURE BENEFITS (PVFB)
AS OF APRIL 30, 2019

1. Active employees		
a. Retirement Benefit	$	550,339,938
b. Pre-Retirement Death Benefit		5,700,111
c. Withdrawal Benefit		10,294,304
d. Disability Benefit		82,117,787
e. Supplemental Benefit		17,662,895
f. Total	$	666,115,035
2. Inactive Vested Members		
a. Retirement Benefit	$	18,326,957
b. Supplemental Benefit		857,102
c. Total	$	19,184,059
3. In Pay Members		
a. Retirees	$	521,343,925
b. Disabled Members		105,811,262
c. Beneficiaries		64,238,110
d. Supplemental Benefit		34,948,853
e. Partial Lump Sum Payable		51,281
f. Total	$	726,393,431
4. Total Present Value of Future Benefits		
[1f] + [2c] + [3f]	$	1,411,692,525

TABLE 5

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

ACTUARIAL ACCRUED LIABILITY
AS OF APRIL 30, 2019

1. Active employees		
a. Present Value of Future Benefits	$	666,115,035
b. Present Value of Future Normal Costs		200,476,497
c. Actuarial Accrued Liability [1a] - [1b]	$	465,638,538
2. Inactive Vested Members	$	19,184,059
3. In Pay Members		
a. Retirees	$	521,343,925
b. Disabled Members		105,811,262
c. Beneficiaries		64,238,110
d. Supplemental Benefit		34,948,853
e. Partial Lump Sum Payable		51,281
f. Total	$	726,393,431
4. Total Actuarial Accrued Liability [1c] + [2] + [3f]	$	1,211,216,028

TABLE 6

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

DERIVATION OF SYSTEM EXPERIENCE GAIN/(LOSS)

Liabilities		
1. Actuarial Accrued Liability as of May 1, 2018	$	1,161,788,502
2. Normal Cost for Year		22,799,458
3. Interest on (1) & (2)		88,844,097
4. Benefit Payments during FYE 2019, Excluding Supplemental Benefits		(62,880,809)
5. Interest on Benefit Payments		(2,315,401)
6. Assumption Changes		6,542,433
7. Expected Actuarial Accrued Liability as of April 30, 2019	$	1,214,778,280
8. Actuarial Accrued Liability as of April 30, 2019	$	1,211,216,028
Assets		
9. Actuarial Value of Assets as of May 1, 2018	$	886,676,375
10. Actual Contributions, Excluding Supplemental Benefits		40,496,360
11. Benefit Payments, Excluding Supp. Benefits and Expenses during FYE 2019		(63,683,514)
12. Interest on Items (9), (10) and (11)		65,646,929
13. Expected Actuarial Value of Assets as of April 30, 2019	$	929,136,150
14. Actual Actuarial Value of Assets as of April 30, 2019	$	913,895,177
Gain / (Loss)		
15. Expected Unfunded Actuarial Accrued Liability (7) – (13)	$	285,642,130
16. Actual Unfunded Actuarial Accrued Liability (8) – (14)	$	297,320,851
17. Actuarial Gain / (Loss) (15) – (16)	$	(11,678,721)
18. Actuarial Gain / (Loss) on Actuarial Assets (14) – (13)	$	(15,240,973)
19. Actuarial Gain / (Loss) on Actuarial Accrued Liability (7) – (8)	$	3,562,252

TABLE 7

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

ACTUARIAL GAIN/(LOSS) ANALYSIS BY SOURCE

Source of Gain/(Loss)	Gain/(Loss) ($M)
Retiree Mortality	(1.7)
Withdrawal	0.4
Retirement	(0.6)
Death	(0.2)
Disability	(0.8)
Salary	1.9
New Actives	(0.4)
Actual vs Expected COLA	6.3
Other	(1.3)
Total Liability Gain/(Loss)	3.6
Asset Gain/(Loss)	(15.2)
Total Gain/(Loss)	(11.7)

Note: Numbers may not add due to rounding

TABLE 8

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

PROJECTED BENEFIT PAYMENTS

The chart below shows estimated benefits expected to be paid over the next twenty years, based on the assumptions used in this valuation. The "Actives" column shows benefits expected to be paid to members currently active on April 30, 2019. The "Retirees" column shows benefits expected to be paid to all other members. This includes those who, as of April 30, 2019, are receiving benefit payments or who are inactive vested and are entitled to a benefit in the future (including officers past 32 years of service). No future members are reflected.

Retirement, Survivor, Withdrawal and Supplemental Benefits

Year Ending April 30	Actives	Retirees	Total
2020	$ 2,409,000	$ 62,771,000	$ 65,180,000
2021	5,403,000	63,253,000	68,656,000
2022	8,659,000	63,679,000	72,338,000
2023	12,300,000	63,971,000	76,271,000
2024	16,157,000	63,789,000	79,946,000
2025	20,239,000	63,627,000	83,866,000
2026	24,479,000	63,337,000	87,816,000
2027	28,872,000	62,896,000	91,768,000
2028	33,345,000	62,481,000	95,826,000
2029	37,865,000	61,841,000	99,706,000
2030	42,530,000	61,224,000	103,754,000
2031	47,315,000	60,410,000	107,725,000
2032	52,111,000	59,505,000	111,616,000
2033	56,992,000	58,505,000	115,497,000
2034	61,720,000	57,447,000	119,167,000
2035	66,554,000	56,248,000	122,802,000
2036	71,206,000	54,999,000	126,205,000
2037	75,556,000	53,649,000	129,205,000
2038	79,782,000	52,228,000	132,010,000
2039	83,851,000	50,743,000	134,594,000

The previous two sections were devoted to a discussion of the assets and liabilities of the System. A comparison of Tables 3 and 4 indicates that current assets fall short of meeting the present value of future benefits (total liability). This is expected in all but a completely closed fund, where no further contributions are anticipated. In an active system, there will almost always be a difference between the actuarial value of assets and total liabilities. This deficiency has to be made up by future contributions and investment returns. An actuarial valuation sets out a schedule of future contributions that will deal with this deficiency in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. Under an actuarial cost method, the contributions required to meet the difference between current assets and current liabilities are allocated each year between two elements: (1) the normal cost rate and (2) the unfunded actuarial accrued liability contribution rate.

The term "fully funded" is often applied to a system in which contributions at the normal cost rate are sufficient to pay for the benefits of existing employees as well as for those of new employees. More often than not, systems are not fully funded, either because of past benefit improvements that have not been completely funded or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists. Likewise, when the actuarial value of assets is greater than the actuarial accrued liability, a surplus exists.

Description of Contribution Rate Components

The Entry Age Normal (EAN) actuarial cost method is used for the valuation. Under that method, the normal cost for each year from entry age to assumed exit age is a constant percentage of the member's year by year projected compensation. The portion of the present value of future benefits not provided by the present value of future normal costs is the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.

In general, contributions are computed in accordance with a level percent-of-payroll funding objective although the City contributes the dollar amount from the valuation. The contribution rate based on the April 30, 2019 actuarial valuation will be used to determine the dollar amount of the actuarial required employer contribution (contribution rate times expected payroll) to the Police Retirement System of Kansas City, Missouri for fiscal year end 2021. In this context, the term “contribution rate” means the percentage which is applied to a particular active member payroll to determine the actual employer contribution amount (i.e., in dollars) for the group.

As of April 30, 2019, the actuarial accrued liability was greater than the valuation assets so an unfunded actuarial accrued liability (UAAL) exists. The UAAL as of April 30, 2017 is amortized as a level percent of payroll, over a closed 30-year period (28 years remaining as of April 30, 2019). Any new unfunded actuarial accrued liability generated as a result of actuarial experience in subsequent years will be layered and amortized over a closed 20-year period. Active member payroll is assumed to increase 3.00% per year. Note that the use of closed amortization periods will result in the System being fully funded at the end of the amortization period, if all actuarial assumptions are met.

Contribution Rate Summary

In Table 9, the UAAL is projected to the beginning of FY 2021. Table 10 shows the amortization of the UAAL bases as well as develops the UAAL Amortization Payment Rate. Table 11 develops the actuarial contribution rate for the System. A historical summary of the actual and actuarial contribution rates for the City is shown in Table 12.

The contribution rates shown in this report are based on the actuarial assumptions and cost methods described in Appendix C.

TABLE 9

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

PROJECTED UAAL AT MAY 1, 2020

1. Actuarial Accrued Liability as of April 30, 2019	$	1,211,216,028
2. Actuarial Value of Assets	$	913,895,177
3. Unfunded Actuarial Accrued Liability as of April 30, 2019	$	297,320,851
4. Total Contribution Rate for FYE 2020*		41.91%
5. Normal Cost Rate		25.25%
6. Contribution Rate Applied to Fund the UAAL for FYE 2020 (4) - (5)		16.66%
7. Expected Payroll for FYE 2020	$	97,674,929
8. Projected UAAL on May 1, 2020 [(3) * 1.0745] - [(6) * (7) * $1.0745^{.5}$]	$	302,603,343

* Reflects member contributions of 11.55% and City contributions of 30.36%

TABLE 10

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

AMORTIZATION OF THE UAAL

Amortization Base	Original Amount	Remaining Payments	Projected May 1, 2020 Balance	Annual Payment*
2017 Legacy UAAL	$ 271,513,914	28	$ 280,947,253	$ 17,377,855
2018 Experience	3,938,832	19	3,943,725	306,540
2019 Assumption Changes	7,029,844	20	7,029,844	528,671
2019 Experience	10,682,521	20	10,682,521	803,367
Total			**$ 302,603,343**	**$ 19,016,433**

* Payment amount reflects mid-year timing.

1. Total UAAL Amortization Payments	$	19,016,433
2. Expected Payroll for FYE 2021	$	100,605,177
3. UAAL Amortization Payment Rate (1) / (2)		18.90%

TABLE 11

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

CITY CONTRIBUTION RATE

	Valuation Date*	
	4/30/2019	**4/30/2018**
Normal Cost		
Service pensions	16.53%	19.08%
Pre-retirement death pensions	0.50%	0.49%
Disability pensions	5.64%	4.35%
Termination benefits	1.55%	1.21%
Supplemental retirement benefit	0.43%	0.45%
Administrative expenses	0.60%	0.40%
Total Normal Cost	25.25%	25.98%
Total UAAL Amortization payment	18.90%	15.93%
Total Actuarial Contribution Rate	44.15%	41.91%
Member Portion	11.55%	11.55%
City Portion	32.60%	30.36%

* The valuation results are used to determine the employer contribution rate for the fiscal year ending two years later.

TABLE 12

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

COMPUTED AND ACTUAL CITY CONTRIBUTIONS COMPARATIVE STATEMENT

				Fiscal Year Contributions			
			As a % of Projected Pay		$ Contributions		
Fiscal Year Beginning May 1		Valuation Date April 30	Projected Annual Payroll	Annual Required Contribution	Reported FY City Contribution	Annual Required Contribution	Projected FY City Contribution	Actual Dollar Contribution
1998		1998	49,872,090	19.81 %	20.60 %	9,880,286	10,273,651	$10,318,583
1999		1999	51,963,858	17.65	20.60	9,172,029	10,704,555	10,789,963
2000		2000	57,791,028	18.66	20.60	10,785,784	11,904,952	11,392,871
2001		2001	57,505,238	18.85	19.70	10,837,294	11,328,532	11,312,754
2002		2002	59,228,848	19.55	19.70	11,579,240	11,668,083	12,017,801
2003	*	2003	65,234,614	23.14	19.70	15,095,290	12,851,219	12,817,176
2004		2003	68,170,172	23.14	19.70	15,774,578	13,429,524	13,297,605
2005		2004	72,325,478	26.26	19.70	18,992,671	14,248,119	13,729,225
2006		2005	73,794,574	29.06	19.70	21,444,703	14,537,531	14,526,734
2007		2006	78,446,156	29.00	19.70	22,749,385	15,453,893	15,747,111
2008		2007	83,716,533	29.04	19.70	24,311,281	16,492,157	16,700,688
2009		2008	90,168,869	26.22	19.70	23,642,278	17,763,267	16,645,229
2010		2009	93,479,787	36.76	19.70	34,363,170	18,415,518	16,532,015
2011		2010	94,094,251	33.75	19.70	31,756,810	18,536,567	16,476,608
2012	*	2011	91,982,770	36.79	19.70	33,840,461	18,120,606	16,933,694
2013		2012	91,396,005	38.85 **	19.70 **	35,507,348	18,005,013	20,528,569
2014	*#	2013	94,109,913	27.35	27.35	25,739,061	25,739,061	25,739,061
2015		2014	99,755,810	27.33	27.33	27,263,263	27,263,263	27,263,263
2016		2015	100,744,778	27.71	27.71	27,916,378	27,916,378	27,916,378
2017		2016	99,605,252	29.08	29.08	28,965,207	28,965,207	28,965,207
2018		2017	96,913,504	30.01	30.01	29,083,743	29,083,743	29,083,743
2019		2018	99,331,917	30.36	30.36	30,157,170	30,157,170	
2020	*	2019	100,605,177	32.60		32,797,288		

* After changes in actuarial assumptions or methods.

** Effective September 1, 2013, the actuarial contribution rate was revised to 36.58% and the City began contributing the full employer actuarial contribution rate of 25.03%.

\# After changes in benefits

Note: For years prior to 2011, information is shown from the prior actuary's report.

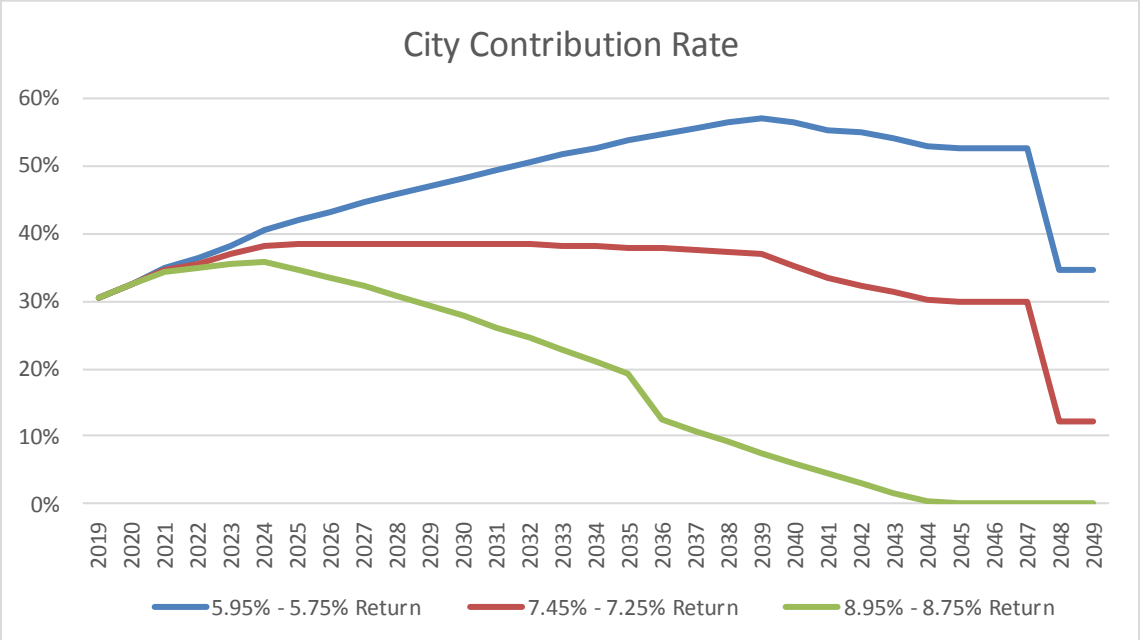
While the April 30, 2019 valuation results indicate the System's financial status at a single point in time, projections are used to identify trends and to compare various scenarios rather than predicting some future state of events. The projections model a change in one key variable to provide insight into the longer term trend of (1) the projected City contributions; (2) the projected System funded status (ratio of actuarial assets over liabilities); and (3) the unfunded actuarial accrued liability (actuarial accrued liability minus actuarial assets). The projections also show how sensitive the results are to the key variable being modeled. The projections do not predict the System's financial condition or its ability to pay benefits in the future and do not provide any guarantee of future financial soundness of the System. Over time, a defined benefit plan's total cost will depend on a number of factors, including the amount of benefits paid, the number of people paid benefits, plan expenses, and the amount of earnings on assets invested to pay benefits. These amounts and other variables are uncertain and unknowable at the time the projections were prepared. Because not all of the assumptions will unfold exactly as expected, actual results will differ from the projections shown.

The following three investment return scenarios are modeled (note the assumption does not change):

(1) Returns of 7.45% - 7.25% (current assumption),
(2) Returns of 8.95% - 8.75% (1.50% higher than the current assumption), and
(3) Returns of 5.95% - 5.75% (1.50% lower than the current assumption).

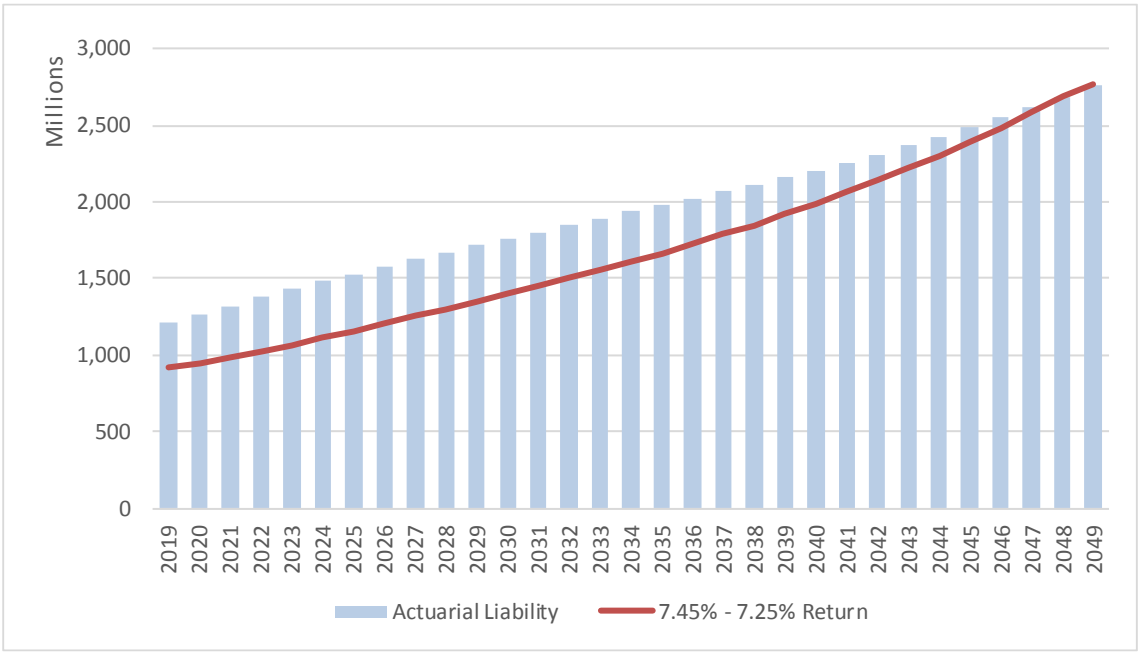
The projections assume that all actuarial assumptions, other than investment return, are met in all future years and that the City makes contributions equal to the full amount of the actuarially determined contribution as calculated by the System's actuary, based on the Board's Funding Policy (including closed amortization periods). Note that the 2.5% COLA is assumed to be granted in all years even when the Board's criteria is not met. These projections include estimates of future valuation results, including the unfunded actuarial accrued liability and funded ratio. It should be noted that these actuarial measurements do not indicate the sufficiency of plan assets to settle the plan's obligations nor do they, on their own, indicate future funding requirements.

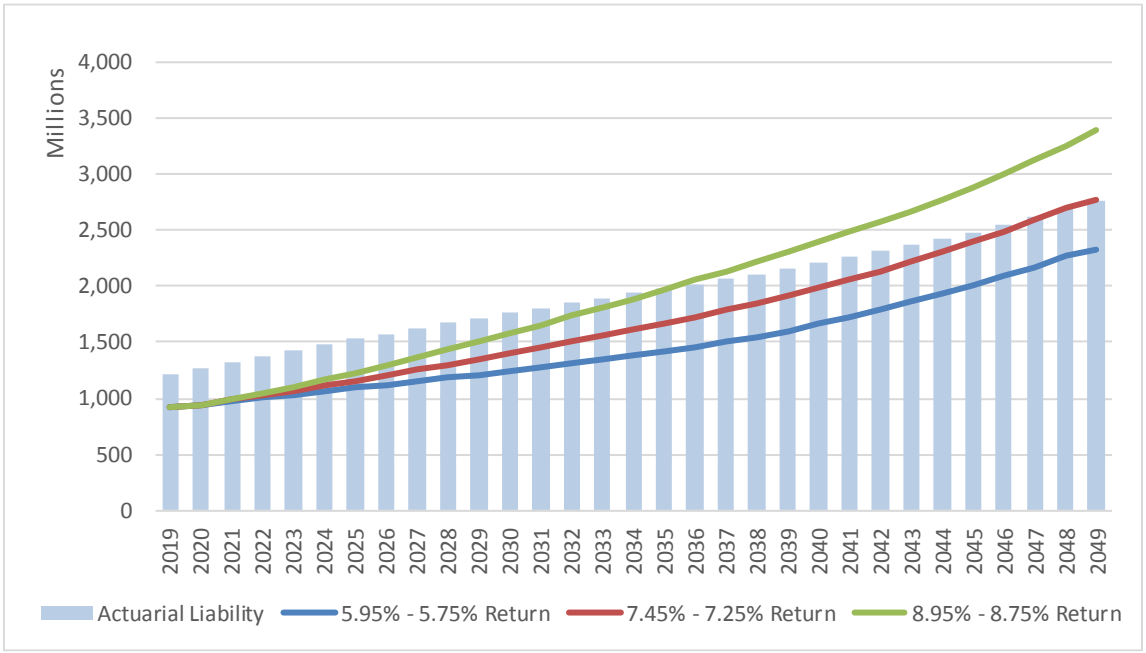
Effect of Various Returns on City Contribution Rate



Comparison of Projected Actuarial Assets to Actuarial Liability

The following graphs compare the actuarial value of assets (red line) to the System's actuarial accrued liabilities (light blue bars). The first graph shows the baseline case, while the second graph shows the sensitivity of the results to the rate of return.





Funded Ratio

The following graph shows the projected System funded ratio (ratio of actuarial value of assets to actuarial accrued liabilities). The years shown in the chart are valuation dates (April 30 of each year).

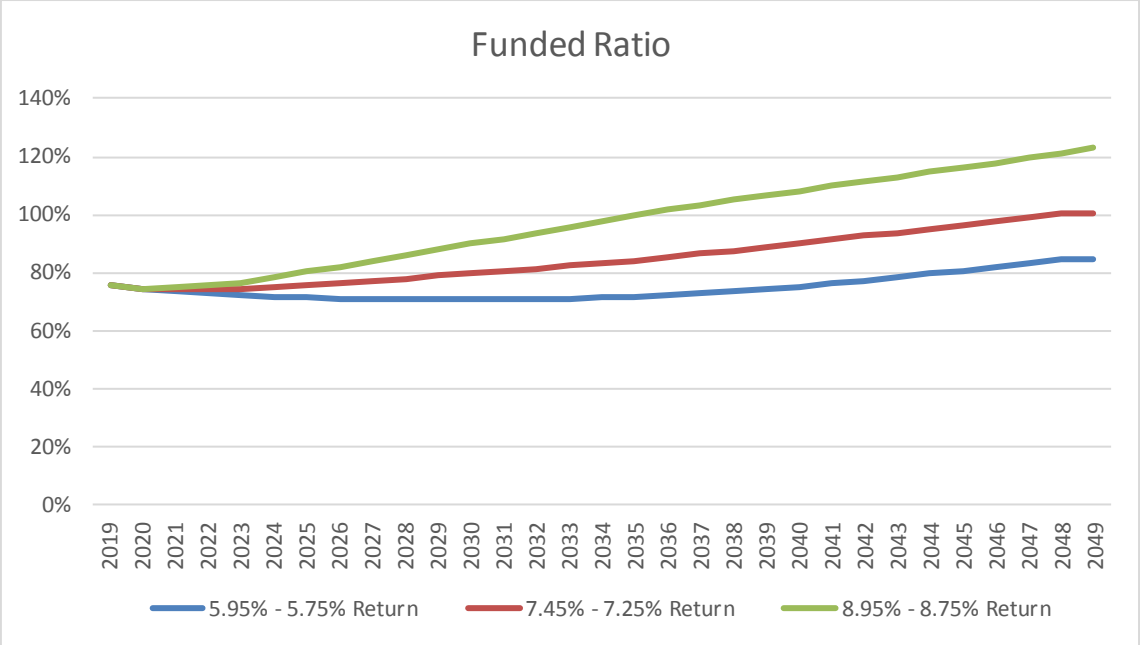


TABLE 13

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
PROJECTION OF VALUATION RESULTS

Projection Based on April 30, 2019 Actuarial Valuation
7.45% - 7.25% Investment Return
Amounts in thousands

Valuation as of April 30, (1)	Covered Payroll at Valuation (2)	Actuarial Accrued Liability (AAL) (3)	Actuarial Value of Assets (AVA) (4)	Unfunded AAL (5)	Funded Ratio Using AVA (6)	UAAL Amortization Payment Rate (7)	Normal Cost Rate (8)	Actuarial Contribution Rate (9)	Member Contribution Rate (10)	Employer Actuarial Contribution Rate (11)	Dollar Amount of Employer Contribution* (12)
2019	$97,675	$1,211,216	$913,895	$297,321	75.45%	18.90%	25.25%	44.15%	11.55%	32.60%	$32,797
2020	99,353	1,265,789	941,787	324,002	74.40%	20.75%	25.43%	46.18%	11.55%	34.63%	35,438
2021	101,023	1,321,241	983,993	337,248	74.47%	21.60%	25.60%	47.20%	11.55%	35.65%	37,095
2022	103,094	1,377,195	1,024,798	352,397	74.41%	22.61%	25.80%	48.41%	11.55%	36.86%	39,140
2023	105,095	1,433,481	1,063,690	369,792	74.20%	23.82%	25.96%	49.78%	11.55%	38.23%	41,383
2024	106,880	1,481,746	1,109,741	372,006	74.89%	24.13%	25.81%	49.94%	11.55%	38.39%	42,262
2025	108,663	1,529,575	1,157,336	372,238	75.66%	24.44%	25.66%	50.10%	11.55%	38.55%	43,146
2026	111,014	1,576,900	1,205,217	371,682	76.43%	24.63%	25.49%	50.12%	11.55%	38.57%	44,103
2027	113,532	1,623,749	1,253,672	370,077	77.21%	24.79%	25.33%	50.12%	11.55%	38.57%	45,103
2028	116,058	1,670,038	1,302,530	367,508	77.99%	24.96%	25.16%	50.12%	11.55%	38.57%	46,107
2029	118,762	1,715,846	1,351,953	363,893	78.79%	25.11%	25.02%	50.13%	11.55%	38.58%	47,193
2030	121,931	1,761,029	1,401,853	359,176	79.60%	25.17%	24.87%	50.04%	11.55%	38.49%	48,339
2031	125,337	1,805,592	1,452,585	353,007	80.45%	25.20%	24.73%	49.93%	11.55%	38.38%	49,547
2032	128,912	1,849,758	1,504,330	345,428	81.33%	25.21%	24.59%	49.80%	11.55%	38.25%	50,788
2033	132,659	1,893,508	1,557,189	336,318	82.24%	25.20%	24.48%	49.68%	11.55%	38.13%	52,100
2034	136,831	1,937,138	1,611,476	325,662	83.19%	25.14%	24.37%	49.51%	11.55%	37.96%	53,499
2035	141,153	1,980,621	1,667,509	313,113	84.19%	25.08%	24.27%	49.35%	11.55%	37.80%	54,957
2036	145,744	2,024,343	1,725,668	298,675	85.25%	24.99%	24.19%	49.18%	11.55%	37.63%	56,489
2037	150,785	2,068,789	1,786,623	282,166	86.36%	24.86%	24.11%	48.97%	11.55%	37.42%	58,116
2038	156,116	2,114,159	1,850,928	263,231	87.55%	24.38%	24.05%	48.43%	11.55%	36.88%	59,303
2039	161,427	2,160,915	1,919,078	241,837	88.81%	22.83%	24.00%	46.83%	11.55%	35.28%	58,660
2040	167,061	2,208,929	1,990,650	218,279	90.12%	20.90%	23.96%	44.86%	11.55%	33.31%	57,317
2041	173,258	2,259,143	2,064,778	194,364	91.40%	20.02%	23.93%	43.95%	11.55%	32.40%	57,820
2042	179,308	2,311,709	2,141,104	170,604	92.62%	18.96%	23.91%	42.87%	11.55%	31.32%	57,844
2043	185,531	2,366,795	2,221,347	145,448	93.85%	17.75%	23.90%	41.65%	11.55%	30.10%	57,520
2044	192,037	2,424,986	2,305,714	119,272	95.08%	17.64%	23.90%	41.54%	11.55%	29.99%	59,320
2045	198,364	2,486,265	2,394,035	92,230	96.29%	17.58%	23.90%	41.48%	11.55%	29.93%	61,151
2046	204,444	2,550,515	2,488,299	62,216	97.56%	17.56%	23.91%	41.47%	11.55%	29.92%	63,005
2047	210,590	2,617,752	2,588,644	29,107	98.89%	(0.24%)	23.92%	23.68%	11.55%	12.13%	26,311
2048	216,827	2,687,885	2,695,421	(7,536)	100.28%	(0.25%)	23.94%	23.69%	11.55%	12.14%	27,112

* Amounts shown are contributions in the fiscal year ending two years after the valuation date.

Note: Investment return assumption is assumed to be 7.45% in 2019, 7.40% in 2020, 7.35% in 2021, 7.30% in 2022, and 7.25% for 2023 and thereafter.

TABLE 14

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

CITY CONTRIBUTIONS UNDER ALTERNATE SCENARIOS

Projection Based on April 30, 2019 Actuarial Valuation

Board's Funding Policy (Layered Amortization of UAAL)
Amounts in Thousands

Fiscal Year End April 30,*	City Contribution Amounts at Various Investment Returns		
	7.45% - 7.25% Return	8.95% - 8.75% Return	5.95% - 5.75% Return
2021	$32,797	$32,797	$32,797
2022	35,438	35,223	35,653
2023	37,095	36,377	37,803
2024	39,140	37,622	40,627
2025	41,383	38,763	43,938
2026	42,262	38,211	46,159
2027	43,146	37,539	48,485
2028	44,103	36,796	50,940
2029	45,103	35,970	53,546
2030	46,107	35,001	56,232
2031	47,193	33,957	59,095
2032	48,339	32,816	62,104
2033	49,547	31,577	65,259
2034	50,788	30,207	68,554
2035	52,100	28,721	72,050
2036	53,499	27,144	75,711
2037	54,957	18,304	79,527
2038	56,489	16,273	83,555
2039	58,116	14,195	87,796
2040	59,303	12,076	91,704
2041	58,660	9,860	93,959
2042	57,317	7,606	95,242
2043	57,820	5,354	98,026
2044	57,844	2,973	99,990
2045	57,520	535	101,243
2046	59,320	0	104,319
2047	61,151	0	107,449
2048	63,005	0	110,721
2049	26,311	0	75,115
2050	27,112	0	77,451

*The Actuarially Determined Contribution (ADC) determined in the annual actuarial valuation is contributed in the following fiscal year. For example, the dollar amount of the ADC for fiscal year-end April 30, 2021 is based on the ADC calculated in the April 30, 2019 valuation.

Note: Projections assume a constant population and no actuarial gains and losses other than recognition of the deferred investment experience as of April 30, 2019.

Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September, 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, is first applicable for the April 30, 2019 actuarial valuation for the Police Retirement System of Kansas City, Missouri (System).

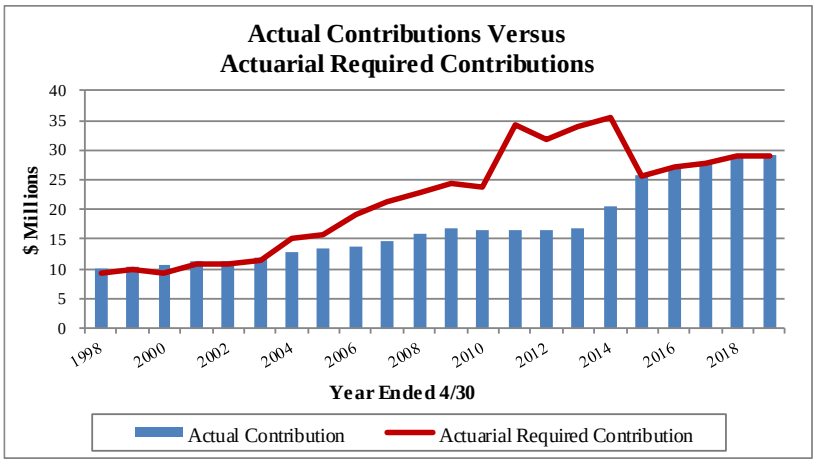
A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become "pay as you go". The term "risk" is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for volatility in contribution rates and
- external risks, such as the regulatory and political environment, are not included in ASOP 51.

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial required contribution each year. As the following graph shows, the City failed to make contributions equal to the actuarial rate from 2003 to 2014, with large shortfalls in some years. Based on legislation passed in 2013, the City has contributed the full actuarial required contribution for the past 5 fiscal years.



One of the strongest factors regarding the future funding of the System is the City's statutory requirement to make the full actuarial required contribution, as determined by the System's actuary in the annual actuarial valuation. This is an important change from the prior decade when actual City contributions were far below the full actuarial contribution.

The most significant risk factor for most retirement systems, including the Police Retirement System of Kansas City, Missouri, is investment return risk because of the volatility of returns and the size of plan assets compared to payroll (see Table 15). As that Table illustrates, a difference of 10% between the actual return in a year and the assumed return results in an ultimate contribution rate increase of nearly 7% of pay over a 20-year period. Given the System's target asset allocation and the associated standard deviation of the portfolio, a variance of 10% or more from the assumption in any given year is not unexpected (likely to occur in about one of every three years).

A key demographic risk for all retirement systems, including the Police Retirement System of Kansas City, Missouri, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect small, continuous improvements in mortality experience over time and these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

Finally, the unfunded actuarial accrued liability is amortized as a level percentage of payroll. The underlying assumption used in developing the payment schedule for UAAL payments assumes an increasing covered payroll over time which is dependent on a stable employment level, i.e., active member count remains the same. When payroll does not grow as expected, the UAAL contribution rate will be higher than expected, even if the dollar amount of the payment is the same as scheduled. As Table 18 illustrates, the growth in covered payroll over the last ten years has been minimal compared to expected increases over that period of 3.75% to 4.00%. This trend is due to the combined impact of a smaller number of active members and relatively low salary increases. While this is less critical for the Police Retirement System of Kansas City, Missouri because the City contributes a dollar amount, not a percent of payroll, the lack of payroll growth does result in a payment schedule for the UAAL that allocates higher dollar amounts of contributions later in the period because it assumes payroll is increasing at a higher rate than is actually occurring.

Many of the public retirement systems in the United States were created shortly after World War II. The Police Retirement System of Kansas City, Missouri was created in 1946 so it has been in existence for more than 70 years. In general, the aging of the population, including the retirement of the baby boomers, along with earlier retirement eligibility, has created a shift in the demographics of most retirement systems. This change is not unexpected and has, in fact, been anticipated in the funding of the retirement system. Even though it was anticipated, the demographic shift and maturing of the plans have increased the risk associated with funding the system. The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the natural maturing of the retirement system, including the percentage of liability attributable to retirees and the active to retiree ratio.

TABLE 15

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

HISTORICAL ASSET VOLATILITY RATIOS

As a retirement system matures, the size of the market value of assets typically increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Actuarial Valuation Date	Market Value of Assets	Estimated Plan Year Payroll	Asset Volatility Ratio	Increase in ACR with a Return 10% Lower than Assumed*
4/30/2000	$638,358,684	$57,791,028	11.05	8.31%
4/30/2001	594,853,903	57,505,238	10.34	7.78%
4/30/2002	561,755,162	56,678,323	9.91	7.45%
4/30/2003	502,971,920	62,425,468	8.06	6.06%
4/30/2004	577,093,152	66,230,606	8.71	6.55%
4/30/2005	604,107,701	67,575,902	8.94	6.72%
4/30/2006	692,539,940	71,835,495	9.64	7.25%
4/30/2007	755,107,136	80,111,515	9.43	7.09%
4/30/2008	734,379,847	86,700,836	8.47	6.37%
4/30/2009	534,314,117	89,884,411	5.94	4.47%
4/30/2010	655,571,619	90,475,241	7.25	5.45%
4/30/2011	715,764,084	88,444,971	8.09	6.08%
4/30/2012	687,870,657	87,880,774	7.83	5.89%
4/30/2013	717,317,928	90,708,350	7.91	5.95%
4/30/2014	763,076,453	96,150,178	7.94	5.97%
4/30/2015	793,880,318	97,103,400	8.18	6.15%
4/30/2016	772,791,036	96,005,062	8.05	6.05%
4/30/2017	827,347,041	93,410,606	8.86	6.66%
4/30/2018	879,496,868	95,741,607	9.19	6.91%
4/30/2019	891,225,734	97,674,929	9.12	6.86%

Note: Years prior to the 1/1/2011 were provided by the prior actuary.

*The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). Current year assumptions are used for all years shown.

The amount of assets at April 30, 2019 is 9.12 times the covered payroll so underperforming the investment return assumption by 10.00% (i.e., earn -2.55% for one year) is equivalent to 91.2% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, the magnitude of the ultimate contribution increase illustrates the risk associated with volatile investment returns.

TABLE 16

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

HISTORICAL CASH FLOWS

Plans with negative cash flows tend to experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of market value that may cause significant concerns. The System has had negative cash flows of 2 to 3% for the last five years.

Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments and Expenses	Net Cash Flow	Net Cash Flow as a Percent of MVA
4/30/2001	$594,853,903	$17,351,192	$31,575,046	($14,223,854)	(2.39%)
4/30/2002	561,755,162	17,470,774	34,971,153	(17,500,379)	(3.12%)
4/30/2003	502,971,920	18,569,429	35,975,070	(17,405,641)	(3.46%)
4/30/2004	577,093,152	19,790,162	36,982,155	(17,191,993)	(2.98%)
4/30/2005	604,107,701	20,510,595	38,834,191	(18,323,596)	(3.03%)
4/30/2006	692,539,940	21,201,728	40,396,756	(19,195,028)	(2.77%)
4/30/2007	755,107,136	22,340,876	43,503,803	(21,162,927)	(2.80%)
4/30/2008	734,379,847	24,206,873	44,022,306	(19,815,433)	(2.70%)
4/30/2009	534,314,117	25,683,054	45,394,340	(19,711,286)	(3.69%)
4/30/2010	655,571,619	25,579,929	47,088,273	(21,508,344)	(3.28%)
4/30/2011	715,764,084	25,756,009	47,565,630	(21,809,621)	(3.05%)
4/30/2012	687,870,657	25,370,816	49,679,973	(24,309,157)	(3.53%)
4/30/2013	717,317,928	26,277,110	52,371,938	(26,094,828)	(3.64%)
4/30/2014	763,076,453	32,440,600	53,525,039	(21,084,439)	(2.76%)
4/30/2015	793,880,318	39,808,182	55,955,411	(16,147,229)	(2.03%)
4/30/2016	772,791,036	41,020,299	59,150,352	(18,130,053)	(2.35%)
4/30/2017	827,347,041	42,731,044	60,806,452	(18,075,408)	(2.18%)
4/30/2018	879,496,868	43,493,778	65,446,603	(21,952,825)	(2.50%)
4/30/2019	891,225,734	43,693,560	66,880,714	(23,187,154)	(2.60%)

Note: Years prior to the 1/1/2011 were provided by the prior actuary.

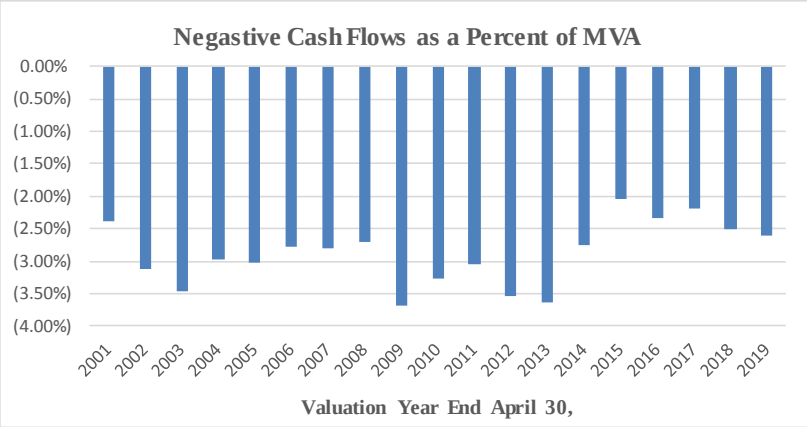


TABLE 17

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

LIABILITY MATURITY MEASUREMENTS

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs.

Projections provide the most effective way of analyzing the impact of these changes on future funding measures, but studying several key metrics from the valuation can also provide some valuable insight.

Year End	Retiree Liability (a)	Total Actuarial Liability (b)	Retiree Percentage (a / b)
4/30/2002	$424,565,985	$648,632,789	65.5%
4/30/2003	436,805,324	682,690,968	64.0%
4/30/2004	448,521,694	712,273,616	63.0%
4/30/2005	460,235,649	741,001,020	62.1%
4/30/2006	476,677,326	775,271,985	61.5%
4/30/2007	487,633,976	807,902,176	60.4%
4/30/2008	511,571,757	850,763,745	60.1%
4/30/2009	521,607,916	893,559,090	58.4%
4/30/2010	526,521,860	915,463,037	57.5%
4/30/2011	537,670,377	940,609,092	57.2%
4/30/2012	551,677,775	972,127,874	56.7%
4/30/2013	554,078,691	964,302,215	57.5%
4/30/2014	568,199,815	1,006,243,143	56.5%
4/30/2015	585,754,594	1,037,256,917	56.5%
4/30/2016	613,092,387	1,076,824,221	56.9%
4/30/2017	652,700,808	1,118,948,065	58.3%
4/30/2018	681,913,348	1,161,788,502	58.7%
4/30/2019	726,393,431	1,211,216,028	60.0%

Note: Years prior to the 1/1/2011 were provided by the prior actuary.

TABLE 17
(continued)

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

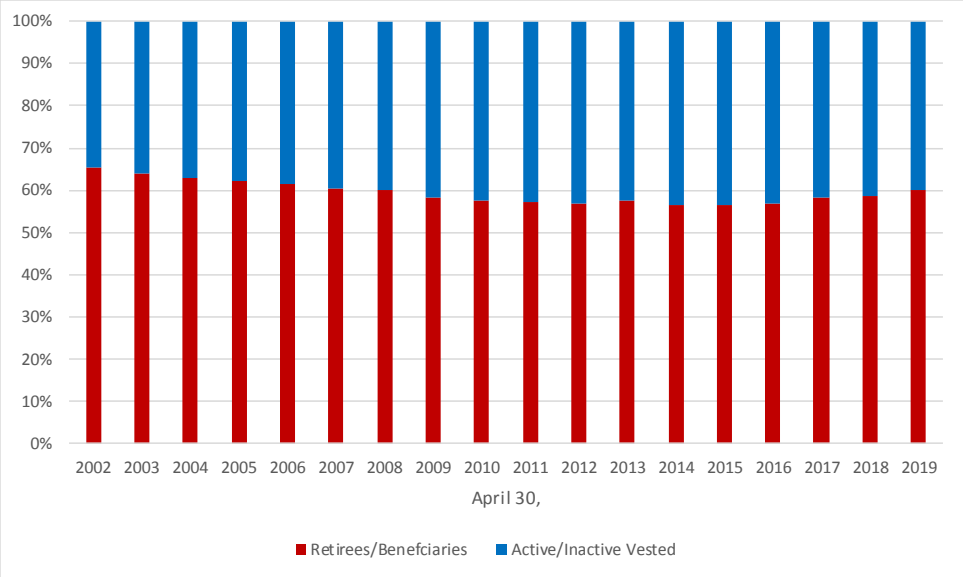


TABLE 18

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

HISTORICAL MEMBER STATISTICS

Valuation Date April 30,	Number of Active	Number of Retired	Active/ Retired
2001	1,224	1,132	1.08
2002	1,204	1,152	1.05
2003	1,266	1,154	1.10
2004	1,303	1,162	1.12
2005	1,285	1,174	1.09
2006	1,355	1,186	1.14
2007	1,391	1,189	1.17
2008	1,433	1,188	1.21
2009	1,410	1,186	1.19
2010	1,418	1,201	1.18
2011	1,391	1,202	1.16
2012	1,366	1,209	1.13
2013	1,359	1,240	1.10
2014	1,408	1,243	1.13
2015	1,397	1,252	1.12
2016	1,334	1,274	1.05
2017	1,286	1,308	0.98
2018	1,284	1,332	0.96
2019	1,279	1,369	0.93

Note: Years prior to 1/1/2011 were provided by prior actuary.

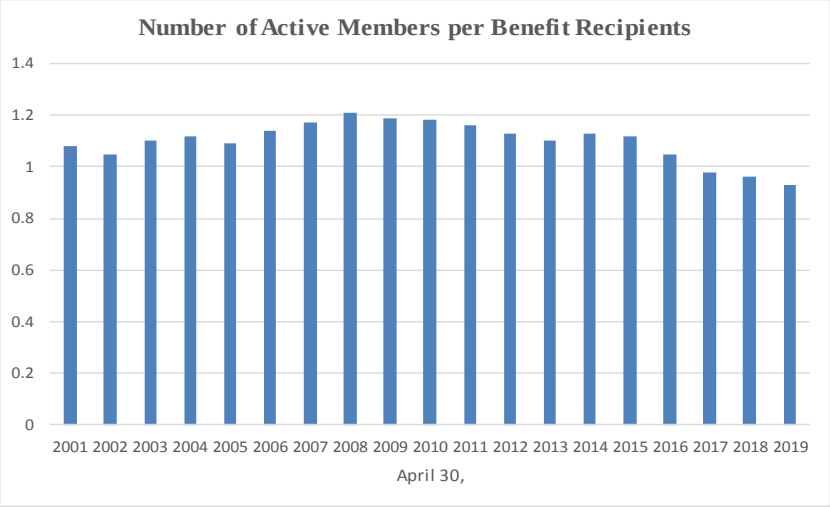


TABLE 18
(continued)

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

Valuation Date April 30,	Number of Active Members	Projected Payroll	% Incr.
2001	1,224	$57,505,238	
2002	1,204	56,678,323	(1.44%)
2003	1,266	62,425,468	10.14%
2004	1,303	66,230,606	6.10%
2005	1,285	67,575,902	2.03%
2006	1,355	71,835,495	6.30%
2007	1,391	80,111,515	11.52%
2008	1,433	86,700,836	8.23%
2009	1,410	89,884,411	3.67%
2010	1,418	90,475,241	0.66%
2011	1,391	88,444,971	(2.24%)
2012	1,366	87,880,774	(0.64%)
2013	1,359	90,708,350	3.22%
2014	1,408	96,150,178	6.00%
2015	1,397	97,103,400	0.99%
2016	1,334	96,005,062	(1.13%)
2017	1,286	93,410,606	(2.70%)
2018	1,284	95,741,607	2.50%
2019	1,279	97,674,929	2.02%

Note: Years prior to 1/1/2011 were provided by prior actuary.

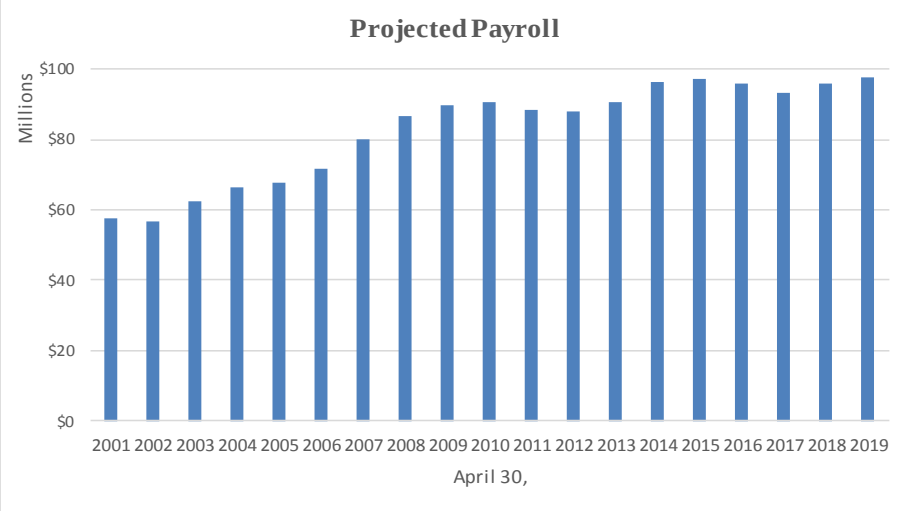


TABLE 19

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

COMPARISON OF VALUATION RESULTS UNDER ALTERNATE INVESTMENT RETURN ASSUMPTIONS

This exhibit compares the key April 30, 2019 valuation results under five (5) different investment return assumptions to illustrate the impact of different assumptions on the funding of the System. Note that only the investment return assumption is changed, as identified in the heading below. All other assumptions are unchanged for purposes of this analysis.

Investment Return Assumption	**6.95%**	**7.20%**	**7.45%**	**7.70%**	**7.95%**
Contributions					
Normal Cost Rate	28.38%	26.75%	25.25%	23.84%	22.54%
Employee Contribution Rate	(11.55%)	(11.55%)	(11.55%)	(11.55%)	(11.55%)
UAAL Contribution Rate	23.93%	21.40%	18.90%	16.42%	13.97%
Employer Contribution Rate	40.76%	36.60%	32.60%	28.71%	24.96%
Employer Contribution for Following Fiscal Year ($ in thousands)	$41,007	$36,821	$32,797	$28,884	$25,111
Actuarial Value of Assets	$913,895	$913,895	$913,895	$913,895	$913,895
Actuarial Accrued Liability	$1,287,675	$1,248,491	$1,211,216	$1,175,732	$1,141,929
Funded Ratio	71%	73%	75%	78%	80%

Note: All other assumptions are unchanged for purposes of this sensitivity analysis.

The actuarial accrued liability is a measure intended to help the reader assess (i) a retirement plan's funded status on a going concern basis and (ii) progress being made toward accumulating the assets needed to pay benefits as due. Allocation of the actuarial present value of projected benefits between past and future service was based on service using the Entry Age Normal actuarial cost method. Assumptions, including projected pay increases, were the same as used to determine the System's level percent of payroll annual required contribution between entry age and assumed exit age. Entry age was established by subtracting credited service from current age on the valuation date. The Entry Age Normal actuarial accrued liability was determined as part of an actuarial valuation of the System as of April 30, 2019. The actuarial assumptions used in determining the actuarial accrued liability can be found in Appendix C.

TABLE 20

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

Valuation Date	April 30, 2019
Actuarial cost method	Entry Age Normal
Amortization method for unfunded actuarial accrued liability	Level percent of payroll
Amortization period	30-year closed, beginning with the 2017 valuation for the Legacy UAAL base 20-year closed for experience bases
Asset valuation method	5-year smoothing of actual versus expected return on market value
Actuarial assumptions:	
Investment rate of return	7.45%, net of investment expenses
Projected salary increases including wage inflation at 3.00%	3.00% to 19.00%
Cost-of-living adjustments	2.50% simple

Membership of the plan consisted of the following at April 30, 2019, the date of the latest actuarial valuation:

Retirees and beneficiaries receiving benefits	1,369
Inactive vested members entitled to but not yet receiving benefits*	38
Active plan members	1,279
Total	2,686

*Note: Officers who are actively working and have 32 or more years of service are included with the inactive vested members entitled to future benefits since they are currently not accruing benefits nor contributing to the System, but are entitled to a benefit in the future.

TABLE 21

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

SCHEDULE OF FUNDING PROGRESS

Actuarial Valuation Date		Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b) - (a)	Funded Ratio (a) / (b)	Active Member Covered Payroll** (c)	UAAL as a Percentage of Active Member Covered Payroll [(b) - (a)] / (c)
4/30/1998		$433,090,523	$493,183,065	$60,092,542	88%	$49,872,090	120%
4/30/1999		484,396,958	521,600,003	37,203,045	93%	51,963,858	72%
4/30/2000		584,514,972	589,566,248	5,051,276	99%	57,791,028	9%
4/30/2001		600,051,893	615,291,156	15,239,263	98%	57,505,238	27%
4/30/2002		620,948,986	648,632,789	27,683,803	96%	56,678,323	49%
4/30/2003	*	611,246,928	682,690,968	71,444,040	90%	62,425,468	114%
4/30/2004		603,418,620	712,273,616	108,854,996	85%	66,230,606	164%
4/30/2005		604,560,607	741,001,020	136,440,413	82%	67,575,902	202%
4/30/2006		635,621,582	775,271,985	139,650,403	82%	71,835,495	194%
4/30/2007		698,078,688	807,902,176	109,823,488	86%	80,111,515	137%
4/30/2008		742,060,223	850,763,745	108,703,522	87%	86,700,836	125%
4/30/2009		641,176,940	893,559,090	252,382,150	72%	89,884,411	281%
4/30/2010		722,464,003	915,463,037	192,999,034	79%	90,475,241	213%
4/30/2011	*	715,764,084	940,609,092	224,845,008	76%	88,444,971	254%
4/30/2012		734,375,923	972,127,874	237,751,951	76%	87,880,774	271%
4/30/2013	*#	749,617,334	964,302,215	214,684,881	78%	90,708,350	237%
4/30/2014		773,338,034	1,006,243,143	232,905,109	77%	96,150,178	242%
4/30/2015		803,672,621	1,037,256,917	233,584,296	77%	97,103,400	241%
4/30/2016		821,895,127	1,076,824,221	254,929,094	76%	96,005,062	266%
4/30/2017		853,286,442	1,118,948,065	265,661,623	76%	93,410,606	284%
4/30/2018		886,676,375	1,161,788,502	275,112,127	76%	95,741,607	287%
4/30/2019	*	913,895,177	1,211,216,028	297,320,851	75%	97,674,929	304%

* After changes in actuarial assumptions or methods.

** For valuation years 2001 and prior, and 2007 and later, valuation payroll includes projected increases for year following valuation.
For valuation years 2002 through 2006, valuation payroll is payroll reported in data after annualization of pays for new hires.

\# After change in benefit provisions

Note: Results for years prior to 2011 were taken from the prior actuary's report.

Analysis of the dollar amounts of actuarial value of assets, actuarial accrued liability, or unfunded actuarial accrued liability in isolation can be misleading. Expressing the actuarial value of assets as a percentage of the actuarial accrued liability provides one indication of the System's funded status on a going-concern basis. Analysis of this percentage over time indicates whether the System is becoming financially stronger or weaker. Generally, the greater this percentage, the stronger the plan's funding. The unfunded actuarial accrued liability and annual covered payroll are both affected by inflation. Expressing the unfunded actuarial accrued liability as a percentage of covered payroll approximately adjusts for the effects of inflation and aids analysis of the progress being made in accumulating sufficient assets to pay benefits when due. Generally, the smaller this percentage, the stronger the plan's funding.

TABLE 22

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

SCHEDULE OF CITY CONTRIBUTIONS

Fiscal Year Ending April 30	Annual Required Contribution	Percent Contributed	Contribution Shortfall/(Excess)
1998	$ 9,355,956	107%	$ (622,506)
1999	9,880,286	104%	(438,297)
2000	9,172,029	118%	(1,617,934)
2001	10,785,784	106%	(607,087)
2002	10,837,294	104%	(475,460)
2003	11,579,240	104%	(438,561)
2004	15,095,290	85%	2,278,114
2005	15,774,578	84%	2,476,973
2006	18,992,671	72%	5,263,446
2007	21,444,703	68%	6,917,969
2008	22,749,385	69%	7,002,274
2009	24,311,281	69%	7,610,593
2010	23,642,278	70%	6,997,049
2011	34,363,170	48%	17,831,155
2012	31,756,810	52%	15,280,202
2013	33,840,461	50%	16,906,767
2014	35,507,348	58%	14,978,779
2015	25,739,061	100%	0
2016	27,263,263	100%	0
2017	27,916,378	100%	0
2018	28,965,207	100%	0
2019	29,083,743	100%	0

Note: For years prior to 2011, information shown is from the prior actuary's report.

TABLE 23

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

SOLVENCY TEST

Valuation Date April 30		Entry Age Actuarial Accrued Liabilities (1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active Members (Employer Financed Portion)	Valuation Assets	Portion of Actuarial Accrued Liabilities Covered by Reported Assets (1)	(2)	(3)
2003	*	$46,015,271	$436,805,624	$199,870,073	$611,246,928	100 %	100 %	64 %
2004		50,340,747	448,521,694	213,411,175	603,418,620	100	100	49
2005		55,220,395	460,235,649	225,544,976	604,560,607	100	100	40
2006		59,717,930	476,677,326	238,876,729	635,621,582	100	100	42
2007		64,314,276	487,633,976	255,953,924	698,078,688	100	100	57
2008		70,012,081	511,571,757	269,179,907	742,060,223	100	100	60
2009		76,321,890	521,607,916	295,629,284	641,176,940	100	100	15
2010		81,310,956	526,521,860	307,630,221	722,464,003	100	100	37
2011	*	86,306,128	537,670,377	316,632,587	715,764,084	100	100	29
2012		91,427,576	551,677,775	329,022,523	734,375,923	100	100	28
2013	*#	93,709,417	554,078,691	316,514,107	749,617,334	100	100	32
2014		100,221,012	568,199,815	337,822,316	773,338,034	100	100	31
2015		106,540,143	585,754,594	344,962,180	803,672,621	100	100	32
2016		109,073,053	613,092,387	354,658,781	821,895,127	100	100	28
2017		111,119,569	652,700,808	355,127,688	853,286,442	100	100	25
2018		114,197,453	681,913,348	365,677,701	886,676,375	100	100	25
2019	*	114,812,821	726,393,431	370,009,776	913,895,177	100	100	20

* After changes in actuarial assumptions or methods

\# After benefit changes

Note: Results for years before 2011 were prepared by the prior actuary

MEMBER DATA RECONCILIATION

April 30, 2018 to April 30, 2019

The number of members included in the valuation, as summarized in the table below, is in accordance with the data submitted by the System for members as of the valuation date.

	Active Participants	Retirees	Disableds	Beneficiaries	Inactive Vested	Total
Members as of 04/30/2018	1,284	873	193	266	33	2,649
New Members*	77	0	0	0	0	77
Terminations						
Refunded	(20)	0	0	0	0	(20)
Inactive Vested	(9)	0	0	0	9	0
Retirements						
Service	(46)	50	0	0	(4)	0
Disability	(6)	0	6	0	0	0
Deaths						
Cashed Out/Payments Ended	0	0	0	(1)	0	(1)
With Beneficiary	(1)	(13)	(3)	17	0	0
Without Beneficiary	0	(6)	(2)	(11)	0	(19)
Data Adjustments	0	0	0	0	0	0
Members as of 04/30/2019	**1,279**	**904**	**194**	**271**	**38**	**2,686**

* Includes reappointments.

Note: There are 11 officers who are counted with the Inactive Vested members as of April 30, 2019 because they have continued employment past 32 years of service.

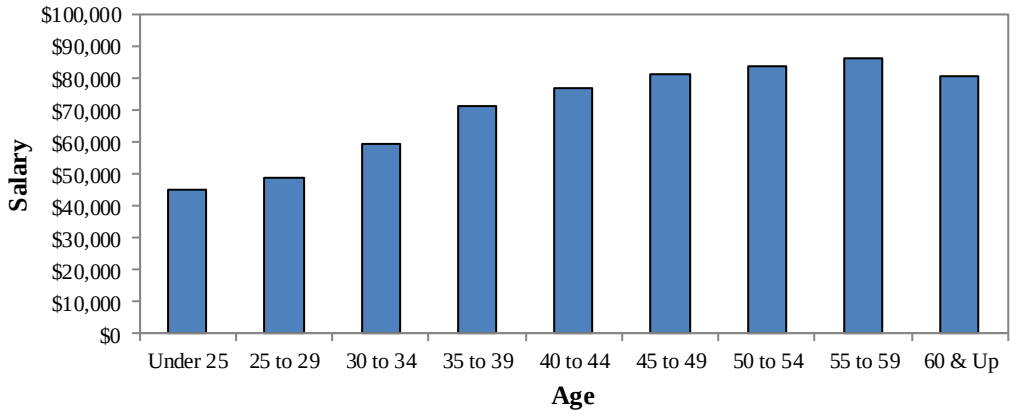
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTIVE MEMBERS
as of Apri1 30, 2019

Total

	Number			Annual Reported Compensation*		
Age	Male	Female	Total	Male	Female	Total**
Under 25	18	4	22	$ 809,692	$ 177,936	$ 987,628
25 to 29	98	25	123	4,741,312	1,242,721	5,984,034
30 to 34	139	24	163	8,399,457	1,293,706	9,693,162
35 to 39	179	33	212	12,879,052	2,244,361	15,123,413
40 to 44	196	35	231	15,135,942	2,654,915	17,790,857
45 to 49	259	39	298	21,102,120	3,178,322	24,280,442
50 to 54	153	15	168	12,934,302	1,190,794	14,125,096
55 to 59	46	7	53	3,938,443	641,892	4,580,336
60 & Up	7	2	9	522,060	202,668	724,728
Total**	1,095	184	1,279	$ 80,462,380	$ 12,827,315	$ 93,289,696

* Compensation reported in the valuation data for the prior plan year with annualization of pay for new hires.
** Numbers may not add due to rounding

Average Salary by Age



Average age:	41.4
Average service:	14.4
Average salary:	$72,940

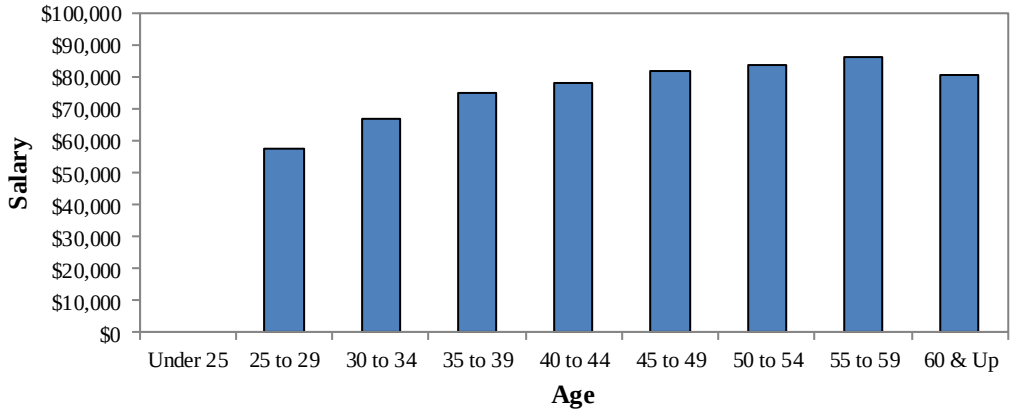
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTIVE MEMBERS
as of Apri1 30, 2019

Tier I

	Number			Annual Reported Compensation*		
Age	Male	Female	Total	Male	Female	Total**
Under 25	0	0	0	$ 0	$ 0	$ 0
25 to 29	6	2	8	346,068	114,753	460,821
30 to 34	83	8	91	5,610,906	491,257	6,102,163
35 to 39	153	24	177	11,545,862	1,775,841	13,321,704
40 to 44	189	32	221	14,775,535	2,499,831	17,275,365
45 to 49	256	38	294	20,945,679	3,124,136	24,069,815
50 to 54	153	15	168	12,934,302	1,190,794	14,125,096
55 to 59	46	7	53	3,938,443	641,892	4,580,336
60 & Up	7	2	9	522,060	202,668	724,728
Total**	893	128	1,021	$ 70,618,855	$ 10,041,173	$ 80,660,028

* Compensation reported in the valuation data for the prior plan year with annualization of pay for new hires.
** Numbers may not add due to rounding

Average Salary by Age



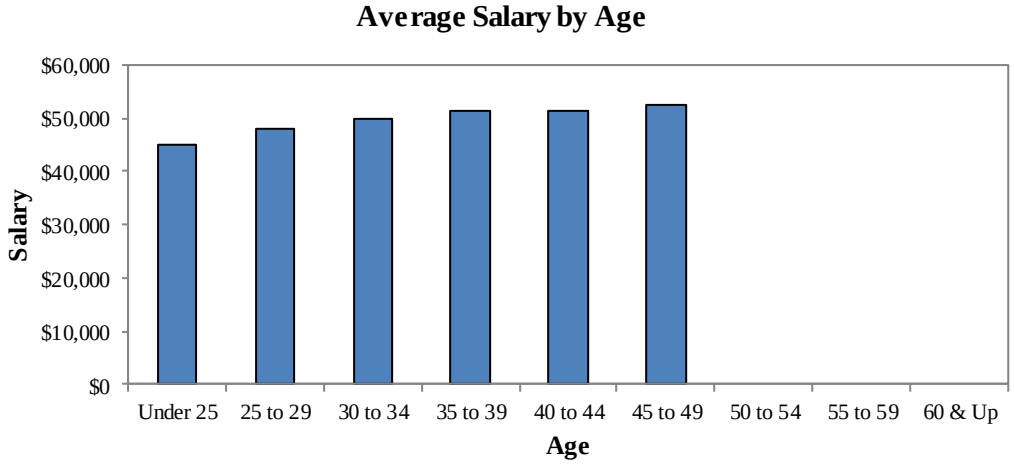
Average age:	44.2
Average service:	17.5
Average salary:	$79,001

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTIVE MEMBERS
as of Apri1 30, 2019

Tier II

	Number			Annual Reported Compensation*		
Age	Male	Female	Total	Male	Female	Total**
Under 25	18	4	22	$ 809,692	$ 177,936	$ 987,628
25 to 29	92	23	115	4,395,244	1,127,969	5,523,213
30 to 34	56	16	72	2,788,551	802,449	3,591,000
35 to 39	26	9	35	1,333,190	468,520	1,801,710
40 to 44	7	3	10	360,407	155,084	515,491
45 to 49	3	1	4	156,441	54,185	210,627
50 to 54	0	0	0	0	0	0
55 to 59	0	0	0	0	0	0
60 & Up	0	0	0	0	0	0
Total**	202	56	258	$ 9,843,525	$ 2,786,143	$ 12,629,668

* Compensation reported in the valuation data for the prior plan year with annualization of pay for new hires.
** Numbers may not add due to rounding



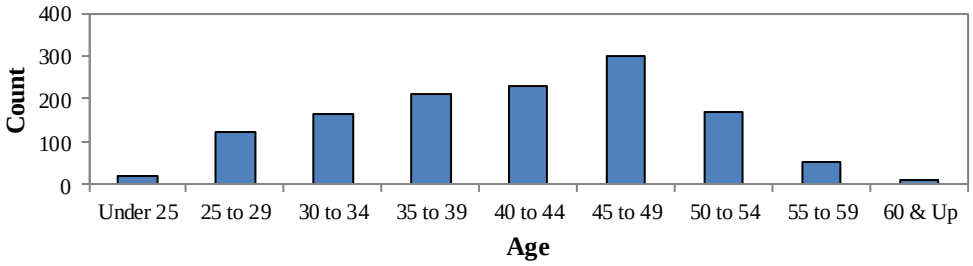
Average age:	30.1
Average service:	2.5
Average salary:	$48,952

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
DISTRIBUTION OF ACTIVE MEMBERS
as of April 30, 2019

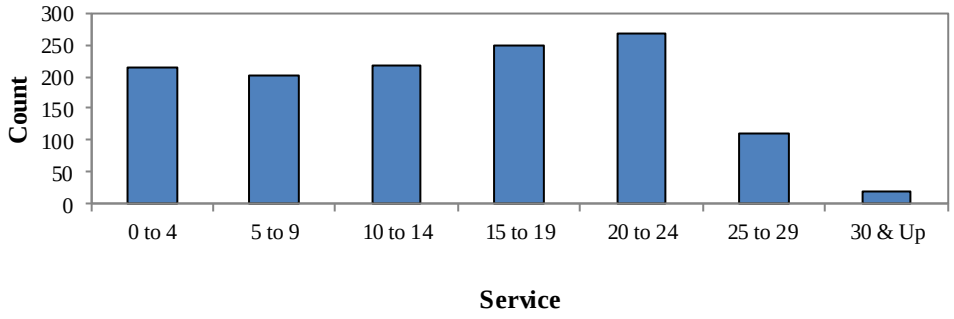
Total

	Years of Service							
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	Total
Under 25	22	0	0	0	0	0	0	22
25 to 29	102	21	0	0	0	0	0	123
30 to 34	55	88	20	0	0	0	0	163
35 to 39	25	53	99	35	0	0	0	212
40 to 44	7	23	62	110	29	0	0	231
45 to 49	3	10	25	81	154	25	0	298
50 to 54	0	7	7	17	66	66	5	168
55 to 59	0	0	3	5	13	18	14	53
60 & Up	0	0	0	0	5	2	2	9
Total	214	202	216	248	267	111	21	1,279

Age Distribution



Service Distribution

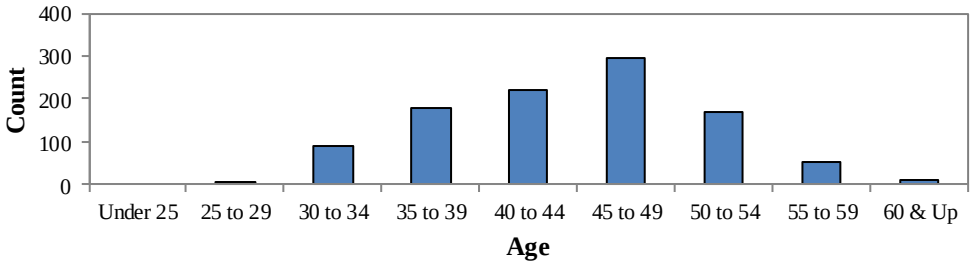


POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
DISTRIBUTION OF ACTIVE MEMBERS
as of April 30, 2019

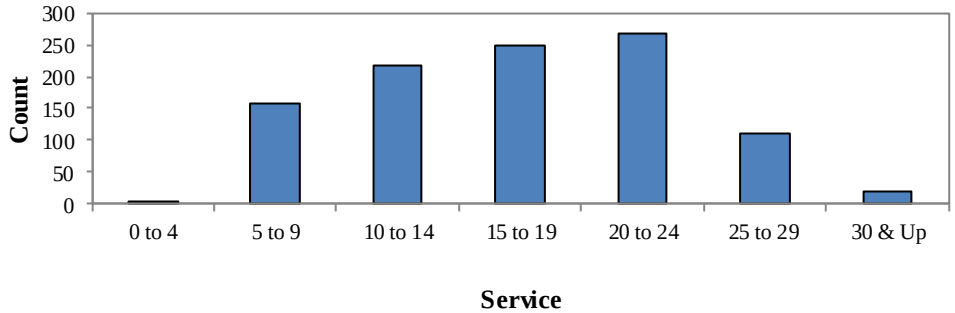
Tier I

	Years of Service							
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	Total
Under 25	0	0	0	0	0	0	0	0
25 to 29	1	7	0	0	0	0	0	8
30 to 34	0	71	20	0	0	0	0	91
35 to 39	0	43	99	35	0	0	0	177
40 to 44	0	20	62	110	29	0	0	221
45 to 49	0	9	25	81	154	25	0	294
50 to 54	0	7	7	17	66	66	5	168
55 to 59	0	0	3	5	13	18	14	53
60 & Up	0	0	0	0	5	2	2	9
Total	1	157	216	248	267	111	21	1,021

Age Distribution



Service Distribution

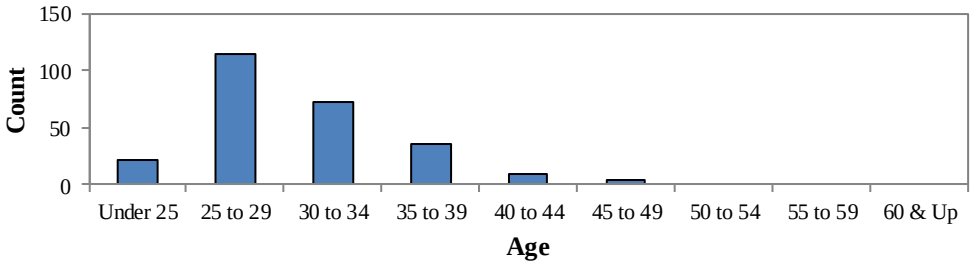


POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
DISTRIBUTION OF ACTIVE MEMBERS
as of April 30, 2019

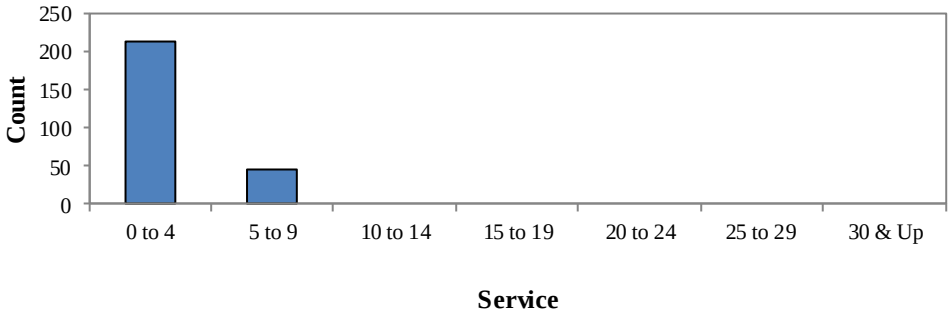
Tier II

	Years of Service							
Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	Total
Under 25	22	0	0	0	0	0	0	22
25 to 29	101	14	0	0	0	0	0	115
30 to 34	55	17	0	0	0	0	0	72
35 to 39	25	10	0	0	0	0	0	35
40 to 44	7	3	0	0	0	0	0	10
45 to 49	3	1	0	0	0	0	0	4
50 to 54	0	0	0	0	0	0	0	0
55 to 59	0	0	0	0	0	0	0	0
60 & Up	0	0	0	0	0	0	0	0
Total	213	45	0	0	0	0	0	258

Age Distribution



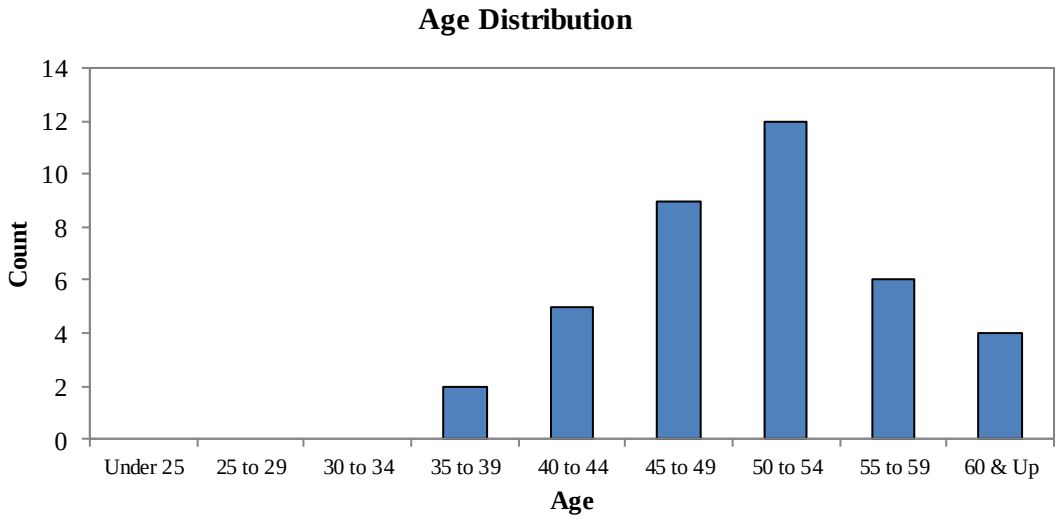
Service Distribution



POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF INACTIVE VESTED MEMBERS
as of April 30, 2019

	Number			Current Monthly Benefit at Retirement*		
Age	Male	Female	Total	Male	Female	Total**
Under 25	0	0	0	$ 0	$ 0	$ 0
25 to 29	0	0	0	0	0	0
30 to 34	0	0	0	0	0	0
35 to 39	2	0	2	4,459	0	4,459
40 to 44	5	0	5	11,420	0	11,420
45 to 49	6	3	9	15,336	9,429	24,765
50 to 54	11	1	12	33,551	2,244	35,794
55 to 59	5	1	6	31,716	4,725	36,442
60 & Up	3	1	4	18,630	4,750	23,380
Total**	32	6	38	$ 115,112	$ 21,148	$ 136,260

*Does not include supplemental benefits
** Numbers may not add due to rounding



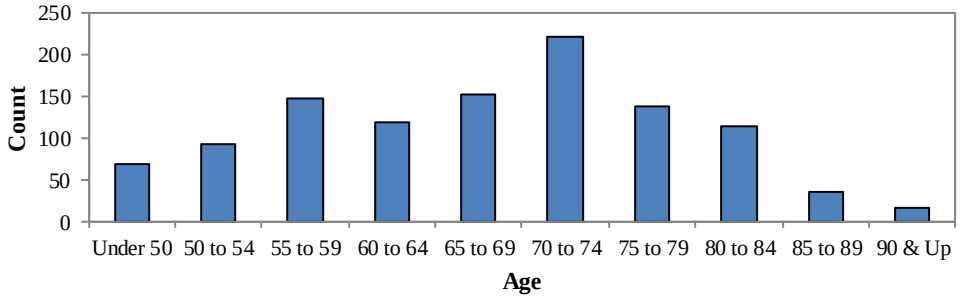
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF RETIRED MEMBERS
as of Apri1 30, 2019

Healthy & Disabled Retirees

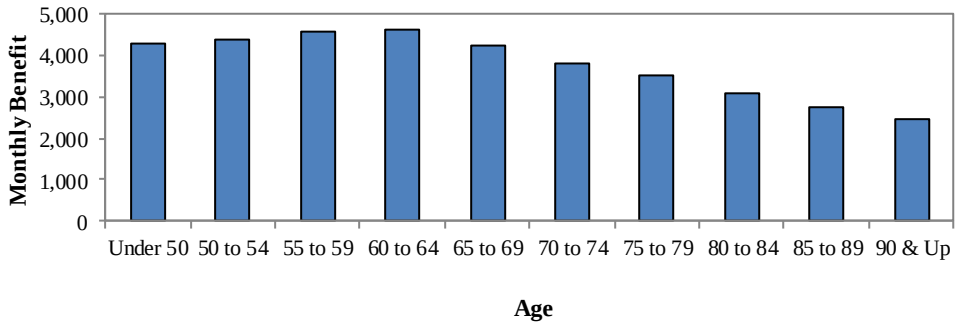
	Number			Monthly Benefit*		
Age	Male	Female	Total	Male	Female	Total**
Under 50	50	17	67	$ 214,424	$ 71,229	$ 285,653
50 to 54	78	14	92	340,231	61,094	401,324
55 to 59	122	25	147	565,213	105,470	670,683
60 to 64	91	27	118	428,338	117,398	545,737
65 to 69	124	27	151	532,967	105,615	638,582
70 to 74	211	10	221	795,391	41,202	836,594
75 to 79	138	0	138	485,158	0	485,158
80 to 84	112	1	113	346,673	3,016	349,689
85 to 89	35	0	35	96,290	0	96,290
90 & Up	15	1	16	37,599	1,588	39,187
Total**	976	122	1,098	$ 3,842,284	$ 506,613	$ 4,348,897

*Does not include supplemental benefits
** Numbers may not add due to rounding

Age Distribution



Average Benefit

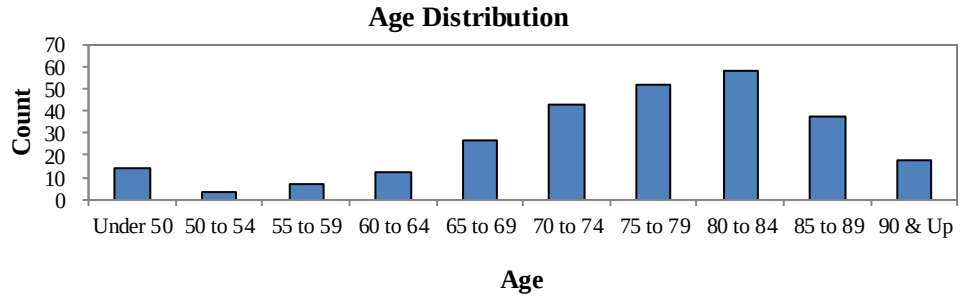


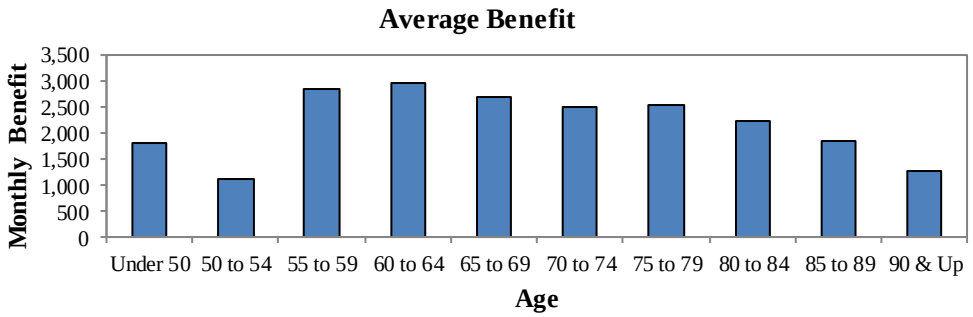
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF RETIRED MEMBERS
as of Apri1 30, 2019

Beneficiaries

	Number			Monthly Benefit*		
Age	Male	Female	Total	Male	Female	Total**
Under 50	7	7	14	$ 9,322	$ 15,953	$ 25,276
50 to 54	0	3	3	0	3,353	3,353
55 to 59	1	6	7	1,440	18,323	19,763
60 to 64	1	11	12	600	34,652	35,252
65 to 69	0	27	27	0	72,017	72,017
70 to 74	1	42	43	1,690	105,443	107,132
75 to 79	0	52	52	0	131,703	131,703
80 to 84	0	58	58	0	127,935	127,935
85 to 89	0	37	37	0	68,702	68,702
90 & Up	0	18	18	0	22,972	22,972
Total**	10	261	271	$ 13,052	$ 601,054	$ 614,106

*Does not include supplemental benefits
** Numbers may not add due to rounding





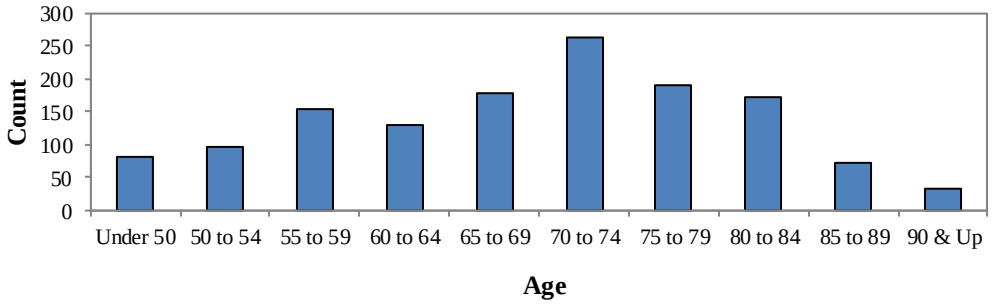
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF RETIRED MEMBERS
as of April 30, 2019

Combined Retirees & Beneficiaries

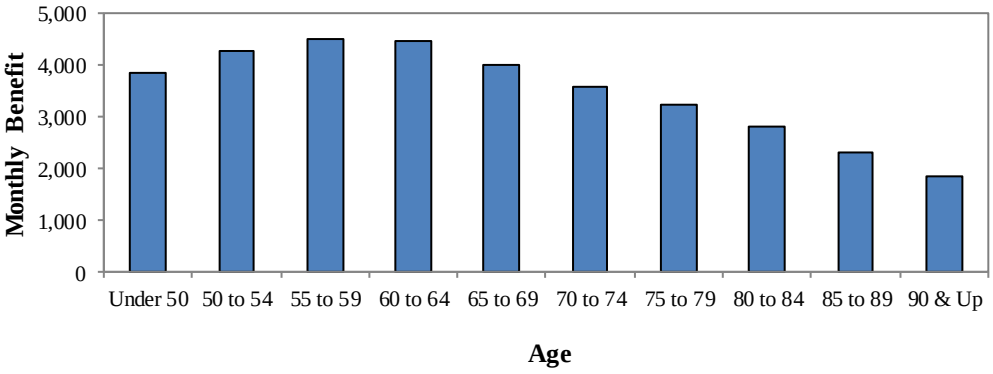
	Number			Monthly Benefit*		
Age	Male	Female	Total	Male	Female	Total**
Under 50	57	24	81	$ 223,746	$ 87,183	$ 310,929
50 to 54	78	17	95	340,231	64,447	404,678
55 to 59	123	31	154	566,653	123,793	690,447
60 to 64	92	38	130	428,938	152,051	580,989
65 to 69	124	54	178	532,967	177,633	710,599
70 to 74	212	52	264	797,081	146,645	943,726
75 to 79	138	52	190	485,158	131,703	616,861
80 to 84	112	59	171	346,673	130,951	477,624
85 to 89	35	37	72	96,290	68,702	164,992
90 & Up	15	19	34	37,599	24,560	62,159
Total**	986	383	1,369	$ 3,855,336	$ 1,107,667	$ 4,963,003

*Does not include supplemental benefits
** Numbers may not add due to rounding

Age Distribution



Average Benefit



POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

SUMMARY OF BENEFIT PROVISIONS

Membership

All police officers who serve as law enforcement officers for compensation become members as a condition of employment.

Tier I member – A person who became a member prior to August 28, 2013 and remains a member on August 28, 2013.

Tier II member – A person who became a member on or after August 28, 2013.

Service Retirement

Eligibility –

Tier I member – 25 years of service, without regard to age, or at age 60 with at least 10 years of service.

Tier II member – 27 years of service, without regard to age, or at age 60 with at least 15 years of service. All members must retire at the completion of 35 years of service, or at age 65, whichever occurs first.

Amount of Pension – For a member retiring prior to August 28, 2000, benefit equal to 2% of Final Compensation multiplied by years of creditable service, subject to a maximum benefit of 60% of Final Compensation.

For a member retiring on or after August 28, 2000 and before August 28, 2013, benefit equal to 2.5% of Final Compensation multiplied by years of creditable service, subject to a maximum benefit of 75% of Final Compensation.

For a member retiring on or after August 28, 2013, benefit equal to 2.5% of Final Compensation multiplied by years of creditable service subject to a maximum benefit of 80% of Final Compensation. After members attain 32 years of creditable service, they will no longer contribute to the Plan and their benefit amount will be frozen.

Final Compensation –

Tier I member – Average annual compensation during the two years of service with the highest salary, whether consecutive or otherwise, or during the entire period of service if less than two years.

Tier II member – Average annual compensation during the three years of service with the highest salary, whether consecutive or otherwise, or during the entire period of service if less than three years.

Deferred Retirement (Vested Termination)

Eligibility – 15 years of creditable service.

Tier I member – Benefit begins at age 55.

Tier II member – Benefit begins at age 60.

Amount of Pension – Computed as service retirement but based on service, Final Compensation and benefit formula in effect at termination of employment. Benefits are unreduced.

Duty Disability

Eligibility – A member in active service who has become permanently unable to perform the full and unrestricted duties of a police officer, as determined by the Board of Police Commissioners, as the exclusive result of an accident or disease occurring in the line of duty.

Amount of Pension – For a member retiring on or after August 28, 2001 and before August 28, 2013, benefit equal to 75% of Final Compensation payable for life or as long as the permanent disability continues.

For a member retiring on or after August 28, 2013, benefit equal to 80% of Final Compensation payable for life or as long as the permanent disability continues.

Duty disability benefits may be subject to offset or reduction by amounts paid or payable under any Workers' Compensation law. A disability retiree who is not age 60 may be required by the Retirement Board to undergo continuing eligibility reviews once every three years which may include a medical re-examination.

Non-duty Disability

Eligibility – A member in active service, with a minimum of 10 years of service, who has become permanently unable to perform the full and unrestricted duties of a police officer as determined by the Board of Police Commissioners. Disability is not exclusively caused by the actual performance of official duties.

Amount of pension – 2.5% of Final Compensation multiplied by years of creditable service payable for life or as long as the permanent disability continues.

A disability retiree who is not age 60 may be required by the Retirement Board to undergo continuing eligibility reviews once every three years which may include a medical re-examination.

Death in Service – Duty or Non-duty

Eligibility – Benefit payable to a surviving spouse, if any, upon the death of an active member. Benefit payable for the life of the surviving spouse. If there is no surviving spouse, benefit payable to an eligible child or children in equal shares until age 18. No service requirement.

Amount of Pension – 40% of Final Compensation payable to surviving spouse for life.

Child Benefit - $600 annually for each child under the age of 18, if any, until the child reaches age 18 or age 21 if a full time student. A child who is mentally or physically incapacitated from wage earning at the time of a member's death shall qualify, without regard to age, for life or so long as the incapacity existing at time of member's death continues.

Funeral Benefit - $1,000 payable upon the death of an active member.

Line of Duty Death

Eligibility – Benefit payable to a surviving spouse. If no surviving spouse, benefit payable to children under age 21 or children over age 21 if mentally or physically incapacitated from wage earning, in equal shares. Death resulting from performance of official duties; no service requirement.

Amount of Benefit – In addition to benefits payable under Death in Service shown above, a lump sum of $50,000.

Death After Retirement

Eligibility – Benefit payable to an eligible surviving spouse, if any, upon the death of a retired member. Benefit payable for the life of the surviving spouse. If there is no surviving spouse, benefit payable to an eligible child or children in equal shares until age 18.

Amount of Pension –

Tier I member – Benefit equal to 80% of the straight life pension the deceased member was receiving at time of death.

Tier II member – Benefit equal to 50% of the straight life pension the deceased member was receiving at time of death. In lieu of the 50% surviving spouse benefit, a Tier II member may elect, at the time of retirement, a reduced actuarially equivalent annuity of either a 75% or 100% surviving spouse benefit.

Funeral Benefit - $1,000 payable upon the death of a retired member.

Non-Vested Termination

Eligibility – Termination of employment and no pension is or will become payable.

Amount of Benefit – Refund of member's contributions without interest.

Minimum Pension Benefit

Eligibility – Any member who retired entitled to a pension benefit and who either has at least 25 years of creditable service or is retired as a result of an injury or illness. A surviving spouse qualifies for the minimum monthly benefit if the member had at least 25 years of creditable service, died in service, or was retired as a result of an injury or illness.

Amount of Benefit – Minimum monthly benefit of not less than $600 in combined pension benefit and cost-of-living adjustments. The minimum monthly pension benefit is in addition to the Supplemental Retirement Benefit.

Post-Retirement Benefit Increases

Eligibility –

Tier I members and surviving spouses – Member's pension must have commenced by December 31 of prior calendar year.

Tier II members and surviving spouses – Service retirements generally eligible in the year following the year in which member would have attained thirty-two years of service. Duty Disability retirements eligible in year following retirement. Non-duty Disability retirements eligible earlier of year following fifth year after retirement or year following the year in which they would have attained thirty-two years of service. Surviving spouses of retired members eligible at same time member would have been if living.

Amount of Benefit – May receive an annual cost-of-living adjustment in an amount not to exceed 3% of their respective base pension. Base pension is the pension computed under the provisions of the law at the date of retirement, without regard to cost-of-living adjustments. The COLA adjustment is normally effective with the May 31st benefit payment.

Statutes require that the Retirement Board must act upon the advice of a qualified actuary when granting cost of living adjustments. The liabilities in this report assume a 2.5% ad hoc COLA will be granted in each future year.

Member Contributions

10.55% of base pay thru August 31, 2013. Effective September 1, 2013, 11.55% of base pay. No contributions are required for members that remain in active service after completion of 32 years of creditable service.

Supplemental Retirement Benefit

Tier I member – Current and future retired and disabled members and their surviving spouses are eligible to receive $420 per month in addition to pension benefits. The City will reimburse the System $200, so the System is liable for $220 per month.

Tier II member – Current and future retired and disabled members and their surviving spouses are eligible to receive $200 per month in addition to pension benefits. The City will reimburse the System $200, so the System is not liable for this benefit.

Optional Form of Benefit Payment

Tier I member – Member retiring with at least 26 or more years of service may elect to take a portion of their lifetime benefit as a lump-sum distribution (PLOP).

Tier II member – Member retiring with at least 28 or more years of service may elect to take a portion of their lifetime benefit as a lump-sum distribution (PLOP).

Members electing PLOP will receive an actuarially reduced monthly benefit for their lifetime.

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

ACTUARIAL COST METHOD AND ASSUMPTIONS

Actuarial Cost Method

The actuarial cost method is a procedure for allocating the actuarial present value of pension benefits and expenses to time periods. The method used for the valuation is known as the Entry Age Normal actuarial cost method, and has the following characteristics.

(i) The annual normal costs for each individual active member are sufficient to accumulate the value of the member's pension at time of retirement.

(ii) Each annual normal cost is a constant percentage of the member's year-by-year projected covered compensation.

The Entry Age Normal actuarial cost method allocates the actuarial present value of each member's projected benefits on a level basis over the member's assumed pensionable compensation rates between the entry age of the member and the assumed exit ages.

The portion of the actuarial present value allocated to the valuation year is called the normal cost. The portion of the actuarial present value not provided for by the actuarial present value of future normal costs is called actuarial accrued liability. Deducting actuarial assets from the actuarial accrued liability determines the unfunded actuarial accrued liability or (surplus).

Asset Valuation Method

The Board adopted a new asset smoothing method effective with the April 30, 2011 valuation. Under the new methodology, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. No corridor is used with the new method. The change to a new asset smoothing method was implemented by resetting the actuarial value of assets at April 30, 2011 equal to the market value of assets.

Actuarial Assumptions

Valuations beginning with the April 30, 2019 actuarial valuation include assumptions and methods resulting from the experience study covering the 5-year period from May 1, 2012 to April 30, 2017.

The Board adopted a new Funding Policy at their November 8, 2016 meeting. The amortization policy for the unfunded actuarial accrued liability (UAAL) was changed from an open 30-year period (reset to 30 each valuation) to a closed 30-year period (declining by one each valuation), beginning with the April 30, 2017 valuation. Any new UAAL generated as a result of actuarial experience in subsequent years will be layered and amortized over a closed 20-year period.

Investment return: 7.45% per year, net of investment expenses, compounded annually. Contingent on Board approval, the assumption will decrease by 0.05% per year until reaching the ultimate rate of 7.25% in 2023.

Pay increase assumption: Rates for sample years of service are shown below.

	Annual Rate of Pay Increase		
Years of Service	General Wage Growth	Merit and Longevity	Total
0-7	3.00%	5.00%	8.00%
8	3.00%	16.00%	19.00%
9-10	3.00%	2.00%	5.00%
11-12	3.00%	1.00%	4.00%
13+	3.00%	0.00%	3.00%

Price inflation: 2.50% per year, compounded annually.

Active member payroll growth: 3.00% per year, compounded annually.

Mortality Tables:

Healthy Retirees: RP-2000 Healthy Annuitant Table projected to 2017 using Scale AA. Future mortality improvement is projected generationally using the ultimate projection scale of MP-2017.

Disabled Retirees: RP-2000 Healthy Annuitant Table, set forward 5 years, projected to 2017 using Scale AA, also set forward 5 years. Future mortality improvement is projected generationally using the ultimate projection scale of MP-2017, also with a set forward of 5 years.

Actives: RP-2000 Employee Table projected to 2017 using Scale AA. Future mortality improvement is projected generationally using the ultimate projection scale of MP-2017.

Rates of termination from active membership:

Years of Service	% of Active Members Terminating Within Next Year
0	5.00%
1	4.75%
2-9	3.75%
10	3.00%
11-19	1.00%
20	0.30%
21+	0.00%

The rates do not apply to members eligible to retire and do not include separation on account of death or disability. All vested members are assumed to leave their contribution with the System and receive a deferred benefit.

Rates of Disability:

	% of Active Members Becoming Disabled Within Next Year	
Sample Ages	**Male**	**Female**
30	0.075%	0.140%
35	0.390%	0.700%
40	0.550%	1.000%
45	0.600%	1.250%
50	0.800%	1.900%
55	1.456%	3.200%
60	2.579%	5.500%

75% of disabilities are assumed to be duty related

Rates of Retirement:

Active Members Retiring Within Next Year	
Years of Service	**Percent Retiring**
25	20%
26	20%
27	20%
28	20%
29	20%
30	20%
31	20%
32	50%
33	50%
34	50%
35	100%

100% of Tier 1 active members are assumed to retire at age 60, if they have 10 years of service.
100% of Tier 2 active members are assumed to retire at age 65, if they have 15 years of service.

Inactive vested members are assumed to retire at age 55 for Tier I and age 60 for Tier II.

Miscellaneous and Technical Assumptions

Marriage Assumption:	85% of males and 55% of females are assumed to be married for purposes of death-in-service benefits and death-after-retirement benefits. Males are assumed to be 3 years older than their spouses. Actual reported data is utilized for retirees and beneficiaries.
Pay Increase Timing:	Assumed to occur at the start of the fiscal year.
Pay Annualization:	Reported pays for members with less than 1 year of service were annualized for valuation purposes.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year at the start of the year in which the decrement is assumed to occur.
Benefit Service:	Service calculated to the nearest month, as of the decrement date, is used to determine the amount of benefit payable.
Child Beneficiaries:	None assumed.
Other:	Turnover decrement does not operate during retirement eligibility.
Form of Payment:	The assumed normal form of payment for Tier I is an 80% joint and survivor annuity (50% joint and survivor for Tier II), if married. Otherwise, a single life annuity.
Administrative Expense:	0.60% of payroll each year. Administrative expenses beyond this allocation and all investment expenses are assumed to be funded by investment return in excess of the actuarial assumed rate of return.
Valuation of Supplemental Benefits:	The net Supplemental Benefit of $220 per month for Tier I members only ($420 less City paid portion of $200) was valued in the valuation.
Cost of Living Adjustment:	It was assumed that the Retirement Board will grant, on average, a 2.5% cost of living adjustment.

Actuarial Accrued Liability	The difference between the actuarial present value of system benefits and the actuarial value of future normal costs. Also referred to as "accrued liability" or "actuarial liability."
Actuarial Assumptions	Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long term average rate of inflation.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
Actuarial Equivalent	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate assumptions.
Actuarial Cost Method	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of retirement system benefit between future normal cost and actuarial accrued liability. Sometimes referred to as the "actuarial funding method."
Experience Gain (Loss)	The difference between actual experience and actuarial assumptions anticipated experience during the period between two actuarial valuation dates.
Actuarial Present Value	The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest and by probabilities of payment.
Amortization	Paying off an interest-discounted amount with periodic payments of interest and principal, as opposed to paying off with lump sum payment.
Normal Cost	The actuarial present value of retirement system benefits allocated to the current year by the actuarial cost method.
Unfunded Actuarial Accrued Liability	The difference between actuarial accrued liability and the valuation assets. Most retirement systems have an unfunded actuarial accrued liability. They arise each time new benefits are added and each time an actuarial loss is realized. The existence of unfunded actuarial accrued liability is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liability does not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liability and the trend in its amount.

KCPERS Policy

Policy #027 - Funding Policy
Adopted: November 8, 2016
Revised: September 12, 2019

The purpose of the funding policy is to state the overall funding goals for the Police Retirement System of Kansas City, Missouri and Civilian Employees' Retirement System of the Police Department of Kansas City, Missouri (KCPERS or System), the benchmarks that will be used to measure progress in achieving those goals, and the methods and assumptions that will be employed to develop the benchmarks.

I. Funding Goals

The objective is to accumulate sufficient assets during a member's employment with the Kansas City, Missouri Police Department from member and employer contributions to KCPERS (and investment earnings on those contributions) to fully finance the benefits the member receives throughout retirement. In meeting this objective, KCPERS will strive to meet the following funding goals:

- To maintain an increasing ratio of assets to actuarial liabilities and reach a funded ratio of at least 100 percent;
- To maintain adequate asset levels to finance the benefits promised to members;
- To develop a pattern of stable contribution amounts and rates as a percentage of member payroll. This goal is achieved by contribution amounts from the City of Kansas City, Missouri and rates as a percentage of payroll from members of the Systems as set out in sections 86.1000 and 86.1010RSMo. for the Police plan and sections 86.1390 and 86.1400RSMo. for the Civilian Employees' plan. In order to evaluate whether the contribution amounts and rates are sufficient, an annual Actuarial Required Contribution Rate (ARC) will be calculated in the annual valuations of the Systems. The ARC may be referred to in the valuations as the Actuarial Determined Contribution Rate (ADC). Such valuations will be prepared in accordance with the principles of practice promulgated by the Actuarial Standards Board. The ARC will be calculated as the normal cost rate plus the amortization payment on the unfunded actuarial liability, based on the amortization methodology set out in this funding policy. The ARC will never be less than the normal cost rate determined under the Entry Age Normal funding method.
- To provide intergenerational equity for members and taxpayers with respect to KCPERS' contribution requirements.

II. Benchmarks

To track progress in achieving the previously outlined funding goals, the following benchmarks will be measured annually as of the actuarial valuation date (with due recognition that a single year's results may not be indicative of long-term trends):

- **Funded ratio** – The funded ratio, defined as the actuarial value of KCPERS' assets divided by KCPERS' actuarial liability, should be increasing over time, before adjustments for changes in benefits, actuarial methods, and/or actuarial assumptions.
- **Evaluation of Contribution Amounts and Rates –** The Retirement Board Trustees have a fiduciary responsibility to ensure the funding of the Systems by maintaining the contribution amounts and rates set out in state statutes. The Trustees recognize that the ARC will fluctuate from year to year, due to the volatility associated with investing in the financial markets. Therefore, valuation results which produce an ARC that is higher or lower than the current contribution amounts and rates will be submitted to the City for inclusion in the next budget cycle.

III. Actuarial Methods and Assumptions

Actuarial Assumptions: The actuarial assumptions used will be those last adopted by the Trustees based upon the advice and recommendation of the actuary. A formal study of KCPERS' experience shall be conducted by the actuary at least every five years and the results of the study used to form the basis of the actuary's recommendations. In addition, the actual experience compared to the actuarial assumptions will be monitored each year in the annual actuarial valuation by including an analysis of the actuarial gain or loss by source.

Actuarial Cost Method: The actuarial cost method is the means by which the total present value of future benefits for current active and inactive members is allocated to each year of service, including past years. The Entry Age cost method will be used.

Asset Valuation Method: The method of valuing assets is intended to recognize a "smoothed" value of assets that is market related. Asset smoothing methods reduce the effect of short term volatility on contributions while still tracking the overall movement of the market value of assets by recognizing the effects of investment gains and losses over a period of years. The asset valuation method uses the difference between the actual and assumed investment return on the market value of assets, recognized evenly over a five year period. No corridor is used with this asset valuation method.

Amortization of the Unfunded Actuarial Liability (UAL): The UAL as of April 30, 2017 is amortized over a closed, 30-year period. Any new UAL generated as a result of actuarial experience in subsequent years will be separately identified as a new amortization base and amortized over a closed 20 year period. Any new UAL generated as a result of changes to benefits will be amortized over a closed 20 year period. Changes in the UAL resulting from changes in the actuarial assumptions or methods used in the valuation will be amortized over a period not to exceed 25 years, as determined by the Board upon the recommendation of the actuary. All amortization payments will be developed using the level percent of payroll methodology.

IV. Other

Actuarial Audit: The Trustees may have an audit of KCPERS' actuarial valuation results conducted by an independent actuary periodically, as determined by the Trustees. The purpose of such a review is to provide a critique of the reasonableness of the actuarial methods and assumptions in use and to verify the resulting actuarially computed liabilities and contribution rates.

Benefit Changes: An actuarial cost study shall be completed before any change to the benefit structure is made.

Actuarial Projections: The funded status of KCPERS will be monitored on a regular basis, both on a snapshot basis in the actuarial valuation and on a projected basis. The Trustees will periodically have projections of funded status performed to assess the current and expected future progress toward the overall funding goals of KCPERS.

V. Funding Policy Review

It is expected that the funding policy may need to be amended in future years as the funding of the Retirement Systems is a dynamic process which is dependent on a number of variables. Therefore, the funding policy will be reviewed annually following the annual actuarial valuation and amended as necessary by the Trustees.