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Police Retirement System of Kansas City, Missouri

*Actuarial Valuation Report
as of April 30, 2018*





TABLE OF CONTENTS

Section	Page
Actuarial Certification Letter	
Section 1 – Board Summary	1
Section 2 – Scope of the Report.....	9
Section 3 - Assets.....	10
Table 1 – Statement of Net Plan Assets at Market Value	11
Table 2 – Statement of Changes in Net Assets	12
Table 3 – Development of Actuarial Value of Assets.....	13
Section 4 – System Liabilities.....	15
Table 4 – Present Value of Future Benefits (PVFB)	16
Table 5 – Actuarial Accrued Liability	17
Table 6 – Derivation of System Experience Gain/(Loss)	18
Table 7 – Actuarial Gain/(Loss) Analysis By Source.....	19
Table 8 – Projected Benefit Payments	20
Section 5 – City Contributions.....	21
Table 9 – Projected UAAL at May 1, 2019	23
Table 10 – Amortization of the UAAL.....	24
Table 11 – City Contribution Rates	25
Table 12 – Computed and Actual City Contributions Comparative Statement.....	26
Section 6 – Financial Projections	27
Table 13 – Projection of Valuation Results	30
Table 14 – City Contributions under Alternate Scenarios	31
Section 7 – Other Information	32
Table 15 – Summary of Actuarial Methods and Assumptions	33
Table 16 – Schedule of Funding Progress	34
Table 17 – Schedule of City Contributions.....	35
Table 18 – Solvency Test.....	36
Appendices	
A – Summary of Membership Data	37
B – Summary of Benefit Provisions	48
C – Actuarial Cost Methods and Assumptions	52
D – Glossary of Terms	56



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September 20, 2018

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, 2018 for the purpose of determining the actuarial required contribution for the fiscal year ending in 2020. The major findings of the valuation are contained in this report, which reflects the benefit provisions in effect as of April 30, 2018. There were no changes in the benefit provisions or actuarial assumptions and methods since the prior valuation.

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. We found this information to be reasonably consistent and comparable with information reported in prior years. 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,

A handwritten signature in blue ink that reads 'Patrice Beckham'.

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

A handwritten signature in blue ink that reads 'Bryan K. Hoge'.

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



SECTION 1 – BOARD SUMMARY

OVERVIEW

This report presents the results of the April 30, 2018 actuarial valuation of the Police Retirement System of Kansas City, Missouri. 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,
- 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.

There were no changes in the benefit provisions or actuarial assumptions and methods from those used in the prior valuation.

The valuation results provide a “snapshot” view of the System’s financial condition on April 30, 2018. The unfunded actuarial accrued liability (UAAL) increased from the last valuation by \$9 million (from \$266 million to \$275 million). The investment return on the market value of assets for fiscal year 2018 was 9.1%, but due to the asset smoothing method and deferred investment experience, the return on the actuarial value of assets was 6.6%. Since this is less than the assumed rate of return of 7.5%, there was an experience loss on assets of \$7.8 million. Net demographic experience resulted in a gain of \$1.3 million on liabilities, primarily due to cost of living increases that were lower than expected. A detailed analysis of the change in the UAAL from April 30, 2017 to April 30, 2018 is shown on page 4.

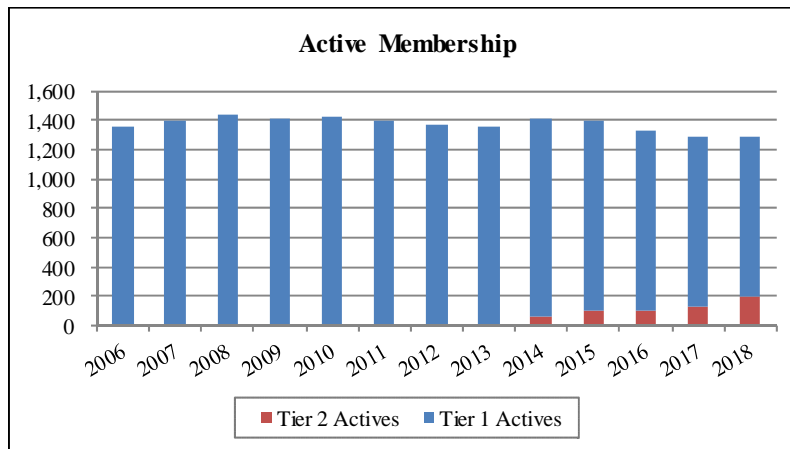
MEMBERSHIP

As the graph on the following page shows, the number of active members in the valuation has generally been decreasing over the past ten or so 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 3.75% each year. A decline in the number of active members usually results in lower covered payroll than the assumed increase of 3.75%. 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 the same. The number of active members in the 2018 valuation was nearly unchanged, 1,284 compared to 1,286 in the 2017 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, 2018, there were 193 members in Tier II out of a total of 1,284 active members (about 15% of total actives). The Tier II portion of total estimated payroll was slightly lower at 10% 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 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.



SECTION 1 – BOARD SUMMARY



ASSETS

As of April 30, 2018, the System had total assets, when measured on a market value basis, of \$879 million. This was an increase of \$52 million from the April 30, 2017 figure of \$827 million. The market value of assets is not used directly in the calculation of the actuarial contribution rate. An asset valuation method which smoothes 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.

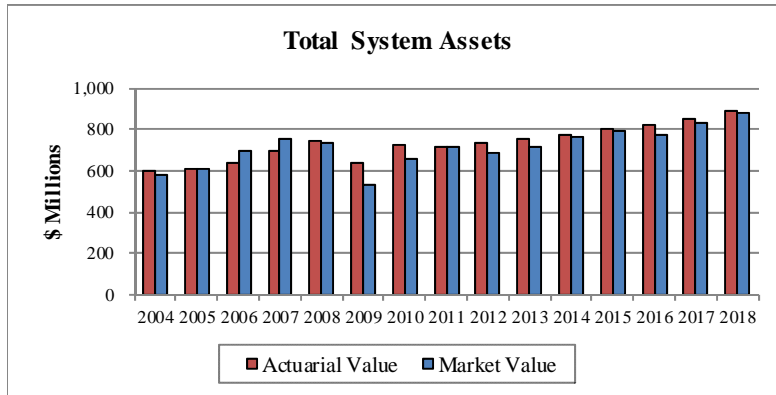
A summary of the asset experience follows:

	Market Value (\$M)	Actuarial Value (\$M)
Assets, April 30, 2017	\$827.3	\$853.3
• City and Member Contributions	43.5	43.5
• Benefit Payments and Refunds	(64.7)	(64.7)
• Administrative Expenses	(0.7)	(0.7)
• Investment Income (net of expenses)	74.1	55.3
Assets, April 30, 2018	\$879.5	\$886.7

The annualized dollar-weighted rate of return, measured on the market value of assets, was 9.1%. However, due to the use of an asset smoothing method, the rate of return on the actuarial value of assets was 6.6%. Since the return on the actuarial value of assets was less than 7.5% (the assumed rate of return) there was an actuarial loss of about \$7.8 million, which increased the unfunded actuarial accrued liability. Historical asset information is shown in the following two graphs:

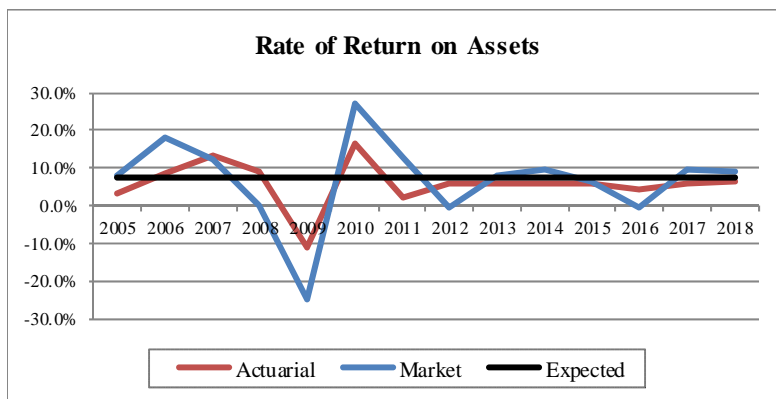


SECTION 1 – BOARD SUMMARY



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's 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, 2018 are:

Actuarial Accrued Liability	\$1,161,788,502
Actuarial Value of Assets	(886,676,375)
Unfunded Actuarial Accrued Liability	\$ 275,112,127



SECTION 1 – BOARD SUMMARY

Between April 30, 2017 and April 30, 2018, the change in the unfunded actuarial accrued liability for the System was as follows (in millions):

	\$ millions
UAAL, April 30, 2017	265.7
<ul style="list-style-type: none"> • effect of contributions less than actuarial rate • expected change due to amortization method • loss from investment return on actuarial assets • demographic experience¹ • all other experience 	0.0 5.9 7.8 (1.3) (3.0)
UAAL, April 30, 2018	275.1

¹ Liability gain is 0.11% of total actuarial liability

The net experience for the plan year was a loss of \$6.5 million, the combined result of an actuarial loss of \$7.8 million on System assets (actuarial value) and a liability gain of \$1.3 million. The liability gain was primarily the result of cost of living increases that were lower than expected, based on the assumptions.

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 following the table.

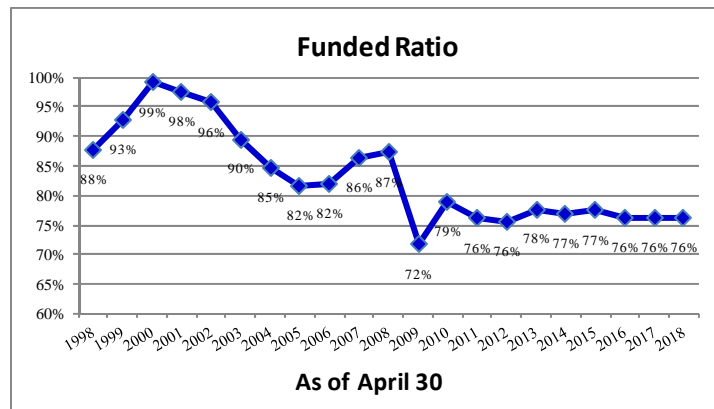
	4/30/2014	4/30/2015	4/30/2016	4/30/2017	4/30/2018
Actuarial Value of Assets (\$M)	\$773.3	\$803.7	\$821.9	\$853.3	\$886.7
Actuarial Accrued Liability (\$M)	\$1,006.2	\$1,037.3	\$1,076.8	\$1,118.9	\$1,161.8
Funded Ratio (Assets/Liability)	77%	77%	76%	76%	76%

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 21 years. The funded ratio was near 100% in the early years of this period, but has declined due to benefit changes, assumption changes, and actual experience that was less favorable than expected based on the actuarial assumptions. Over the more recent past, the funded ratio has stabilized and remained around 75%.



SECTION 1 – BOARD SUMMARY



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 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:

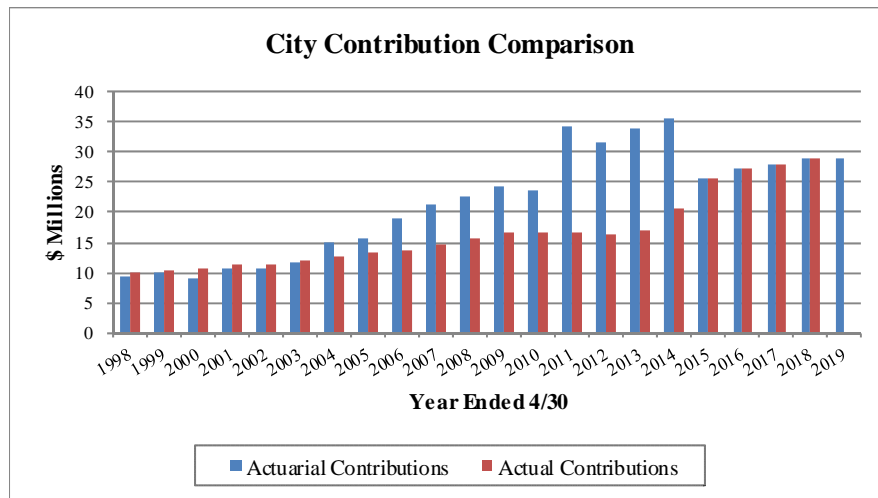
- A “normal cost” for the portion of projected liabilities allocated to service of members during the year following the valuation date, by the actuarial cost method,
- An “unfunded actuarial accrued liability contribution” for the excess of the portion of projected liabilities allocated to service to 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. The actuarial contribution rate for fiscal year end 2020 is computed based on the results of the April 30, 2018 actuarial valuation. The City’s actuarial contribution rate equals the System’s normal cost, budgeted expenses and an amortization payment on the unfunded actuarial accrued liability. The City’s actuarial contribution rate for FY 2020 is 30.36% of payroll (normal cost of 14.43% and an UAAL payment of 15.93%) or \$30,157,170.

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 begun to contribute 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 (29 years remaining as of April 30, 2018). 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. 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.



SECTION 1 – BOARD SUMMARY



FINANCIAL PROJECTIONS

While the April 30, 2018 valuation results indicate the System’s financial status at a single point in time, it does 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.

COMMENTS

As of April 30, 2018, the actuarial accrued liability was \$1,162 million and the actuarial value of assets was \$887 million, resulting in an unfunded actuarial accrued liability (UAAL) of \$275 million. The funded ratio remained the same at 76% as last year and the UAAL increased by \$9 million as a result of actual experience during FY 2018.

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 9.1%, but due to the asset smoothing method only part of the FY 2018 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 6.6%, which resulted in an increase in the UAAL since it was less than the assumed rate of return 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.

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. Beginning September 1, 2013, the City began to contribute the full dollar amount



SECTION 1 – BOARD SUMMARY

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 (29 years remaining as of April 30, 2018). 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. 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.

Based on the Board's 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, 2018 valuation (which indicates the funded ratio exceeds 75%), and the Board's policy, an *ad hoc* COLA can be granted. However, the Board may want to take into consideration that asset returns in the short-term (the next 5 to 10 years) are expected to be significantly lower than the assumed rate of return of 7.5%. If this unfolds as expected, it will cause the funded ratio to decline, perhaps significantly.

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. 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.



SECTION 1 – BOARD SUMMARY

SUMMARY OF PRINCIPAL RESULTS

	4/30/2018 Valuation	4/30/2017 Valuation	% Change
1. MEMBER DATA			
Number of:			
Active members			
- Tier 1	1,091	1,154	(5.5%)
- Tier 2	193	132	46.2%
- Total	1,284	1,286	(0.2%)
Retired Members and Beneficiaries	1,332	1,308	1.8%
Inactive Vested Members	33	31	6.5%
Total Members	2,649	2,625	0.9%
Annual Projected Salaries of Active Members	\$ 95,741,607	\$ 93,410,606	2.5%
Annual Retirement Payments for Retired Members and Beneficiaries*	\$ 56,724,656	\$ 54,078,840	4.9%
*Does not include supplemental benefits			
2. ASSETS AND LIABILITIES			
Total Actuarial Accrued Liability	\$1,161,788,502	\$1,118,948,065	3.8%
Market Value of Assets	879,496,868	827,347,041	6.3%
Actuarial Value of Assets	886,676,375	853,286,442	3.9%
Unfunded Actuarial Accrued Liability	\$ 275,112,127	\$ 265,661,623	3.6%
Funded Ratio (Actuarial Value)	76%	76%	0.0%
Funded Ratio (Market Value)	76%	74%	2.7%
3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL			
Normal Cost	25.98%	26.10%	(0.5%)
Member Financed	(11.55%)	(11.55%)	0.0%
Employer Normal Cost	14.43%	14.55%	(0.8%)
Amortization of Unfunded Actuarial Accrued Liability	15.93%	15.46%	3.0%
Employer Contribution Rate	30.36%	30.01%	1.2%
4. EMPLOYER CONTRIBUTION FOR FOLLOWING FISCAL YEAR			
	\$ 30,157,170	\$ 29,083,743	3.7%



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, 2018. There were no changes to the benefit provisions or the actuarial assumptions and methods from those used in the prior valuation.

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 return scenarios. Section 7 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, 2018.
- 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.



SECTION 3 - ASSETS

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, 2018. 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, 2018, and April 30, 2017, in total and by investment category. Table 2 summarizes the change in the market value of assets from April 30, 2017 to April 30, 2018.

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.



SECTION 3 - ASSETS

TABLE 1
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
STATEMENT OF NET PLAN ASSETS AT MARKET VALUE

Table with 3 columns: Asset Category, April 30, 2018, and April 30, 2017. Rows include Cash & Equivalents, Receivables, Stocks (Common & Preferred Corporate, World Equities, Foreign), Bonds (U.S. Government, Corporate), Asset Backed Securities, Real Estate, Partnerships and Hedge Funds, Building and Other Property Used in Plan Operations, Total Assets, Accounts Payable, and Net Assets Available for Benefits.



SECTION 3 - ASSETS

TABLE 2
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
STATEMENT OF CHANGES IN NET ASSETS
DURING YEAR ENDED APRIL 30, 2018

(Market Value)

1. Market Value of Assets as of April 30, 2017	\$	827,347,041
2. Contributions:		
a. Members	\$	11,390,571
b. City		28,965,207
c. City Supplemental Benefit		3,138,000
d. Miscellaneous		0
e. Total	\$	<u>43,493,778</u>
3. Investment Income		
a. Interest and Dividends	\$	19,222,745
b. Net Securities Lending Income		116,726
c. Investment Expenses		(5,509,157)
d. Net Appreciation (Depreciation) in Fair Value		60,272,338
e. Net Investment Income (Loss)	\$	<u>74,102,652</u>
4. Deductions		
a. Refunds of Member Contributions	\$	954,437
b. Benefits Paid:		
(1) Retirement Benefits		58,420,087
(2) City-paid Supplemental Benefit		3,138,000
(3) Death Benefits		33,000
(4) Partial Lump Sums		2,186,123
c. Administrative Expenses		714,956
d. Total	\$	<u>65,446,603</u>
5. Net Change	\$	52,149,827
[2e] + [3e] - [4d]		
6. Market Value of Assets as of April 30, 2018	\$	879,496,868
[1] + [5]		



SECTION 3 - ASSETS

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.

Table with 5 columns: Description, 4/30/2015, 4/30/2016, 4/30/2017, 4/30/2018. Rows include Market Value of Assets, Contributions, Benefits and Expenses, Expected Net Investment Income, Expected Value of Assets, Market Value of Assets, and Excess/(Shortfall) of Net Investment Income.



SECTION 3 - ASSETS

**TABLE 3
(continued)**

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

1. Excess/(Shortfall) of Investment Income	
a. Year ending 4/30/2018	\$ 12,859,972
b. Year ending 4/30/2017	15,337,659
c. Year ending 4/30/2016	(61,832,667)
d. Year ending 4/30/2015	(9,685,066)
e. Total	\$ <u>(43,320,102)</u>
2. Deferral of Excess/(Shortfall) of Investment Income	
a. Year ending 4/30/2018 (80%)	\$ 10,287,978
b. Year ending 4/30/2017 (60%)	9,202,595
c. Year ending 4/30/2016 (40%)	(24,733,067)
d. Year ending 4/30/2015 (20%)	(1,937,013)
e. Total	\$ <u>(7,179,507)</u>
3. Market Value End of Year	879,496,868
4. Actuarial Value End of year (3) - (2e)	886,676,375
5. Ratio of Actuarial Value to Market Value	100.8%
6. Difference Between Actuarial & Market Value	\$ 7,179,507
7. Rate of Return on Actuarial Value of Assets	6.6%
8. Rate of Return on Market Value of Assets	9.1%



SECTION 4 – SYSTEM LIABILITIES

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, 2018. 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, 2018, 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 cost of living adjustment for all future years as it better reflects the 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.



SECTION 4 – SYSTEM LIABILITIES

TABLE 4
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
PRESENT VALUE OF FUTURE BENEFITS (PVFB)
AS OF APRIL 30, 2018

1. Active employees		
a. Retirement Benefit	\$	581,011,505
b. Pre-Retirement Death Benefit		5,549,796
c. Withdrawal Benefit		6,361,598
d. Disability Benefit		70,827,186
e. Supplemental Benefit		18,137,159
f. Total	\$	<u>681,887,244</u>
2. Inactive Vested Members		
a. Retirement Benefit	\$	12,052,664
b. Supplemental Benefit		691,786
c. Total	\$	<u>12,744,450</u>
3. In Pay Members		
a. Retirees	\$	485,476,522
b. Disabled Members		101,500,314
c. Beneficiaries		61,293,430
d. Supplemental Benefit		33,643,082
e. Partial Lump Sum Payable		0
f. Total	\$	<u>681,913,348</u>
4. Total Present Value of Future Benefits		
[1f] + [2c] + [3f]	\$	1,376,545,042



SECTION 4 – SYSTEM LIABILITIES

TABLE 5
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
ACTUARIAL ACCRUED LIABILITY
AS OF APRIL 30, 2018

1. Active employees		
a. Present Value of Future Benefits	\$	681,887,244
b. Present Value of Future Normal Costs		214,756,540
c. Actuarial Accrued Liability [1a] - [1b]	\$	<u>467,130,704</u>
2. Inactive Vested Members	\$	12,744,450
3. In Pay Members		
a. Retirees	\$	485,476,522
b. Disabled Members		101,500,314
c. Beneficiaries		61,293,430
d. Supplemental Benefit		33,643,082
e. Partial Lump Sum Payable		0
f. Total	\$	<u>681,913,348</u>
4. Total Actuarial Accrued Liability	\$	1,161,788,502
[1c] + [2] + [3f]		



SECTION 4 – SYSTEM LIABILITIES

TABLE 6

POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI

DERIVATION OF SYSTEM EXPERIENCE GAIN/(LOSS)

Liabilities

1. Actuarial liability as of May 1, 2017	\$ 1,118,948,065
2. Normal cost for year	22,401,375
3. Assumed investment return on (1) & (2)	85,601,208
4. Benefit payments during FYE 2018, excluding supplemental benefits	(61,593,647)
5. Interest on benefit payments	(2,268,005)
6. Expected actuarial liability as of April 30, 2018	\$ 1,163,088,996
7. Actuarial liability as of April 30, 2018	\$ 1,161,788,502

Assets

8. Actuarial value of assets as of May 1, 2017	\$ 853,286,442
9. Actual contributions, excluding supplemental benefits	40,355,778
10. Benefit payments, excluding supp. benefits and expenses during FYE 2018	(62,308,603)
11. Interest on items (8), (9) and (10)	63,188,135
12. Expected actuarial value of assets as of April 30, 2018	\$ 894,521,752
13. Actual actuarial value of assets as of April 30, 2018	\$ 886,676,375

Gain / (Loss)

14. Expected unfunded actuarial liability (6) – (12)	\$ 268,567,244
15. Actual unfunded actuarial liability (7) – (13)	\$ 275,112,127
16. Actuarial Gain / (Loss) (14) – (15)	\$ (6,544,883)
17. Actuarial Gain / (Loss) on Actuarial Assets (13) – (12)	\$ (7,845,377)
18. Actuarial Gain / (Loss) on Actuarial Liability (6) – (7)	\$ 1,300,494



SECTION 4 – SYSTEM LIABILITIES

TABLE 7
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
ACTUARIAL GAIN/(LOSS) ANALYSIS BY SOURCE

Source of Gain/(Loss)	Gain/(Loss) (\$M)
Retiree Mortality	1.5
Withdrawal	0.9
Retirement	1.1
Death	0.6
Disability	(1.9)
Salary	0.3
New actives	(0.3)
COLA Experience	2.5
Other	(3.4)
	<hr/>
Total Liability Gain/(Loss)	1.3
Asset Gain/(Loss)	(7.8)
Total Gain/(Loss)	(6.5)

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, 2018. The "Retirees" column shows benefits expected to be paid to all other members. This includes those who, as of April 30, 2018, 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

Table with 4 columns: Year Ending April 30, Actives, Retirees, Total. Rows range from 2019 to 2038.



SECTION 5 – CITY CONTRIBUTIONS

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, 2018 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 2020. 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, 2018, 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 (29 years remaining as of April 30, 2018). 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 3.75% 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.



SECTION 5 – CITY CONTRIBUTIONS

Contribution Rate Summary

In Table 9, the UAAL is projected to the beginning of FY 2020. 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.



SECTION 5 – CITY CONTRIBUTIONS

TABLE 9
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
PROJECTED UAAL AT MAY 1, 2019

1. Actuarial Accrued Liability as of April 30, 2018	\$ 1,161,788,502
2. Actuarial Value of Assets	\$ 886,676,375
3. Unfunded Actuarial Accrued Liability as of April 30, 2018	\$ 275,112,127
4. Total Contribution Rate for FYE 2019*	41.56%
5. Normal Cost Rate	25.98%
6. Contribution Rate Applied to Fund the UAAL for FYE 2019 (4) - (5)	15.58%
7. Expected Payroll for FYE 2019	\$ 95,741,607
8. Projected UAAL on May 1, 2019 [(3) * 1.075] - [(6) * (7) * 1.075 ⁻⁵]	\$ 280,279,736

* Reflects member contributions of 11.55% and City contributions of 30.01%



SECTION 5 – CITY CONTRIBUTIONS

TABLE 10
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
AMORTIZATION OF THE UAAL

Amortization Base	Original Amount	Remaining Payments	Projected May 1, 2019 Balance	Annual Payment*
2017 Legacy UAAL	\$ 271,513,914	29	\$ 276,340,904	\$ 15,546,755
2018 Experience	3,938,832	20	3,938,832	280,202
Total			\$ 280,279,736	\$ 15,826,957

* Payment amount reflects mid-year timing.

1. Total UAAL Amortization Payments	\$	15,826,957
2. Expected Payroll for FYE 2020	\$	99,331,917
3. UAAL Amortization Payment Rate (1) / (2)		15.93%



SECTION 5 – CITY CONTRIBUTIONS

TABLE 11
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
CITY CONTRIBUTION RATES

	Valuation Date*	
	4/30/2018	4/30/2017
Normal Cost		
Service pensions	19.08%	19.19%
Pre-retirement death pensions	0.49%	0.49%
Disability pensions	4.35%	4.30%
Termination benefits	1.21%	1.23%
Supplemental retirement benefit	0.45%	0.49%
Administrative expenses	0.40%	0.40%
Total Normal Cost	25.98%	26.10%
Total UAAL Amortization payment	15.93%	15.46%
Total Actuarial Contribution Rate	41.91%	41.56%
Member Portion	11.55%	11.55%
City Portion	30.36%	30.01%

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



SECTION 5 – CITY CONTRIBUTIONS

TABLE 12
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
COMPUTED AND ACTUAL CITY CONTRIBUTIONS COMPARATIVE STATEMENT

Fiscal Year Beginning <u>May 1</u>	Valuation Date <u>April 30</u>	Projected Annual <u>Payroll</u>	Fiscal Year Contributions							
			As a % of Projected Pay			\$ Contributions				
			Annual Required <u>Contribution</u>		Reported FY City <u>Contribution</u>	Annual Required <u>Contribution</u>	Projected FY City <u>Contribution</u>	Actual Dollar <u>Contribution</u>		
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		
2019		2018	99,331,917	30.36			30,157,170			

* 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.



SECTION 6 – FINANCIAL PROJECTIONS

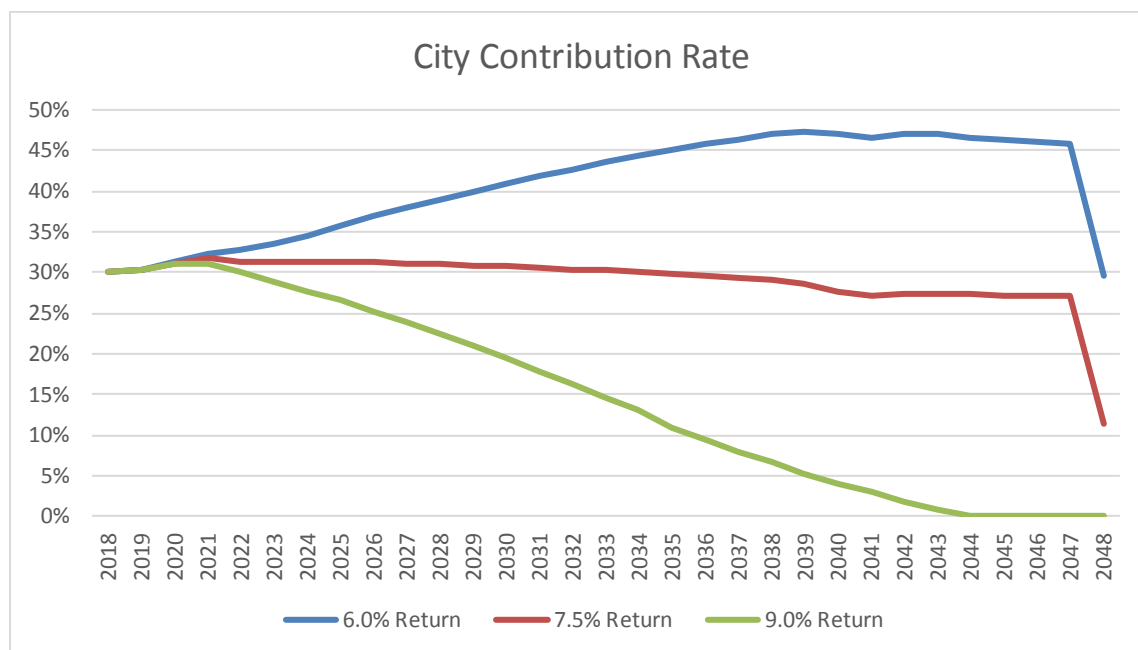
While the April 30, 2018 valuation results indicate the System’s financial status at a single point in time, projections are used to identify trends and to compare various scenarios rather than predicting some future state of events. The projections model a change in one key variable to provide insight 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:

- (1) Returns of 7.5% (current assumption),
- (2) Returns of 9.0% (1.5% higher than the current assumption), and
- (3) Returns of 6.0% (1.5% 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

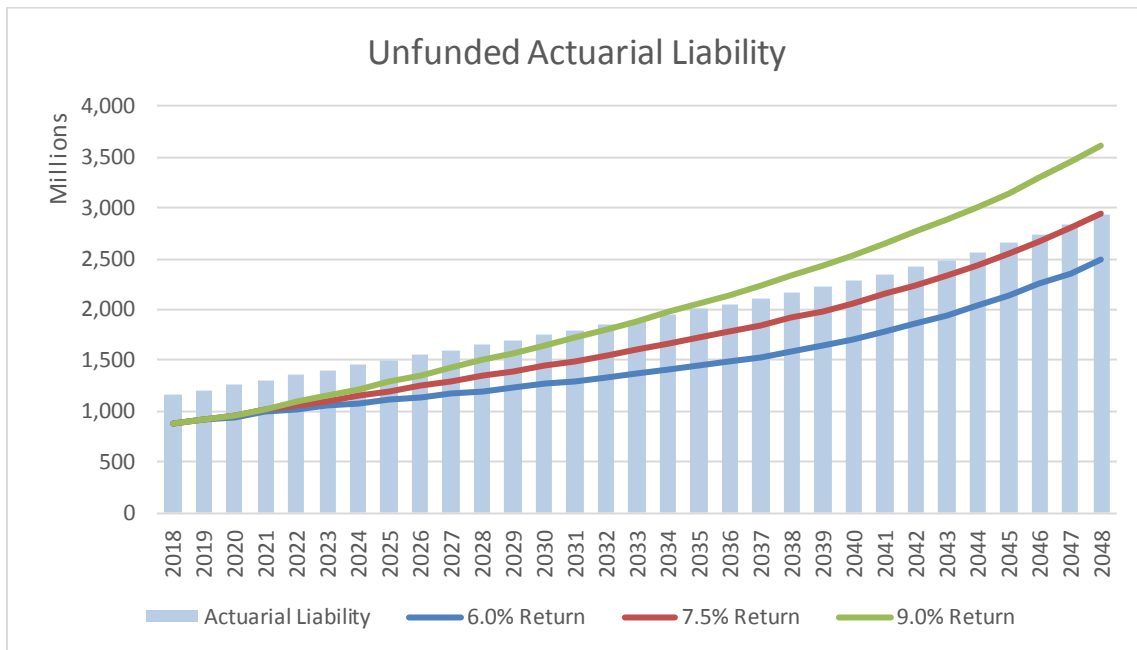
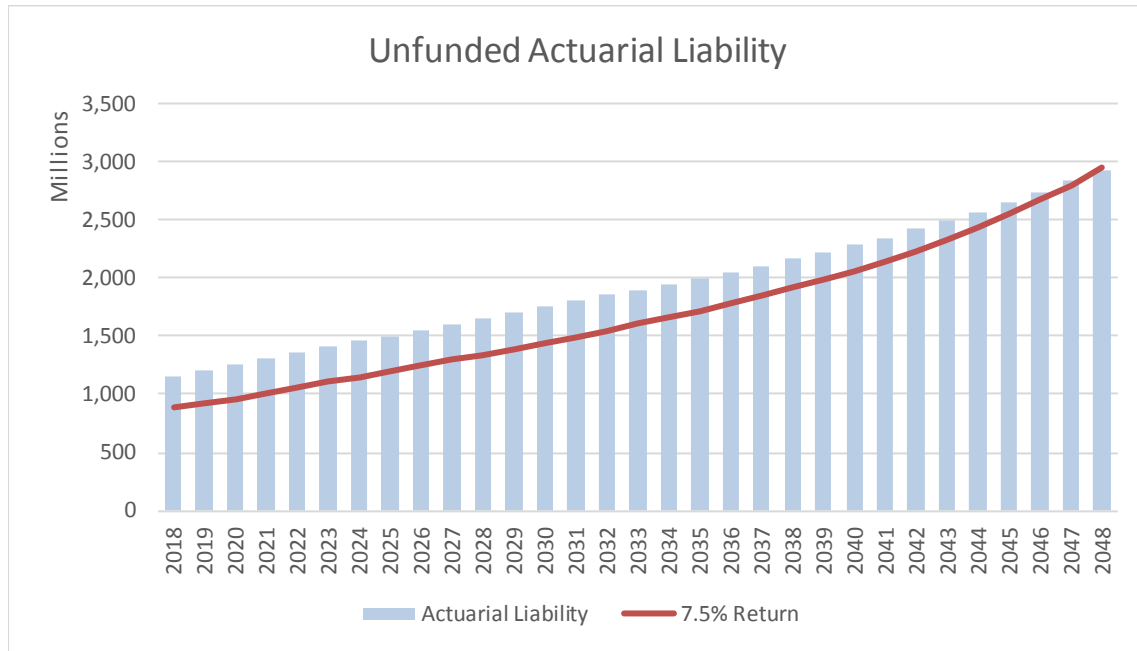




SECTION 6 – FINANCIAL PROJECTIONS

Unfunded Actuarial Accrued 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.





SECTION 6 – FINANCIAL PROJECTIONS

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).

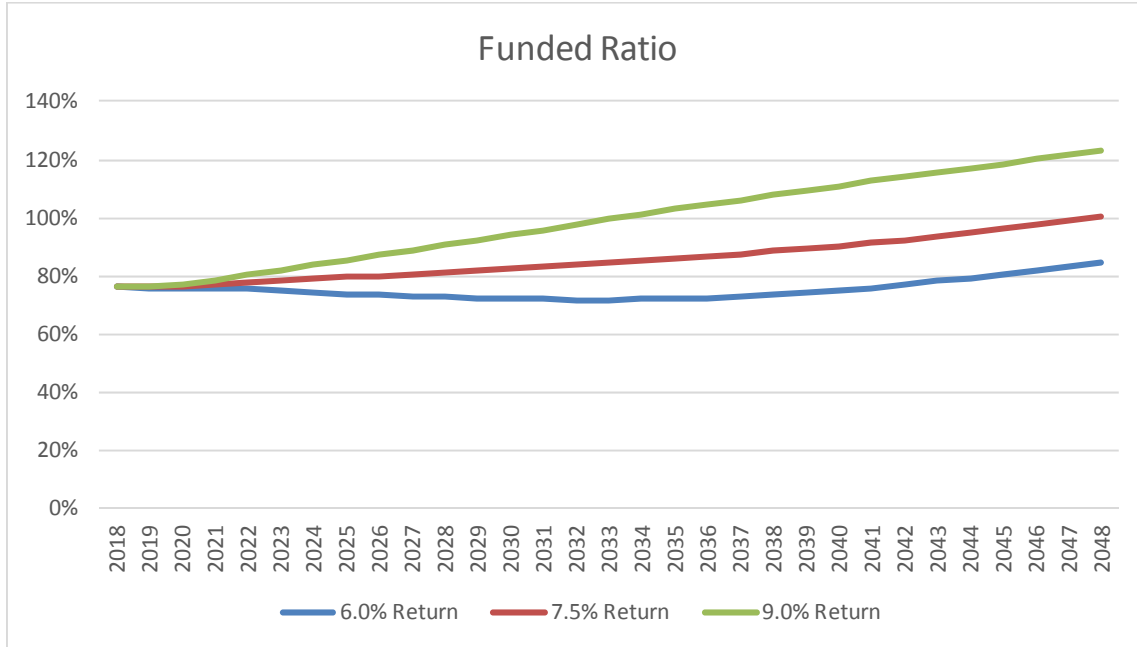




TABLE 13
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
PROJECTION OF VALUATION RESULTS

Projection Based on April 30, 2018 Actuarial Valuation 7.5% 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)
2018	\$95,742	\$1,161,789	\$886,676	\$275,112	76.3%	15.93%	25.98%	41.91%	11.55%	30.36%	\$30,157
2019	97,999	1,209,435	920,299	289,136	76.1%	16.82%	25.88%	42.70%	11.55%	31.15%	31,671
2020	100,613	1,258,051	957,066	300,985	76.1%	17.48%	25.78%	43.26%	11.55%	31.71%	33,101
2021	103,091	1,307,111	1,007,668	299,444	77.1%	17.25%	25.66%	42.91%	11.55%	31.36%	33,542
2022	105,956	1,356,515	1,056,456	300,059	77.9%	17.20%	25.55%	42.75%	11.55%	31.20%	34,298
2023	108,807	1,406,065	1,102,867	303,197	78.4%	17.36%	25.40%	42.76%	11.55%	31.21%	35,232
2024	111,624	1,455,866	1,149,780	306,086	79.0%	17.54%	25.24%	42.78%	11.55%	31.23%	36,168
2025	114,489	1,505,586	1,197,150	308,436	79.5%	17.72%	25.07%	42.79%	11.55%	31.24%	37,107
2026	117,882	1,555,114	1,244,938	310,175	80.1%	17.83%	24.87%	42.70%	11.55%	31.15%	38,097
2027	121,439	1,604,572	1,293,439	311,133	80.6%	17.93%	24.70%	42.63%	11.55%	31.08%	39,159
2028	125,665	1,654,172	1,342,713	311,460	81.2%	17.95%	24.50%	42.45%	11.55%	30.90%	40,287
2029	129,652	1,703,793	1,393,000	310,793	81.8%	18.02%	24.33%	42.35%	11.55%	30.80%	41,430
2030	134,304	1,753,196	1,443,824	309,372	82.4%	18.02%	24.15%	42.17%	11.55%	30.62%	42,666
2031	139,310	1,802,399	1,495,650	306,749	83.0%	17.98%	23.99%	41.97%	11.55%	30.42%	43,967
2032	144,662	1,851,876	1,548,797	303,078	83.6%	17.93%	23.83%	41.76%	11.55%	30.21%	45,341
2033	150,113	1,901,338	1,603,201	298,138	84.3%	17.90%	23.71%	41.61%	11.55%	30.06%	46,816
2034	156,431	1,951,314	1,659,257	292,057	85.0%	17.79%	23.59%	41.38%	11.55%	29.83%	48,413
2035	163,045	2,001,987	1,717,657	284,330	85.8%	17.68%	23.48%	41.16%	11.55%	29.61%	50,088
2036	170,196	2,053,995	1,778,908	275,087	86.6%	17.54%	23.40%	40.94%	11.55%	29.39%	51,896
2037	177,879	2,107,892	1,843,789	264,104	87.5%	17.39%	23.32%	40.71%	11.55%	29.16%	53,815
2038	186,057	2,164,072	1,912,985	251,087	88.4%	16.92%	23.25%	40.17%	11.55%	28.62%	55,246
2039	194,089	2,222,821	1,986,898	235,923	89.4%	16.09%	23.19%	39.28%	11.55%	27.73%	55,839
2040	202,767	2,284,231	2,065,087	219,144	90.4%	15.46%	23.15%	38.61%	11.55%	27.06%	56,926
2041	212,211	2,349,470	2,148,027	201,444	91.4%	15.77%	23.12%	38.89%	11.55%	27.34%	60,194
2042	221,546	2,418,696	2,236,624	182,072	92.5%	15.86%	23.11%	38.97%	11.55%	27.42%	63,026
2043	231,049	2,492,040	2,333,029	159,012	93.6%	15.77%	23.10%	38.87%	11.55%	27.32%	65,490
2044	241,004	2,570,310	2,437,783	132,527	94.8%	15.68%	23.10%	38.78%	11.55%	27.23%	68,086
2045	250,913	2,653,609	2,551,044	102,565	96.1%	15.63%	23.09%	38.72%	11.55%	27.17%	70,730
2046	260,783	2,742,037	2,673,132	68,904	97.5%	15.61%	23.10%	38.71%	11.55%	27.16%	73,485
2047	270,394	2,835,390	2,804,181	31,209	98.9%	-0.26%	23.10%	22.84%	11.55%	11.29%	31,672

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



TABLE 14
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
CITY CONTRIBUTIONS UNDER ALTERNATE SCENARIOS

Projection Based on April 30, 2018 Actuarial Valuation Board's Funding Policy (Layered Amortization of UAL) Amounts in Thousands			
Fiscal Year End April 30,*	City Contribution Amounts at Various Investment Returns		
	7.5% Return	9.0% Return	6.0% Return
2020	\$30,157	\$30,157	\$30,157
2021	31,671	31,478	31,875
2022	33,101	32,422	33,769
2023	33,542	32,087	34,953
2024	34,298	31,781	36,749
2025	35,232	31,315	39,002
2026	36,168	30,724	41,333
2027	37,107	30,004	43,771
2028	38,097	29,181	46,340
2029	39,159	28,273	49,087
2030	40,287	27,262	51,995
2031	41,430	26,109	55,016
2032	42,666	24,858	58,244
2033	43,967	23,501	61,658
2034	45,341	22,018	65,258
2035	46,816	20,418	69,072
2036	48,413	17,755	73,131
2037	50,088	15,935	77,390
2038	51,896	14,144	81,950
2039	53,815	12,273	86,757
2040	55,246	10,366	91,228
2041	55,839	8,337	94,642
2042	56,926	6,269	98,159
2043	60,194	4,227	103,457
2044	63,026	2,023	107,939
2045	65,490	0	111,707
2046	68,086	0	115,694
2047	70,730	0	119,748
2048	73,485	0	124,053
2049	31,672	0	83,234

*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, 2020 is based on the ADC calculated in the April 30, 2018 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, 2018.



SECTION 7 – OTHER INFORMATION

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 liability was determined as part of an actuarial valuation of the System as of April 30, 2018. The actuarial assumptions used in determining the actuarial liability can be found in Appendix C.



TABLE 15
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

Valuation Date	April 30, 2018
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	7.50%, net of investment expenses
Projected salary increases including wage inflation at 3.75%	3.75% to 8.75%
Cost-of-living adjustments	2.50% simple

Membership of the plan consisted of the following at April 30, 2018, the date of the latest actuarial valuation:

Retirees and beneficiaries receiving benefits	1,332
Inactive vested members entitled to but not yet receiving benefits*	33
Active plan members	<u>1,284</u>
Total	2,649

*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.



SECTION 7 – OTHER INFORMATION

TABLE 16
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%

* 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.



SECTION 7 – OTHER INFORMATION

TABLE 17
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

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



SECTION 7 – OTHER INFORMATION

TABLE 18
POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SOLVENCY TEST

Valuation Date	Entry Age Actuarial Accrued Liabilities			Valuation Assets	Portion of Actuarial Accrued Liabilities Covered by Reported Assets		
	(1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active Members (Employer Financed Portion)		(1)	(2)	(3)
<u>April 30</u>							
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

* After changes in actuarial assumptions or methods

After benefit changes

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



APPENDIX A – SUMMARY OF MEMBERSHIP DATA

MEMBER DATA RECONCILIATION

April 30, 2017 to April 30, 2018

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 04/30/2017	1,286	861	190	257	31	2,625
New Members	63	0	0	0	0	63
Rehires	4	0	0	0	0	4
Terminations						
Refunded	(16)	0	0	0	(2)	(18)
Inactive Vested	(8)	0	0	0	8	0
Retirements						
Service	(35)	39	0	0	(4)	0
Disability	(8)	0	8	0	0	0
Deaths						
Cashed Out/Payments Ended	0	0	0	(2)	0	(2)
With Beneficiary	(1)	(14)	(2)	19	0	2
Without Beneficiary	(1)	(13)	(3)	(8)	0	(25)
Data Adjustments	0	0	0	0	0	0
Members as of 04/30/2018	1,284	873	193	266	33	2,649

Note: There are 5 officers who are counted with the Inactive Vested members as of April 30, 2018 because they have continued employment past 32 years of service.



APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

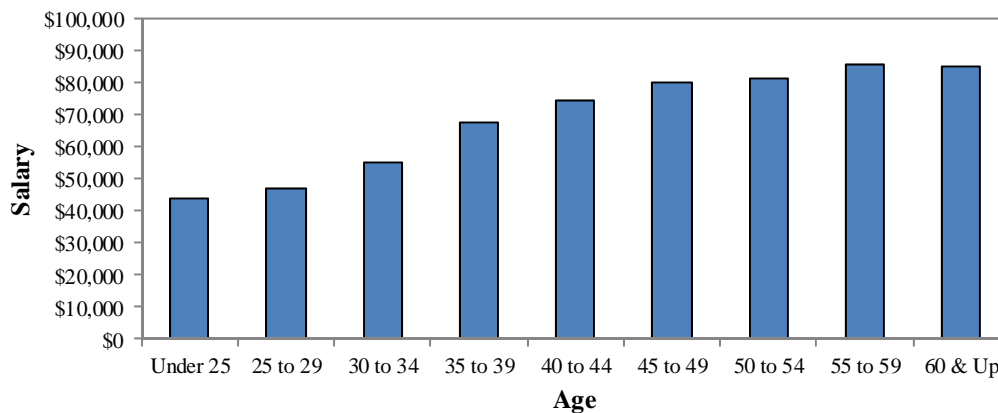
**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTIVE MEMBERS
as of April 30, 2018**

Age	Number			Annual Reported Compensation*		
	Male	Female	Total	Male	Female	Total**
Under 25	12	1	13	\$ 524,203	\$ 43,404	\$ 567,607
25 to 29	85	27	112	4,012,354	1,249,563	5,261,917
30 to 34	139	26	165	7,748,766	1,381,588	9,130,354
35 to 39	200	30	230	13,544,151	1,955,497	15,499,648
40 to 44	195	37	232	14,598,568	2,742,030	17,340,598
45 to 49	258	38	296	20,660,308	3,029,595	23,689,903
50 to 54	156	18	174	12,830,490	1,326,451	14,156,940
55 to 59	45	6	51	3,822,429	554,034	4,376,463
60 & Up	8	3	11	668,994	264,774	933,768
Total**	1,098	186	1,284	\$ 78,410,264	\$ 12,546,935	\$ 90,957,198

* 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: 41.6
 Average service: 14.7
 Average salary: \$70,839



APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTIVE MEMBERS
as of April 30, 2018**

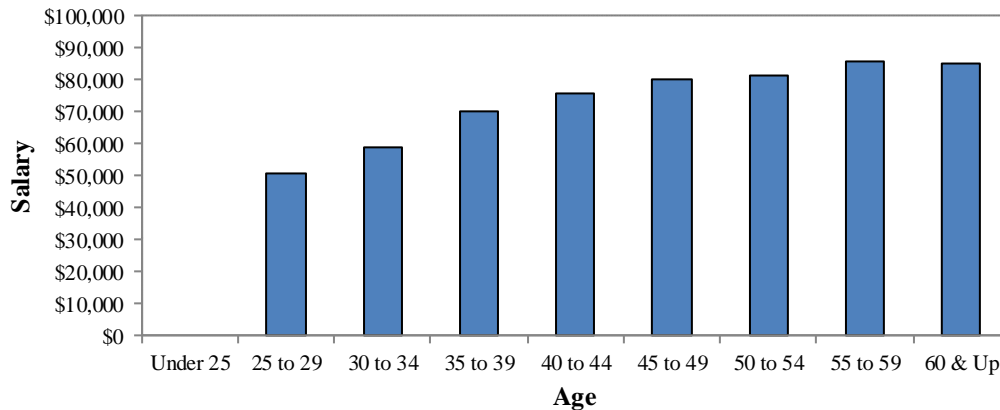
Tier I

Age	Number			Annual Reported Compensation*		
	Male	Female	Total	Male	Female	Total**
Under 25	0	0	0	\$ 0	\$ 0	\$ 0
25 to 29	17	3	20	862,274	153,838	1,016,112
30 to 34	98	15	113	5,810,898	869,072	6,679,970
35 to 39	180	23	203	12,597,663	1,620,732	14,218,395
40 to 44	191	34	225	14,400,232	2,602,656	17,002,888
45 to 49	257	37	294	20,617,527	2,981,603	23,599,130
50 to 54	156	18	174	12,830,490	1,326,451	14,156,940
55 to 59	45	6	51	3,822,429	554,034	4,376,463
60 & Up	8	3	11	668,994	264,774	933,768
Total**	952	139	1,091	\$ 71,610,506	\$ 10,373,160	\$ 81,983,666

* 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: 43.7
 Average service: 16.9
 Average salary: \$75,145



APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF ACTIVE MEMBERS
as of April 30, 2018**

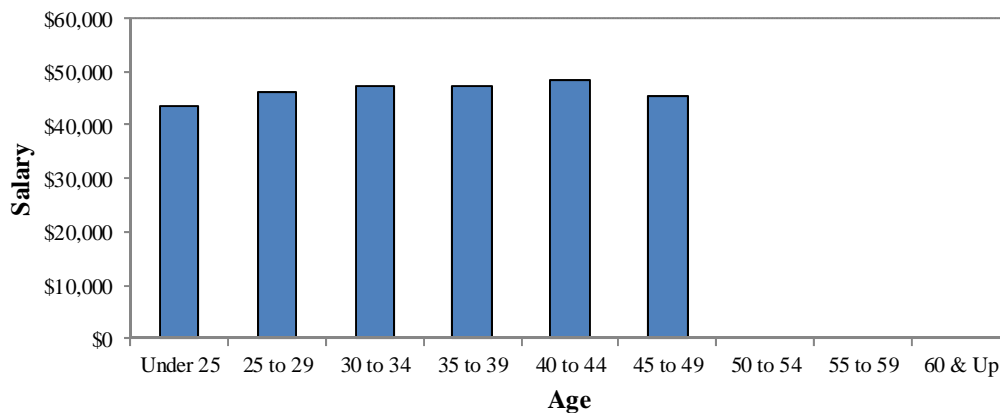
Tier II

Age	Number			Annual Reported Compensation*		
	Male	Female	Total	Male	Female	Total**
Under 25	12	1	13	\$ 524,203	\$ 43,404	\$ 567,607
25 to 29	68	24	92	3,150,080	1,095,725	4,245,805
30 to 34	41	11	52	1,937,868	512,516	2,450,384
35 to 39	20	7	27	946,489	334,765	1,281,253
40 to 44	4	3	7	198,336	139,374	337,710
45 to 49	1	1	2	42,781	47,992	90,773
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**	146	47	193	\$ 6,799,758	\$ 2,173,775	\$ 8,973,532

* 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: 30.1
 Average service: 2.3
 Average salary: \$46,495



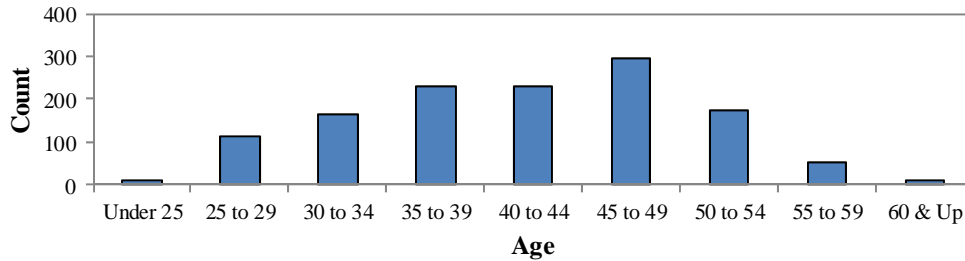
APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
DISTRIBUTION OF ACTIVE MEMBERS
as of April 30, 2018**

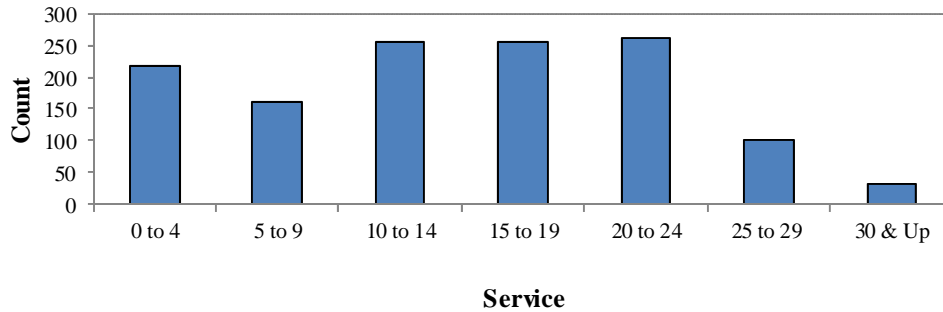
Total

Age	Years of Service							Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	
Under 25	13	0	0	0	0	0	0	13
25 to 29	98	14	0	0	0	0	0	112
30 to 34	62	69	34	0	0	0	0	165
35 to 39	30	44	123	33	0	0	0	230
40 to 44	8	21	56	119	28	0	0	232
45 to 49	3	7	32	83	154	17	0	296
50 to 54	2	5	7	19	67	61	13	174
55 to 59	0	0	2	2	11	20	16	51
60 & Up	0	0	1	0	2	3	5	11
Total	216	160	255	256	262	101	34	1,284

Age Distribution



Service Distribution





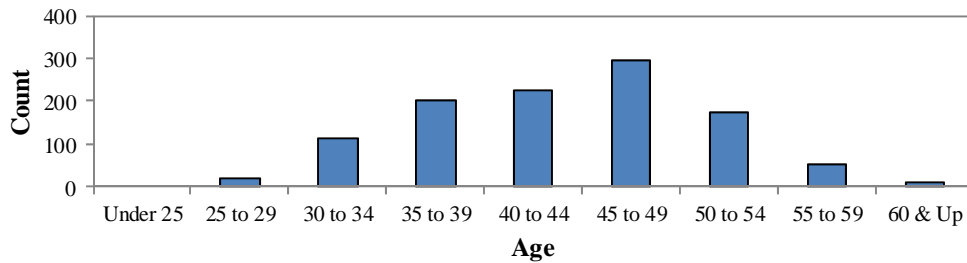
APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
DISTRIBUTION OF ACTIVE MEMBERS
as of April 30, 2018**

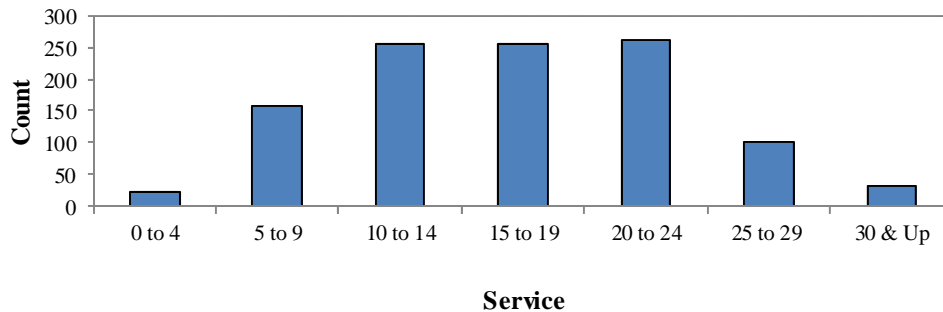
Tier I

Age	Years of Service							Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	
Under 25	0	0	0	0	0	0	0	0
25 to 29	6	14	0	0	0	0	0	20
30 to 34	11	68	34	0	0	0	0	113
35 to 39	3	44	123	33	0	0	0	203
40 to 44	1	21	56	119	28	0	0	225
45 to 49	1	7	32	83	154	17	0	294
50 to 54	2	5	7	19	67	61	13	174
55 to 59	0	0	2	2	11	20	16	51
60 & Up	0	0	1	0	2	3	5	11
Total	24	159	255	256	262	101	34	1,091

Age Distribution



Service Distribution





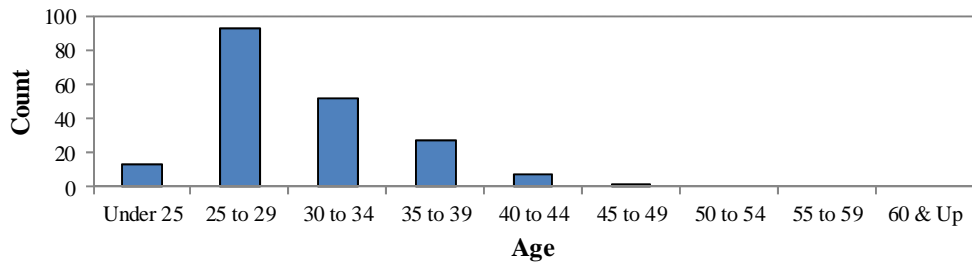
APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
DISTRIBUTION OF ACTIVE MEMBERS
as of April 30, 2018**

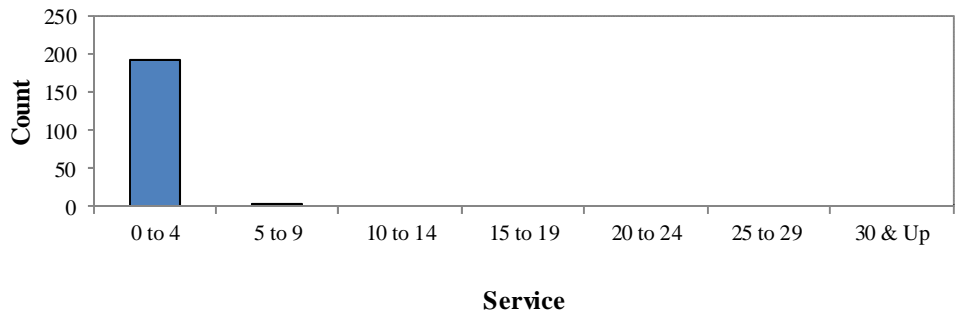
Tier II

Age	Years of Service							Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & Up	
Under 25	13	0	0	0	0	0	0	13
25 to 29	92	0	0	0	0	0	0	92
30 to 34	51	1	0	0	0	0	0	52
35 to 39	27	0	0	0	0	0	0	27
40 to 44	7	0	0	0	0	0	0	7
45 to 49	2	0	0	0	0	0	0	2
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	192	1	0	0	0	0	0	193

Age Distribution



Service Distribution





APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

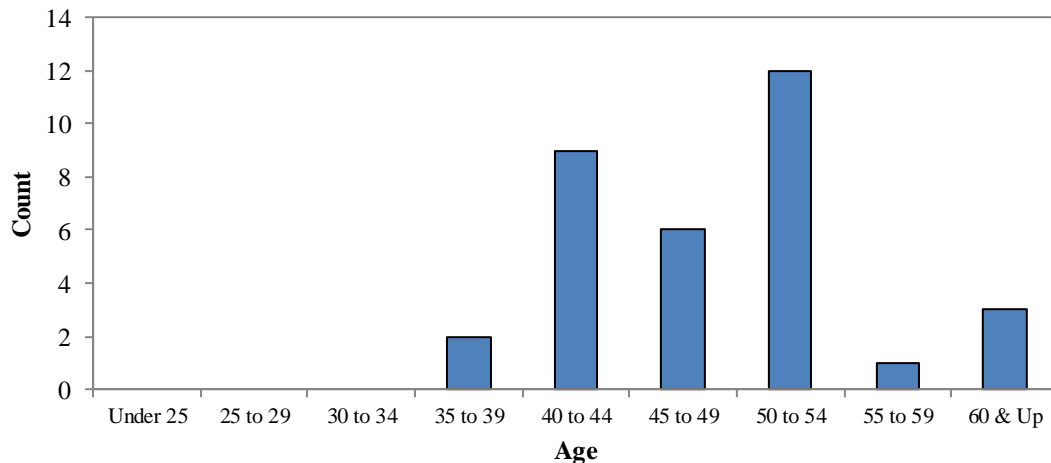
**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF INACTIVE VESTED MEMBERS
as of April 30, 2018**

Age	Number			Current Monthly Benefit at Retirement*		
	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	9	0	9	21,429	0	21,429
45 to 49	4	2	6	10,264	5,362	15,626
50 to 54	9	3	12	28,280	6,700	34,980
55 to 59	0	1	1	0	4,725	4,725
60 & Up	2	1	3	11,894	4,750	16,644
Total**	26	7	33	\$ 76,327	\$ 21,537	\$ 97,864

*Does not include supplemental benefits

** Numbers may not add due to rounding

Age Distribution





APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF RETIRED MEMBERS
as of April 30, 2018**

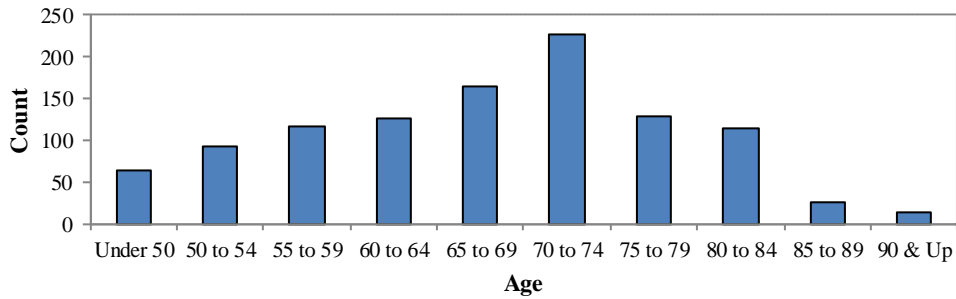
Healthy & Disabled Retirees

Age	Number			Monthly Benefit*		
	Male	Female	Total	Male	Female	Total**
Under 50	47	16	63	\$ 201,008	\$ 64,051	\$ 265,059
50 to 54	79	14	93	338,363	66,741	405,104
55 to 59	92	24	116	418,789	97,807	516,596
60 to 64	99	26	125	465,748	110,572	576,320
65 to 69	140	24	164	564,664	92,503	657,168
70 to 74	218	7	225	809,097	28,964	838,060
75 to 79	128	0	128	441,965	0	441,965
80 to 84	112	1	113	332,981	2,997	335,978
85 to 89	25	0	25	71,509	0	71,509
90 & Up	13	1	14	28,058	1,580	29,637
Total**	953	113	1,066	\$ 3,672,181	\$ 465,213	\$ 4,137,395

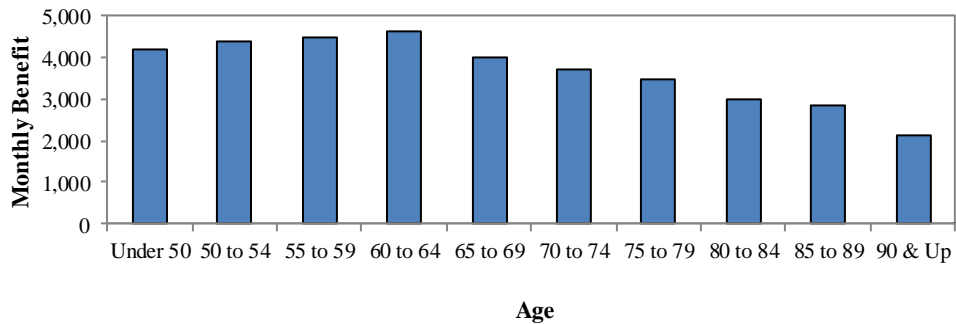
*Does not include supplemental benefits

** Numbers may not add due to rounding

Age Distribution



Average Benefit





APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF RETIRED MEMBERS
as of April 30, 2018**

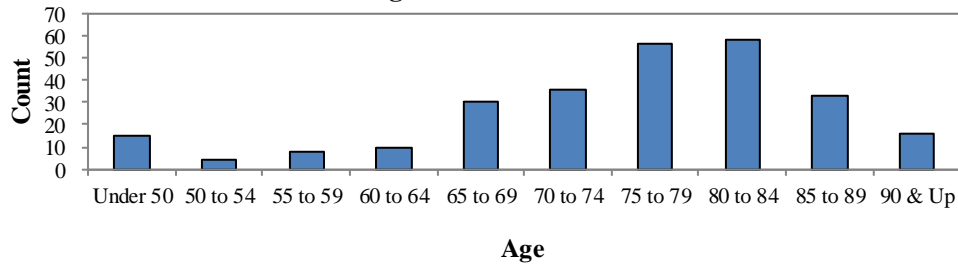
Beneficiaries

Age	Number			Monthly Benefit*		
	Male	Female	Total	Male	Female	Total**
Under 50	6	9	15	\$ 7,049	\$ 15,914	\$ 22,963
50 to 54	0	4	4	0	10,333	10,333
55 to 59	1	7	8	1,429	19,164	20,593
60 to 64	1	9	10	600	28,873	29,473
65 to 69	0	30	30	0	75,595	75,595
70 to 74	1	35	36	1,680	90,697	92,377
75 to 79	0	56	56	0	136,890	136,890
80 to 84	0	58	58	0	125,093	125,093
85 to 89	0	33	33	0	54,770	54,770
90 & Up	0	16	16	0	21,574	21,574
Total**	9	257	266	\$ 10,757	\$ 578,903	\$ 589,660

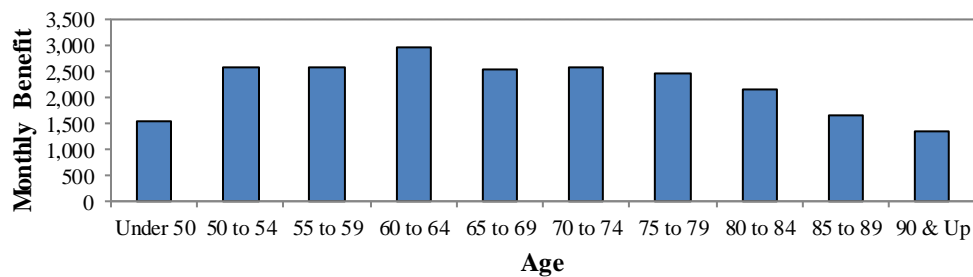
*Does not include supplemental benefits

** Numbers may not add due to rounding

Age Distribution



Average Benefit





APPENDIX A – SUMMARY OF MEMBERSHIP DATA (CONTINUED)

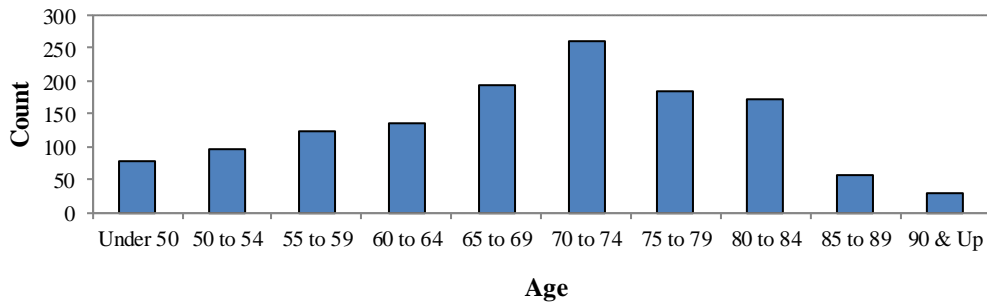
**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI
SUMMARY OF RETIRED MEMBERS
as of April 30, 2018**

Combined Retirees & Beneficiaries

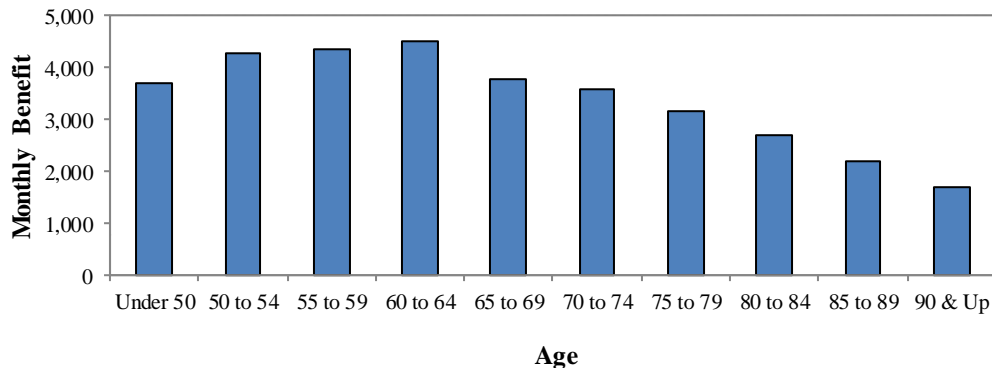
Age	Number			Monthly Benefit*		
	Male	Female	Total	Male	Female	Total**
Under 50	53	25	78	\$ 208,057	\$ 79,965	\$ 288,021
50 to 54	79	18	97	338,363	77,074	415,437
55 to 59	93	31	124	420,218	116,971	537,188
60 to 64	100	35	135	466,348	139,444	605,793
65 to 69	140	54	194	564,664	168,098	732,762
70 to 74	219	42	261	810,776	119,661	930,438
75 to 79	128	56	184	441,965	136,890	578,855
80 to 84	112	59	171	332,981	128,089	461,070
85 to 89	25	33	58	71,509	54,770	126,279
90 & Up	13	17	30	28,058	23,153	51,211
Total**	962	370	1,332	\$ 3,682,938	\$ 1,044,116	\$ 4,727,055

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

Age Distribution



Average Benefit





APPENDIX B – SUMMARY OF BENEFIT PROVISIONS

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.



APPENDIX B – SUMMARY OF BENEFIT PROVISIONS (CONTINUED)

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.



APPENDIX B – SUMMARY OF BENEFIT PROVISIONS (CONTINUED)

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.



APPENDIX B – SUMMARY OF BENEFIT PROVISIONS (CONTINUED)

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, 2013 actuarial valuation include assumptions and methods resulting from the experience study covering the 5-year period from May 1, 2007 to April 30, 2012.

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.



APPENDIX C – ACTUARIAL COST METHODS AND ASSUMPTIONS (CONTINUED)

Investment return: 7.50% per year, net of investment expenses, compounded annually.

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

<u>Years of Service</u>	<u>Annual Rate of Pay Increase</u>		
	<u>General Wage Growth</u>	<u>Merit and Longevity</u>	<u>Total</u>
0	3.75%	5.00%	8.75%
1	3.75%	5.00%	8.75%
2	3.75%	5.00%	8.75%
3	3.75%	5.00%	8.75%
4	3.75%	5.00%	8.75%
5	3.75%	5.00%	8.75%
10	3.75%	2.00%	5.75%
15	3.75%	0.00%	3.75%
20	3.75%	0.00%	3.75%

Price inflation: 3.00% per year, compounded annually.

Active member payroll growth: 3.75% per year, compounded annually.

Mortality Tables:

Healthy Retirees: RP-2000 Healthy Annuitant Table using Scale AA to model future mortality improvement.

Disabled Retirees: RP-2000 Healthy Annuitant Table set forward 5 years using Scale AA to model future mortality improvement.

Actives: RP-2000 Employee Table using Scale AA to model future mortality improvement.

Rates of termination from active membership:

% of Active Members Terminating Within Next Year	
<u>Sample Ages</u>	<u>All Members</u>
25	5.51%
30	3.61%
35	2.21%
40	1.25%
45	0.25%
50	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.



APPENDIX C – ACTUARIAL COST METHODS AND ASSUMPTIONS (CONTINUED)

Rates of Disability:

<u>Sample Ages</u>	<u>% of Active Members Becoming Disabled Within Next Year</u>	
	<u>Male</u>	<u>Female</u>
30	0.062%	0.134%
35	0.312%	0.672%
40	0.416%	0.896%
45	0.437%	0.941%
50	0.759%	1.635%
55	1.456%	3.136%
60	2.579%	5.555%

55% of disabilities are assumed to be duty related

Rates of Retirement:

<u>Active Members Retiring Within Next Year</u>	
<u>Years of Service</u>	<u>Percent Retiring</u>
25	25%
26	25%
27	20%
28	20%
29	20%
30	15%
31	15%
32	35%
33	30%
34	30%
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.



APPENDIX C – ACTUARIAL COST METHODS AND ASSUMPTIONS (CONTINUED)

Miscellaneous and Technical Assumptions

<i>Marriage Assumption:</i>	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.
<i>Pay Increase Timing:</i>	Assumed to occur at the start of the fiscal year.
<i>Pay Annualization:</i>	Reported pays for members with less than 1 year of service were annualized for valuation purposes.
<i>Decrement Timing:</i>	Decrements of all types are assumed to occur mid-year.
<i>Eligibility Testing:</i>	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.
<i>Benefit Service:</i>	Service calculated to the nearest month, as of the decrement date, is used to determine the amount of benefit payable.
<i>Child Beneficiaries:</i>	None assumed.
<i>Other:</i>	Turnover decrement does not operate during retirement eligibility.
<i>Form of Payment:</i>	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.
<i>Administrative Expense:</i>	0.40% 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.
<i>Valuation of Supplemental Benefits:</i>	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.
<i>Cost of Living Adjustment:</i>	It was assumed that the Retirement Board will grant, on average, a 2.5% cost of living adjustment.



APPENDIX D – GLOSSARY OF TERMS

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	<p>The difference between actuarial accrued liability and the valuation assets.</p> <p>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.</p> <p>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.</p>



KCPERS Policy

Policy #027 - Funding Policy

Adopted: November 8, 2016

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 Systems 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 for 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 period 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. In evaluating the need for adjustments to the Systems’ funding, the longer term trends will first be analyzed and projections performed to determine the potential long term funded status of the System under alternative scenarios.

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.

Unfunded Actuarial Liability (UAL) amortization base: One amortization base shall be used in determining the amortization payment.



Unfunded Actuarial Liability (UAL) amortization period: The amortization period for KCPERS' UAL will be set to between 20 and 30 years in 2017 and will be closed and set to decline one year each year until the UAL established in 2017 is retired. Any new UAL generated as a result of actuarial gains or losses, in subsequent years, will be layered 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. The amortization of the UAL 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.