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# State of Oklahoma Police Pension and Retirement System

## Actuarial Valuation Report as of July 1, 2017

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CONSULTING, LLC
*The experience and dedication you deserve*

September 13, 2017

Board of Trustees
Oklahoma Police Pension and Retirement System
1001 N.W. 63rd Street, Suite 305
Oklahoma City, OK 73116-7335

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Oklahoma Police Pension and Retirement System (OPPRS), prepared as of July 1, 2017.

The purpose of this report is to provide a summary of the funded status of the System as of July 1, 2017, and to calculate the Required State Contribution Rate. While not verifying the data at the source, the actuary performed tests for consistency and reasonability. There have been no changes in assumptions, methods or plan provisions since the last valuation.

The promised benefits of the System are included in the actuarially calculated contribution rates which are developed using the Entry Age Normal cost method. A five-year smoothed market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded actuarial accrued liability (UAAL) that is being amortized by regular annual contributions as a level dollar amount over an open five year period.

We have included some historical information, similar to past financial reporting requirements. Information for reporting under GASB 67 will be prepared separately.

This is to certify that the independent consulting actuaries are members of the American Academy of Actuaries and have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Because the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

Brent Banister, PhD, FSA, EA, FCA, MAAA
Chief Pension Actuary

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

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## OVERVIEW

The Oklahoma Police Pension and Retirement System (OPPRS) provides retirement benefits for police officers employed by any of the approximately 135 participating entities. OPPRS is administered by its own Board of Trustees.

This report presents the results of the July 1, 2017, actuarial valuation for the System. The primary purposes of performing an actuarial valuation are to:

- Determine the employer contribution rate required to fund the System on an actuarial basis;
- Evaluate the sufficiency of the statutory contribution rate;
- 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.

The valuation results provide a snapshot view of the System's financial condition on July 1, 2017. The unfunded actuarial accrued liability for the System decreased by nearly $76 million due to various factors. A detailed analysis of the change in the unfunded actuarial accrued liability from July 1, 2016, to July 1, 2017, is shown on page 4.

The highlights of the valuation are shown below:

| | Actuarial Valuation Date | |
|---|---|---|
| **$(millions)** | **July 1, 2017** | **July, 1 2016** |
| Actuarial Accrued Liability | $ 2,403.1 | $ 2,354.8 |
| Actuarial Value of Assets | $ 2,447.4 | $ 2,323.4 |
| Unfunded Actuarial Accrued Liability | ($44.3) | $ 31.4 |
| Funded Ratio (Actuarial Value) | 101.8% | 98.7% |
| Market Value of Assets | $ 2,395.4 | $ 2,201.7 |
| Funded Ratio (Market Value) | 99.7% | 93.5% |

There was a liability gain of $42 million from demographic experience, primarily from salary increases smaller than expected under the assumptions. The estimated net return on the market value of assets was 11.1% for the year ended June 30, 2017. The actuarial value of assets is determined using a method to smooth investment gains and losses in order to develop more stable contribution rates. The return on the actuarial value of assets was approximately 7.5% which resulted in an actuarial gain of less than $200,000.

## EXPERIENCE: July 1, 2016 to July 1, 2017

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 July 1, 2017. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System, which are generally in excess of the assets. The actuarial process leads to a method of determining the contributions needed by members and employers in the future to balance the System assets and liabilities.

Changes in the System's assets and liabilities impacted the change in the actuarial contribution rates between July 1, 2016, and July 1, 2017. Each component is examined in the following discussion.

## ASSETS

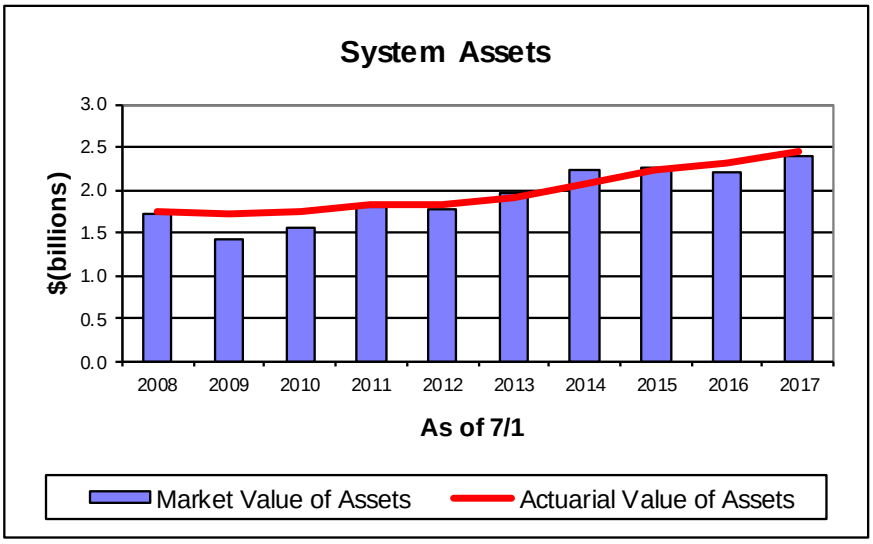
As of July 1, 2017, the System had total funds, when measured on a market value basis, of $2.40 billion. This was an increase from the $2.20 billion balance on July 1, 2016. The market value of assets is not used directly in the calculation of the actuarial contribution rate. An asset valuation method, which smooths the effect of market fluctuations, is used to determine the value of assets used in the valuation, called the "actuarial value of assets". Differences between the actual return on the market value of assets and the assumed return on the actuarial value of assets are phased in over a five-year period. The resulting value must be no less than 80% of the market value and no more than 120% of market value, referred to as "the corridor". See Table 3 for the detailed development of the actuarial value of assets as of July 1, 2017.

The actuarial value of assets as of July 1, 2017, was $2.45 billion. The annualized dollar-weighted rate of return for FY2017, measured on the actuarial value of assets, was approximately 7.5%, which resulted in a small actuarial gain. Measured on the market value of assets, the estimated rate of return was 11.1%.

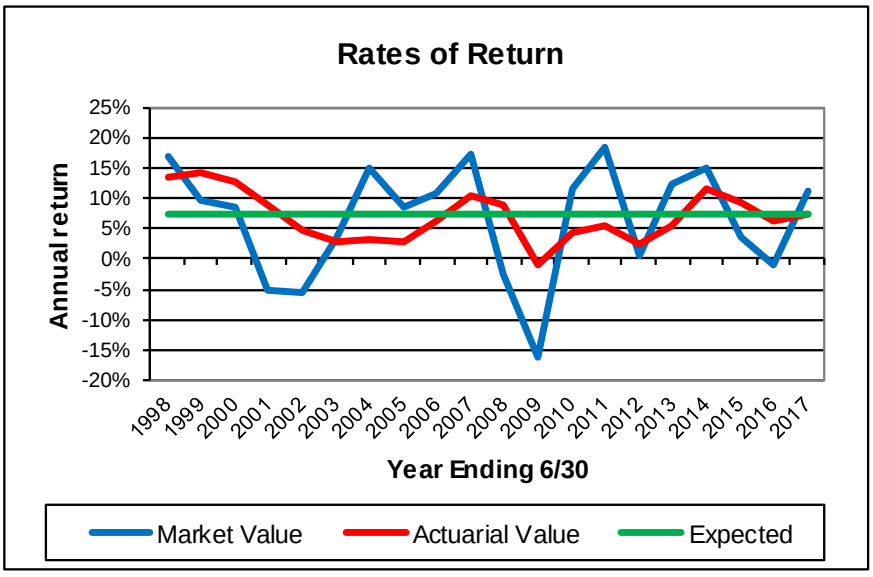
The components of the change in the market and actuarial value of assets for the System are set forth below:

| | Market Value $(millions) | Actuarial Value $(millions) |
|---|---|---|
| Net Assets, July 1, 2016 | $2,202 | $2,323 |
| · Employer and Member Contributions | 97 | 97 |
| · Benefit Payments and Expenses | (146) | (146) |
| · Investment Income/(Loss) | 242 | 173 |
| Preliminary Value July 1, 2017 | $2,395 | $2,447 |
| Application of Corridor | N/A | N/A |
| Final Net Assets, July 1, 2017 | $2,395 | $2,447 |
| Estimated Rate of Return | 11.1% | 7.5% |

Due to the use of an asset smoothing method, there is about $52 million of deferred investment loss that has not yet been recognized. This deferred investment experience will be reflected in the actuarial value of assets over the next four years.




*While the market value of assets was notably lower than actuarial value following the market downturn of 2008 and 2009, a combination of strong returns and systematic recognition of the loss has now resulted in the two numbers being close to each other the last several years..*




*Rates of return on the market value of assets are very volatile. The more stable return on the actuarial value of assets illustrates the advantage of using an asset smoothing method.*

## SYSTEM LIABILITIES

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

The unfunded actuarial accrued liability as of July 1, 2017 is:

| | |
|---|---|
| Actuarial Accrued Liability | $2,403,073,000 |
| Actuarial Value of Assets | 2,447,351,000 |
| Unfunded Actuarial Accrued Liability | $ (44,278,000) |

See Table 5 for the detailed development of the Actuarial Accrued Liability and Table 7 for the calculation of the Unfunded Actuarial Accrued Liability.

Other factors influencing the UAAL from year to year include actual experience versus expected based on the actuarial assumptions (both asset and liability), changes in the actuarial assumptions, procedures or methods and changes in benefit provisions. The actual experience measured in this valuation is that which occurred during the plan year ending June 30, 2017. There was an experience gain on liabilities of approximately $42.0 million, and an experience gain on assets of approximately $0.2 million. Including the state contributions in excess of the actuarial required contribution, the UAAL decreased by almost $76 million from July 1, 2016, resulting in the UAAL currently being negative.

Between July 1, 2016 and July 1, 2017 the change in the unfunded actuarial accrued liability for the System was as follows:

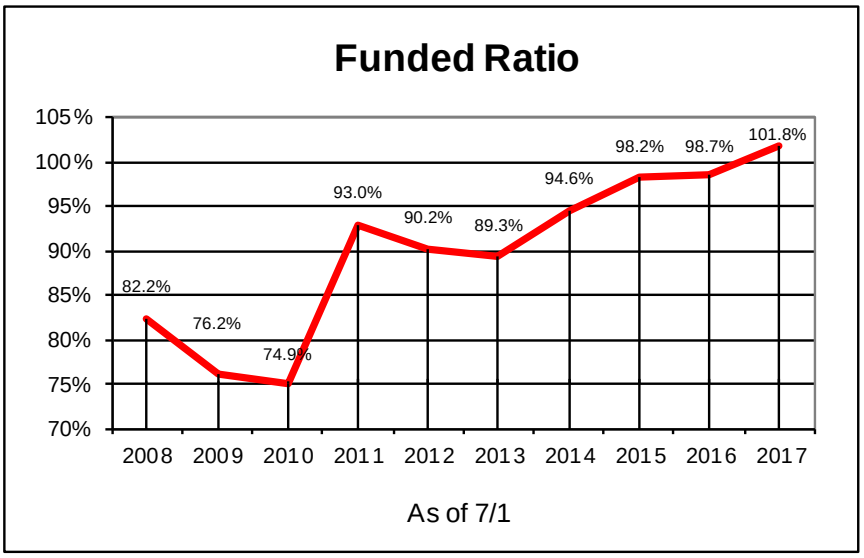
| | **$(millions)** |
|---|---|
| Unfunded Actuarial Accrued Liability, July 1, 2016 | $31.4 |
| · expected decrease due to amortization method | (5.4) |
| · state contribution above required | (24.5) |
| · investment experience | (0.2) |
| · liability experience[1] | (42.0) |
| · other experience | (3.6) |
| Unfunded Actuarial Accrued Liability, July 1, 2017 | (44.3) |

[1] Liability gain is about 1.7% of total expected actuarial accrued liability

An evaluation of the unfunded actuarial accrued liability on a pure dollar basis may not provide a complete analysis because only the difference between the assets and liabilities (which are both very large numbers) is reflected. Another way to evaluate the unfunded actuarial accrued liability and the progress made in its funding is to track the funded status, which is the ratio of the actuarial value of assets to the actuarial accrued liability. The funded ratio does not indicate whether or the fund could settle all of its liabilities, nor is it sufficient by itself to indicate the future funding requirements of the plan. The funded ratio does, however, provide one indication of the funding progress made to this point in time.

The funded status information, on both an actuarial and market value basis, is shown in the following table in $(millions).

| | 7/1/12 | 7/1/13 | 7/1/14 | 7/1/15 | 7/1/16 | 7/1/17 |
|---|---|---|---|---|---|---|
| **Using Actuarial Value of Assets:** | | | | | | |
| Funded Ratio | 90.2% | 89.3% | 94.6% | 98.2% | 98.7% | 101.8% |
| Unfunded Actuarial Accrued Liability (UAAL) | $200 | $229 | $119 | $40 | $31 | ($44) |
| **Using Market Value of Assets:** | | | | | | |
| Funded Ratio | 87.7% | 92.8% | 101.5% | 99.8% | 93.6% | 99.7% |
| Unfunded Actuarial Accrued Liability (UAAL) | $250 | $154 | ($34) | $4 | $150 | $8 |




*With the market downturn in 2008 and 2009, the funded ratio declined significantly. Since 2010, the funded ratio has steadily improved, reaching its highest level in many years.*

## CONTRIBUTION RATES

The funding objective of the System is for contributions to be at least sufficient to pay the normal cost rate plus an amount that will pay off the unfunded actuarial accrued liability over a rolling five-year period.

Under the Entry Age Normal cost method, the actuarial contribution rate consists of:

- A "normal cost" for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date;
- 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.

Contributions to the System are made by the members and their employers. Members not in Deferred Option Plan (DOP) pay 8.00% of compensation. The employer rate is currently 13.00% of pay for actives members and 6.50% of pay for members in the DOP. The remainder of the Total Contribution rate is the required State contribution rate, which are 14% of the total state insurance premium tax revenue. Currently, the total contributions are sufficient to meet the System's funding needs.

## COMMENTS

As the graph on page 3 shows, investment experience continues to be extremely volatile, which creates significant challenges when funding retirement systems. The rate of return on the market value of assets for FY 2017 was about 11.1%. The market value of assets lags the actuarial value of assets (calculated using the asset smoothing method). This deferred loss will be recognized over the next five years, creating losses even if the assumed 7.5% return on the market value of assets is earned.

Primarily as a result of low salary increases granted by employers and strong investment returns, the System is currently just over 100% funded on an actuarial value of assets basis, but just below 100% if the market value of assets is considered. On an actuarial basis, this is the strongest position the fund has ever been in.

While reaching 100% is a target of many pension funds, there are two points which should be noted. First, part of the reason the funded status improved this year resulted from an investment return that was 3.6% above expected and low salary increases granted by most employers. If next year's return is 3.6% low (for a net return of 3.9%) and employers grant somewhat larger than normal pay raises to catch up, the favorable experience this year could be completely reversed. Second, an experience study is scheduled to be done prior to the 2018 valuation. This study will likely recommend a lower inflation assumption, potentially reducing the discount rate, and will also likely recommend somewhat stronger mortality. As a result, the funded status is likely to be lower next year, even if actual experience is roughly as expected, simply because the new assumptions to be adopted by the Board are likely to be somewhat more conservative. Consequently, the current results should be viewed in the light of potential assumption changes and experience volatility.

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below.

## COMPARISON OF PRINCIPAL VALUATION RESULTS

| | 7/1/2017 Valuation | 7/1/2016 Valuation | % Change |
|---|---|---|---|
| **1. PARTICIPANT DATA** | | | |
| Number of: | | | |
| Active Members - Not vested | 2,249 | 2,249 | 0.0 |
| Active Members - Vested | 2,446 | 2,430 | 0.7 |
| Active Members Total | 4,695 | 4,679 | 0.3 |
| Retired and Disabled Members and Beneficiaries | 3,658 | 3,550 | 3.0 |
| Deferred Option Plan (DOP) Members | 14 | 19 | (26.3) |
| Inactive Members | 853 | 801 | 6.5 |
| Total members | 9,220 | 9,049 | 1.9 |
| Projected Annual Salaries of Active Members | $ 313,087,696 | $ 312,751,104 | 0.1 |
| Annual Retirement Payments for Retired Members, Disabled Members, and Beneficiaries | $ 112,345,052 | $ 107,978,847 | 4.0 |
| **2. ASSETS AND LIABILITIES** | | | |
| Total Actuarial Accrued Liability | $ 2,403,073,000 | $ 2,354,815,000 | 2.0 |
| Market Value of Assets | $ 2,395,381,000 | $ 2,201,671,000 | 8.8 |
| Actuarial Value of Assets | $ 2,447,351,000 | $ 2,323,407,000 | 5.3 |
| Unfunded Actuarial Accrued Liability | $ (44,278,000) | $ 31,408,000 | (241.0) |
| Funded Ratio (Actuarial Assets) | 101.8% | 98.7% | 3.1 |
| **3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL** | | | |
| Normal Cost Rate | 21.1% | 21.2% | (0.5) |
| Amortization of Unfunded Actuarial Accrued Liability | (3.4%) | 2.4% | (241.7) |
| Budgeted Expenses | 0.7% | 0.7% | 0.0 |
| Total Actuarial Required Contribution Rate | 18.4% | 24.3% | (24.3) |
| **Less** Member Contribution Rate | (8.0%) | (8.0%) | 0.0 |
| **Less** Estimated Employer Contribution Rate | (13.0%) | (13.0%) | 0.0 |
| Required State Contribution Rate | 0.0% | 3.3% | (100.0) |
| Required State Contribution Amount | $ 0 | $ 10,642,000 | (100.0) |

# Oklahoma Police Pension and Retirement System

## 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, market values of assets provide a basis for measuring investment performance from time to time. At July 1, 2017, the market value of assets for the System was $2.395 million. Table 1 is a comparison, at market values, of System assets as of June 30, 2017 and June 30, 2016 in total and by investment category. Table 2 summarizes the change in the market value of assets from July 1, 2016 to June 30, 2017.

## Actuarial Value of Assets

Neither the market value of assets, representing a "cash-out" value of System assets, nor the book value 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 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.

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- the expected market asset value is calculated as the sum of the previous year's market value increased with a year's interest at the System's valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the difference between the expected market value and the actual market value is the investment gain or loss for the previous fiscal year;
- each year, 20% the initial gain or loss for the past five fiscal years is recognized;
- the actuarial asset value is the market value less the unrecognized investment gains and losses for each of the five previous fiscal years, but neither more than 120% of the market value nor less than 80% of the market value.

Table 3 shows the development of the actuarial value of assets (AVA) as of the valuation date.

## Oklahoma Police Pension and Retirement System

### Table 1

### Analysis of Net Assets at Market Value

| | June 30, 2017 | | June 30, 2016 | |
|---|---|---|---|---|
| | Amount $(millions) | % of Total | Amount $(millions) | % of Total |
| Cash & Short-term Investments | $ 32.7 | 1.4% | $ 40.0 | 1.8% |
| Receivables | 15.4 | 0.6% | 15.9 | 0.7% |
| U.S. Government Bonds | 23.5 | 1.0% | 25.3 | 1.1% |
| Corporate Bonds | 357.3 | 14.9% | 343.0 | 15.6% |
| Domestic Stock | 602.2 | 25.1% | 533.2 | 24.2% |
| International Stock | 356.2 | 14.8% | 299.9 | 13.6% |
| Private Equity | 199.6 | 8.3% | 188.7 | 8.6% |
| Hedge Funds | 522.4 | 21.8% | 481.7 | 21.8% |
| Real Estate | 214.2 | 8.9% | 198.3 | 9.0% |
| Commodities | 76.9 | 3.2% | 79.6 | 3.6% |
| Subtotal | $ 2,400.4 | 100.0% | $ 2,205.6 | 100.0% |
| Net Receivables/(Payables) | (5.0) | | (4.0) | |
| Net Assets | $ 2,395.4 | | $ 2,201.6 | |

## Oklahoma Police Pension and Retirement System

### Table 2

### Statement of Changes in Net Assets

| | Fiscal Year Ended June 30 | |
|---|---|---|
| | 2017 | 2016 |
| 1. Market Value of Net Assets at Beginning of Year | $ 2,201,671,000 | $ 2,264,996,000 |
| 2. Contributions | | |
| a. Members | $ 23,916,000 | $ 23,787,000 |
| b. Participating employers | 38,887,000 | 38,533,000 |
| c. Insurance premium tax | 34,283,000 | 35,915,000 |
| d. Total contributions | $ 97,086,000 | $ 98,235,000 |
| 3. Net Investment Income | | |
| a. Interest and dividends | $ 14,571,000 | $ 15,951,000 |
| b. Realized gain and unrealized appreciation | 241,989,000 | (24,165,000) |
| c. Income from securities lending | 0 | 0 |
| d. Other | 310,000 | 412,000 |
| e. Total | 256,870,000 | (7,802,000) |
| f. Investment expenses | (14,455,000) | (13,302,000) |
| g. Net investment income | $ 242,415,000 | $ (21,104,000) |
| 4. Total additions/(subtractions) (2d) + (3g) | $ 339,501,000 | $ 77,131,000 |
| 5. Deductions | | |
| a. Retirement benefits | $ 142,140,000 | $ 136,591,000 |
| b. Refunds of contributions | 1,952,000 | 2,034,000 |
| c. Administrative expenses | 1,699,000 | 1,831,000 |
| d. Total deductions | $ 145,791,000 | $ 140,456,000 |
| 6. Net Change in Assets (4) - (5d) | 193,710,000 | (63,325,000) |
| 7. Market Value of Net Assets at End of Year (1) + (6) | $ 2,395,381,000 | $ 2,201,671,000 |

## Oklahoma Police Pension and Retirement System

### Table 3

### Determination of Actuarial Value of Assets

| | | |
|---|---|---|
| 1. Market Value as of July 1, 2016 | $ | 2,201,671,000 |
| 2. Contributions | $ | 97,086,000 |
| 3. Decreases during year | | |
| a. Retirement benefits | $ | (142,140,000) |
| b. Refunds of contributions | | (1,952,000) |
| c. Administrative expenses | | (1,699,000) |
| d. Total deductions | $ | (145,791,000) |
| 4. Expected return on assets at 7.5% | $ | 163,332,000 |
| 5. Expected Market Value as of June 30, 2017 (1) + (2) + (3d) + (4) | $ | 2,316,298,000 |
| 6. Actual Market Value as of June 30, 2017 | $ | 2,395,381,000 |
| 7. Year end 2017 asset gain/(loss) (6) - (5) | $ | 79,083,000 |

**Schedule of Asset Gains/(Losses)**

| Year End | Original Amount | Recognized in Prior Years | Recognized in This Year | Recognized in Future Years |
|---|---|---|---|---|
| 2013 | $ 84,702,000 | $ 67,761,000 | $ 16,941,000 | $ 0 |
| 2014 | 152,333,000 | 91,400,000 | 30,467,000 | 30,466,000 |
| 2015 | (80,117,000) | (32,046,000) | (16,023,000) | (32,048,000) |
| 2016 | (189,424,000) | (37,885,000) | (37,885,000) | (113,654,000) |
| 2017 | 79,083,000 | 0 | 15,817,000 | 63,266,000 |
| Total | | | $ 9,317,000 | $ (51,970,000) |

| | | |
|---|---|---|
| 8. Asset gain/(loss) to be recognized in the future | $ | (51,970,000) |
| 9. Initial Actuarial Value as of June 30, 2017 (6) - (8) | $ | 2,447,351,000 |
| 10. Constraining values: | | |
| a. 80% of market value (6) x 0.8 | $ | 1,916,305,000 |
| b. 120% of market value (6) x 1.2 | $ | 2,874,457,000 |
| 11. Actuarial Value as of June 30, 2017 (9), but not less than (10a), nor greater than (10b), rounded | $ | 2,447,351,000 |

## Oklahoma Police Pension and Retirement System

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, July 1, 2017. In this section, the discussion will focus on the commitments of the System, which are referred to as its liabilities.

Table 4 contains 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 measures of both benefits already earned and future benefits expected to be earned. For all members, active and retired, the value includes benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of the surviving beneficiaries.

The actuarial assumptions used to determine liabilities are shown in Appendix B. The liabilities reflect the benefit structure in place as of July 1, 2017.

### Actuarial Liabilities

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 "break down" 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 liabilities for all groups.

## Oklahoma Police Pension and Retirement System

### Table 4

### Present Value of Future Benefits
### As of July 1, 2017

| | | Total |
|---|---|---|
| 1. Active Employees | | |
| a. Retirement Benefit | $ | 1,690,818,000 |
| b. Withdrawal Benefit | | 48,829,000 |
| c. Pre-Retirement Death Benefit | | 19,568,000 |
| d. Disability Benefit | | 3,895,000 |
| e. Subtotal | $ | 1,763,110,000 |
| 2. Inactive Nonvested Members | $ | 2,829,000 |
| 3. Inactive Vested Members | $ | 17,605,000 |
| 4. Disabled Members | $ | 25,745,000 |
| 5. Retirees | $ | 998,257,000 |
| 6. Beneficiaries | $ | 156,562,000 |
| 7. DOP Members, Including DOP Balances | $ | 13,112,000 |
| 8. Total PVFB | $ | 2,977,220,000 |
| Inactive Members Eligible for Automatic COLA | $ | 110,798,000 |
| Inactive Members Not Eligible for Automatic COLA | | 1,103,312,000 |
| Total Inactive Liability | $ | 1,214,110,000 |

## Oklahoma Police Pension and Retirement System

### Table 5

### Actuarial Accrued Liability
### As of July 1, 2017

| | Total |
|---|---|
| 1. Present Value of Future Benefits for Active Members | |
| a. Retirement Benefit | $ 1,690,818,000 |
| b. Withdrawal Benefit | 48,829,000 |
| c. Pre-Retirement Death Benefit | 19,568,000 |
| d. Disability Benefit | 3,895,000 |
| e. Subtotal | $ 1,763,110,000 |
| 2. Present Value of Future Normal Costs for Active Members | |
| a. Retirement Benefit | $ 503,548,000 |
| b. Withdrawal Benefit | 53,103,000 |
| c. Pre-Retirement Death Benefit | 13,308,000 |
| d. Disability Benefit | 4,188,000 |
| e. Subtotal | $ 574,147,000 |
| 3. Present Value of Future Benefits for Inactive Members | 1,214,110,000 |
| 4. Total Actuarial Accrued Liability (1e) - (2e) + (3) | $ 2,403,073,000 |

## Oklahoma Police Pension and Retirement System

In the previous two sections, attention has been focused on the assets and the liabilities (present value of future benefits) of the System. A comparison of Tables 3 and 4 indicates that there is a shortfall in current actuarial assets needed to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation determines a schedule of future contributions that will provide for this funding 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 and (2) the payment on the unfunded actuarial accrued liability.

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 and/or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated under the actuarial assumptions. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists. However, as of the July 1, 2017 valuation, the Oklahoma Police Pension and Retirement System has a negative UAAL. This is an indication that the funding of benefits is proceeding slightly ahead of schedule.

### Description of Rate Components

The actuarial cost method used by the System is the traditional Entry Age Normal (EAN) – level percent of pay cost method. Under the EAN cost method, the actuarial present value of each member's projected benefit is allocated on a level basis over the member's compensation 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 actuarial present value of benefits allocated to prior years of service is called 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. The UAAL is amortized as a level dollar amount over an open 5-year period.

### Contribution Rate Summary

The normal cost rate is developed in Table 6. Table 7 develops the contribution rate for amortization of the unfunded actuarial accrued liability. Table 8 develops the total actuarial contribution rate.

## Oklahoma Police Pension and Retirement System

### Table 6

### Normal Cost Contribution Rates
### As Percentages of Salary

| | | Total | % of Pay |
|---|---|---|---|
| 1. Normal Cost | | | |
| a. Retirement Benefit | $ | 51,366,000 | 18.56% |
| b. Withdrawal Benefit | | 5,370,000 | 1.94% |
| c. Pre-Retirement Death Benefit | | 1,356,000 | 0.49% |
| d. Disability Benefit | | 416,000 | 0.15% |
| e. Total | $ | 58,508,000 | 21.14% |
| 2. Estimated Payroll for Current Actives | $ | 276,699,000 | |
| 3. Normal Cost Rate (1e)/(2) | | 21.14% | |

## Oklahoma Police Pension and Retirement System

### Table 7

### Unfunded Actuarial Accrued Liability Contribution Rate

| | | |
|---|---|---|
| 1. Actuarial Present Value of Future Benefits | $ | 2,977,220,000 |
| 2. Actuarial Present Value of Future Normal Costs | | 574,147,000 |
| 3. Actuarial Accrued Liability (1) - (2) | $ | 2,403,073,000 |
| 4. Actuarial Value of Assets | | 2,447,351,000 |
| 5. Unfunded Actuarial Accrued Liability (UAAL) (3) - (4) | $ | (44,278,000) |
| 6. Amortization of UAAL over 5 years (mid-year) | $ | (10,555,000) |
| 7. Total Estimated Payroll for Year Ending June 30, 2018 | $ | 314,374,000 |
| 8. Amortization as a Percent of Payroll | | (3.4%) |

*The UAAL is amortized as a level dollar amount.

## Oklahoma Police Pension Retirement System

### Table 8

### Actuarial Contribution Rate

| | Valuation as of July 1, 2017 | | Valuation as of July 1, 2016 | |
|---|---|---|---|---|
| | Amount | Rate of Pay | Amount | Rate of Pay |
| 1. Total Normal Cost Rate* | $66,286,000 | 21.1% | $66,913,000 | 21.2% |
| 2. Amortization of UAAL | (10,555,000) | (3.4%) | 7,487,000 | 2.4% |
| 3. Budgeted Expenses | 2,114,000 | 0.7% | 2,037,000 | 0.7% |
| 4. Total Required Contribution | $57,845,000 | 18.4% | $76,437,000 | 24.3% |
| 5. Member Contributions | 25,047,000 | 8.0% | 25,020,000 | 8.0% |
| 6. Estimated Employer Contributions** | 40,785,000 | 13.0% | 40,775,000 | 13.0% |
| 7. Required State Contribution (4) - (5) - (6) (not less than $0) | $0 | 0.0% | $10,642,000 | 3.3% |
| 8. Prior year actual state contributions<br>Rate is percentage of prior year compensation | $34,283,000 | 10.9% | $35,915,000 | 12.2% |

* Normal cost is typically determined as a rate of pay. Dollar amount shown is an estimate only.

| **Determination of Employer Rate | | |
|---|---|---|
| Active member payroll | 313,087,696 | 312,751,104 |
| Employer contribution rate | 13.0% | 13.0% |
| Estimated employer contributions | 40,701,400 | 40,657,644 |
| DOP member payroll | 1,286,253 | 1,806,282 |
| Employer contribution rate | 6.5% | 6.5% |
| Estimated employer contributions | 83,606 | 117,408 |
| Total contributions | 40,785,006 | 40,775,052 |
| As a percentage of total pay | 13.0% | 13.0% |

Note: Due to rounding, there may be differences in addition or multiplication.

## Oklahoma Police Pension and Retirement System

### Table 9

### Calculation of Actuarial Gain/(Loss)

| | | |
|---|---|---|
| 1. Expected actuarial accrued liability | | |
| a. Actuarial accrued liability at July 1, 2016 | $ | 2,354,815,000 |
| b. Normal cost for FY 2017 | | 58,632,000 |
| c. Benefit payments for fiscal year ending June 30, 2017 | | (144,092,000) |
| d. Interest on (a), (b), and (c) | | 175,703,000 |
| e. Expected actuarial accrued liability as of July 1, 2017 | $ | 2,445,058,000 |
| 2. Actuarial accrued liability at July 1, 2017 | $ | 2,403,073,000 |
| 3. Actuarial accrued liability gain/(loss) (1e) - (2) | $ | 41,985,000 |
| 4. Expected actuarial value of assets | | |
| a. Actuarial value of assets at July 1, 2016 | $ | 2,323,407,000 |
| b. Contributions for fiscal year ending June 30, 2017 | | 97,086,000 |
| c. Benefit payments and expenses for fiscal year ending June 30, 2017 | | (145,791,000) |
| d. Interest on (a), (b), and (c) | | 172,462,000 |
| e. Expected actuarial value of assets as of July 1, 2017 | $ | 2,447,164,000 |
| 5. Actuarial value of assets at July 1, 2017 | $ | 2,447,351,000 |
| 6. Actuarial value of assets gain/(loss) (5) - (4e) | $ | 187,000 |
| 7. Net actuarial gain/(loss) (3) + (6) | $ | 42,172,000 |

## Oklahoma Police Pension and Retirement System

In this section we have an exhibit showing the expected benefit payments for the System, an exhibit showing the Present Value of Accrued Benefits, and some historical information.

## Oklahoma Police Pension and Retirement System

### Table 10

### Projected Benefit Payments

The table 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 July 1, 2017. The "Retirees" column shows benefits as of July 1, 2017 expected to be paid to all members receiving benefit payments or to members who have terminated employment and are entitled to a deferred vested benefit.

**Retirement, Survivor and Withdrawal Benefits**

| Year Ending June 30 | Actives | Retirees | Total |
|---|---|---|---|
| 2018 | $ 89,621,000 | $ 112,795,000 | $ 202,416,000 |
| 2019 | 48,400,000 | 111,804,000 | 160,204,000 |
| 2020 | 63,059,000 | 110,748,000 | 173,807,000 |
| 2021 | 70,409,000 | 109,532,000 | 179,941,000 |
| 2022 | 71,798,000 | 108,270,000 | 180,068,000 |
| 2023 | 78,813,000 | 106,917,000 | 185,730,000 |
| 2024 | 79,868,000 | 105,346,000 | 185,214,000 |
| 2025 | 87,719,000 | 103,697,000 | 191,416,000 |
| 2026 | 102,276,000 | 101,908,000 | 204,184,000 |
| 2027 | 107,316,000 | 100,121,000 | 207,437,000 |
| 2028 | 116,886,000 | 98,195,000 | 215,081,000 |
| 2029 | 125,608,000 | 96,109,000 | 221,717,000 |
| 2030 | 139,779,000 | 93,869,000 | 233,648,000 |
| 2031 | 141,218,000 | 91,459,000 | 232,677,000 |
| 2032 | 151,741,000 | 88,971,000 | 240,712,000 |
| 2033 | 162,640,000 | 86,366,000 | 249,006,000 |
| 2034 | 160,105,000 | 83,630,000 | 243,735,000 |
| 2035 | 180,004,000 | 80,817,000 | 260,821,000 |
| 2036 | 194,392,000 | 77,905,000 | 272,297,000 |
| 2037 | 205,850,000 | 74,896,000 | 280,746,000 |

## Oklahoma Police Pension and Retirement System

### Table 11

### Present Value of Accumulated System Benefits

The actuarial present value of accumulated vested and non-vested system benefits was computed on an ongoing System basis to provide information that generally complies with FASB Accounting Standards Codification (ASC 960). While ASC 960 is not directly applicable to public retirement systems, the information is included to allow for historical comparisons.

In this calculation, the benefits valued are based on the present salary and service information for each member. Eligibility for retirement and other future benefits takes into consideration future service as assumed by the System's demographic assumptions. The liabilities presented here may not be appropriate to reflect the settlement obligations of the System, nor are they necessarily appropriate for information regarding the funding of the System.

| | July 1, 2017 | July 1, 2016 |
|---|---|---|
| **Accumulated System Benefits** | | |
| Vested Benefits | | |
| a. Active Members | $825,282,000 | $813,323,000 |
| b. Deferred Option Plan Members | 13,112,000 | 18,025,000 |
| c. Vested Terminated Members | 17,605,000 | 18,465,000 |
| d. Members Receiving Benefits | 1,180,564,000 | 1,137,607,000 |
| e. Total Vested Benefits | $2,036,563,000 | $1,987,420,000 |
| Non-vested Benefits | 251,070,000 | 247,877,000 |
| Total Accumulated System Benefits (PVAB) | $2,287,633,000 | $2,235,297,000 |
| | | |
| Market Value of Assets Available for Benefits (MVA) | $2,395,381,000 | $2,201,671,000 |
| Funded Ratio (MVA / PVAB) | 104.7% | 98.5% |
| | | |
| Assumed Rate of Interest | 7.50% | 7.50% |

## Oklahoma Police Pension and Retirement System

### Table 12

### Historical Investment Returns

Historical asset return information may be useful in explaining the current funded status of the System.

| FYE | Actuarial Value | | | Market Value | | |
|---|---|---|---|---|---|---|
| June 30 | Annual | Cumulative | 10 Years | Annual | Cumulative | 10 Years |
| 1990 | 8.6% | 8.6% | | 9.2% | 9.2% | |
| 1991 | 7.9% | 8.2% | | 8.1% | 8.6% | |
| 1992 | 8.7% | 8.4% | | 13.8% | 10.3% | |
| 1993 | 10.3% | 8.9% | | 15.1% | 11.5% | |
| 1994 | 9.3% | 9.0% | | 0.0% | 9.1% | |
| 1995 | 11.0% | 9.3% | | 17.7% | 10.5% | |
| 1996 | 11.9% | 9.7% | | 13.5% | 10.9% | |
| 1997 | 12.8% | 10.1% | | 17.3% | 11.7% | |
| 1998 | 13.5% | 10.4% | | 16.9% | 12.3% | |
| 1999 | 14.3% | 10.8% | 10.8% | 9.7% | 12.0% | 12.0% |
| 2000 | 12.8% | 11.0% | 11.2% | 8.7% | 11.7% | 12.0% |
| 2001 | 8.8% | 10.8% | 11.3% | -5.3% | 10.2% | 10.5% |
| 2002 | 4.9% | 10.3% | 10.9% | -5.6% | 8.9% | 8.4% |
| 2003 | 2.7% | 9.8% | 10.1% | 3.5% | 8.5% | 7.3% |
| 2004 | 3.3% | 9.3% | 9.5% | 15.0% | 8.9% | 8.8% |
| 2005 | 3.0% | 8.9% | 8.7% | 8.7% | 8.9% | 7.9% |
| 2006 | 6.1% | 8.8% | 8.1% | 11.0% | 9.0% | 7.7% |
| 2007 | 10.6% | 8.9% | 7.9% | 17.3% | 9.5% | 7.7% |
| 2008 | 8.9% | 8.9% | 7.5% | -2.4% | 8.8% | 5.8% |
| 2009 | -0.9% | 8.3% | 5.9% | -16.4% | 7.4% | 2.9% |
| 2010 | 4.4% | 8.2% | 5.1% | 11.7% | 7.6% | 3.2% |
| 2011 | 5.6% | 8.0% | 4.8% | 18.3% | 8.0% | 5.5% |
| 2012 | 2.6% | 7.8% | 4.6% | 0.5% | 7.7% | 6.2% |
| 2013 | 5.4% | 7.7% | 4.9% | 12.5% | 7.9% | 7.1% |
| 2014 | 11.4% | 7.8% | 5.6% | 15.0% | 8.2% | 7.1% |
| 2015 | 9.3% | 7.9% | 6.3% | 3.4% | 8.0% | 6.6% |
| 2016 | 6.2% | 7.8% | 6.3% | -0.9% | 7.6% | 5.4% |
| 2017 | 7.5% | 7.8% | 6.0% | 11.1% | 7.8% | 4.8% |

Note: Returns prior to 2016 were prepared by the prior actuary

| | |
|---|---|
| **Effective Date and Plan Year:** | The System became effective July 1, 1981 and has been amended each year since then. The plan year is July 1 to June 30. |
| **Administration:** | The System is administered by the Oklahoma Police Pension Retirement Board consisting of thirteen Members. The Board shall be responsible for the policies and rules for the general administration of the System. |
| **Plan Type:** | Defined benefit plan. |
| **Employers Included:** | An eligible employer may join the System on the first day of any month. An application of affiliation must be filed in the form of a resolution before the eligible municipality can become a participating municipality. |
| **Eligibility:** | All persons employed full-time as officers working more than 25 hours per week or any person undergoing police training to become a permanent police officer with a police department of a participating municipality, with ages not less than twenty-one (21) nor more than forty-five (45) when accepting membership. |
| **Salary Considered:** | Base salary used in the determination of benefits does not include payment for accumulated sick and annual leave upon termination of employment or any uniform allowances.<br><br>Final average salary means the average paid base salary for normally scheduled hours of an officer over the highest 30 consecutive months of the last 60 months of credited service. |
| **Service Considered:** | Credited service consists of the period during which the Member participated in the System or predecessor municipal pay as an active employee, plus any service prior to the establishment of the municipal plan which was credited under the predecessor municipal systems of credited service granted by the State Board, plus any applicable military service. |
| **State Contributions:** | Insurance premium tax allocation. Historically, the System has received 14% of these collected taxes. For the fiscal years beginning July 1, 2004 and ending June 30, 2009, the System received 17% of these collected taxes. For the fiscal year thereafter, the System received 14% of these collected taxes. Beginning in fiscal year July 1, 2006, the System began receiving 26% of a special allocation established to refund the System for reduced allocations of insurance premium taxes resulting from increases in insurance premium tax credits. Beginning in fiscal year July, 1 2010, the amount of insurance premium tax apportioned to the System will be applied prior to the calculation of the Home Office Credit. |

| | |
|---|---|
| **Member Contributions:** | 8% percent of paid salary. These contributions shall "be picked up" after December 31, 1988 pursuant to Section 414(h)(2) of the Internal Revenue Code. |
| **Municipality Contributions:** | Contribution is 13% percent as of July 1, 1996. |
| **Normal Retirement Benefit:** | |
| Normal Retirement Eligibility: | 20 years of credited service. |
| Benefit Amount: | 2 1/2% of the final average salary multiplied by the years of credited service, with a maximum of 30 years of credited service considered. |
| Normal Form of Benefit: | The benefit is paid as a Joint and 100% Survivor Annuity if the Member was married 30 months prior to death. |
| **Termination Benefit:** | |
| Less than 10 Years of Service: | Refund of contributions without interest. |
| More than 10 Years of Service: | If greater than 10 years of service, but not eligible for the normal retirement benefit, the benefit is payable at the date the Member would have had 20 years of service in an amount equal to 2 1/2% of the greater of final average salary or the salary paid to active employees as described under "salary considered" multiplied by the years and completed months of credited service. |
| **Disability Benefit (Duty):** | Total Disability<br><br>Upon determination of disability incurred as a result of the performance of duty, the normal disability benefit is 50% of final average salary.<br><br>Partial Disability<br><br>Upon determination of partial disability incurred as a result of the performance of duty, the normal disability is reduced according to the percentage of impairment, as outlined in the "American Medical Association's Guide to the Evaluation of Permanent Impairment." The following shows the percent of normal disability benefit payable as related to the percent of impairment. |

| % Impairment | % of Benefit |
|---|---|
| 1% to 49% | 50% |
| 50% to 74% | 75% |
| 75% to 100% | 100% |

**Disability Benefit (Non-Duty):**

Upon determination of disability after 10 years of service due to causes other than duty, the benefit equals the accrued benefit of 2 ½% of final average salary times years of credited service (maximum of 30 years) times:

- 100%, if permanent and total, or
- The following percentages, if partial disability.

| | |
|---|---|
| 1% to 24% | 25% |
| 25% to 49% | 50% |
| 50% to 74% | 75% |
| 75% to 99% | 90% |

**Death Benefits Payable to Beneficiaries:**

Prior to Retirement (Duty):

The greater of:

1) 2 ½% of final average salary times years of credited service (maximum of 30 years), or

2) 50% of final average salary.

Prior to Retirement (Non-Duty):

After 10 years of service, a benefit equal to 2 ½% of final average salary times years of credited service (maximum if 30 years).

Prior to 10 years of service, a refund of the accumulated contributions made by the Member will be paid to the estate.

After Retirement:

100% of the Member's retirement or deferred vested benefit, payable when the Member would have been eligible to receive it, payable to the beneficiary.

Lump Sum:

The beneficiary shall receive a lump-sum amount of $5,000.

Beneficiary:

Surviving spouses must be married to the member 30 months prior to the date of death (waived in the case of duty related death).

If the beneficiary is a child, the benefits are payable to age 18, or to age 22 if a full-time student. If the beneficiary is a spouse to whom the Member was married for at least 30 months prior to death, if the death was not duty related, the benefits are payable for life.

**Postretirement Adjustments:**

Police officers eligible to receive increased benefits according to repealed Section 50-120 of Title 11 of the Oklahoma Statutes pursuant to a court order receive an adjustment of 1/3 to ½ of the increase or decrease of any adjustment to the base salary of a regular police officer.

**Deferred Option Plan:**

A Member with 20 or more years of service may elect to participate in the Deferred Option Plan (DOP). Participation in the DOP shall not exceed five years. The members' contributions cease upon entering the Plan, but the agency contributions are divided equally between the Retirement System and Deferred Option Plan. The monthly retirement benefits that the member is eligible to receive are paid into the Deferred Option Plan account.

Members can elect to retroactively join the DOP as of a back-drop-date which is no earlier than the member's normal retirement date or five years before his termination date. The monthly retirement benefits and employee contributions that would have been payable had the member elected to join the DOP are credited to the member's DOP account with interest.

The retirement benefits are not recalculated for service and salary past the election date to join the Deferred Option Plan. However, the benefits are increased by cost-of-living increases applicable to retired members during the DOP period.

When the Member actually terminates employment, the Deferred Option Plan account balance may be paid in a lump sum or to an annuity provider. Monthly retirement benefits are then paid directly to the retired Member.

This Plan became effective during the July 1, 1991 to June 30, 1992 Plan Year. The Deferred Option Plan account is guaranteed a minimum of the valuation interest rate for investment return, or 2% less than the fund rate of return, if greater.

### Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the Individual Entry Age method of funding. Sometimes called the "funding method," this is a particular technique used by actuaries for establishing the amount of the annual actuarial cost of pension benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the System is comprised of (1) the normal cost; and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Entry Age Actuarial Cost Method, the **Normal Cost** is computed as the level percentage of pay which, if paid from the earliest time each member would have been eligible to join the System had it existed (thus entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the System.

The **Actuarial Accrued Liability** under this method, at any point in time, is the theoretical amount of the fund that would have accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The **Unfunded Actuarial Accrued Liability** is the excess of the actuarial accrued liability over the actuarial value of System assets on the valuation date.

Under this method, experience gains or losses, i.e. decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

### Asset Valuation Method

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- at the beginning of each fiscal year, a preliminary expected actuarial asset value is calculated as the sum of the previous year's actuarial value increased with a year's interest at the System valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the expected actuarial asset value is set equal to the preliminary expected actuarial value plus the unrecognized investment gains and losses as of the beginning of the previous fiscal year;
- the difference between the expected actuarial asset value and the market value is the investment gain or loss for the previous year;
- the (final) actuarial asset value is the preliminary value plus 20% of the investment gains and losses for each of the five previous fiscal years, but in no case more than 120% of the market value or less than 80% of the market value.

### Amortization Method

The unfunded actuarial accrued liability is amortized as a level dollar amount over a 5-year open period.

## Valuation Procedures

The wages used in the projection of benefits and liabilities are pay for the year ending June 30, 2017 (including longevity bonuses). These amounts were projected into the valuation year using the valuation salary scale.

In computing accrued benefits, average earnings were determined using the valuation salary scale. Historical earnings for the past five years have been retained.

Retired Members were assumed to be married with a beneficiary if a spouse date of birth was provided on the data. Members whose data did not have a spouse's date of birth were assumed to be single.

The impact from compensation limit under IRC Section 401(a)(17) and from the dollar limitation required by the Internal Revenue Code Section 415 for governmental plans were considered in this valuation and was determined to be *de minimis*.

No additional liability is being carried for the guaranteed minimum interest rate for the Deferred Option Plan account balances.

The calculations for the required state contribution are determined as of mid-year. Since the agency contributions, member contributions and State insurance premium tax allocations are made on a monthly basis throughout the year, a mid-year determination date represents an average weighting of the contributions.

## Actuarial Assumptions

### Economic Assumptions

1. Investment Return

7.50%, net of investment expenses, per annum, compound annually.

2. Salary Scale

Sample rates are shown below:

| Attained Service | Inflation % | Merit % | Increase % |
|---|---|---|---|
| 0 | 3.00 | 14.00 | 17.00 |
| 1 | 3.00 | 10.00 | 13.00 |
| 2 | 3.00 | 6.30 | 9.30 |
| 3 | 3.00 | 5.90 | 8.90 |
| 4 | 3.00 | 5.50 | 8.50 |
| 5 | 3.00 | 5.10 | 8.10 |
| 6 | 3.00 | 4.70 | 7.70 |
| 7 | 3.00 | 4.30 | 7.30 |
| 8 | 3.00 | 3.90 | 6.90 |
| 9 | 3.00 | 3.50 | 6.50 |
| 10 | 3.00 | 3.15 | 6.15 |
| 15 | 3.00 | 1.70 | 4.70 |
| 20 | 3.00 | 1.50 | 4.50 |

### Demographic Assumptions

1. Retirement Rates

Sample rates are shown below:

| Attained Service | Annual Rates of Retirement |
|---|---|
| 20 | 20% |
| 21 | 6 |
| 22 | 6 |
| 23 | 6 |
| 24 | 10 |
| 25 | 20 |
| 26 | 10 |
| 27 | 10 |
| 28 | 10 |
| 29 | 15 |
| 30 | 100 |

2. Mortality Rates

(a) Active participants — RP-2000 Combined Blue Collar Healthy Employees (Fully generational using Scale AA) with age set back four years

(b) Active participants (post-retirement) and nondisabled pensioners — RP-2000 Combined Blue Collar Healthy Employees with Generational Projection

(c) Disabled pensioners — RP-2000 Combined Blue Collar Healthy Combined with age set back four years

3. Disability Rates — Sample rates are shown below:

| Age | Rate |
|---|---|
| 20-24 | .0002 |
| 25-29 | .0002 |
| 30-34 | .0004 |
| 35-39 | .0006 |
| 40-44 | .0008 |
| 45-49 | .0010 |
| 50-54 | .0012 |
| 55-59 | .0014 |

4. Withdrawal Rates — Sample rates are shown below:

| Service Range | Rate |
|---|---|
| 0 | .200 |
| 1 | .130 |
| 2 | .080 |
| 3 | .060 |
| 4 | .060 |
| 5-10 | .040 |
| 11-15 | .015 |
| 16-20 | .010 |
| Over 20 | .000 |

5. Marital Status

(a) Percentage married: Males: 85%; Females: 85%

(b) Age difference: Males are assumed to be three (3) years older than females.

**Other Assumptions:**

| | |
|---|---|
| 1. Deferred Benefits Begin at: | Age 50, or the date at which the participant would have achieved 20 years of service, if later. |
| 2. Provision for Expenses: | Administrative Expenses, as budgeted by the Oklahoma Police Pension and Retirement System. |
| 3. Percentage of Disability: | Members becoming disabled have a 25%-49% impairment. |
| 4. Duty-Related Death: | All pre-retirement deaths are duty-related. |
| 5. Cost-of-Living Allowance: | Police officers eligible to receive increased benefits according to repealed Section 50-120 of Title 11 of the Oklahoma Statutes pursuant to a court order receive an adjustment of 1/3 to ½ of the increase or decrease of any adjustment to the base salary of a regular police officer, based on an increase in base salary of 3%. |
| 6. Deferred Option Plan: | Members currently participating in the Deferred Option plan (DOP) are assumed to remain in the DOP for the maximum of five years. Active members leaving active service are assumed to retroactively elect to join the DOP for the maximum allowable period. DOP account balances are assumed to accumulate at 7.75% (to reflect the interest rate guarantee prior to retirement) and members are assumed to elect a lump sum at retirement. All balances held in Deferred Option payout Accounts are assumed to be paid immediately. |

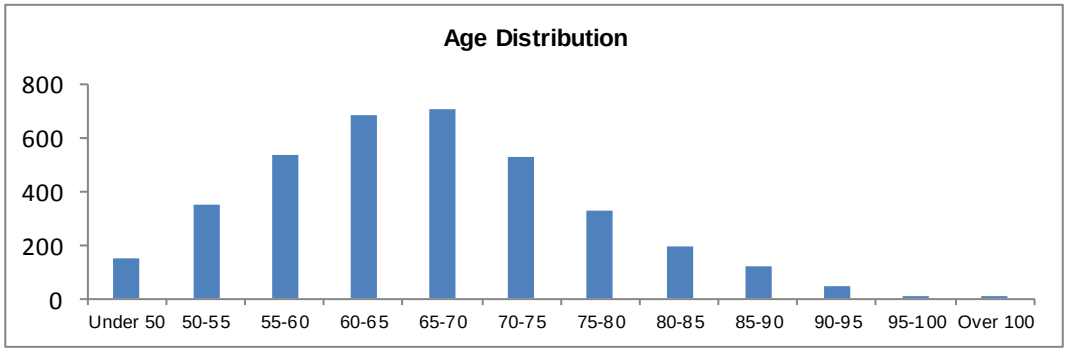
## Oklahoma Police Pension and Retirement System
## Valuation Data Distribution - Actives

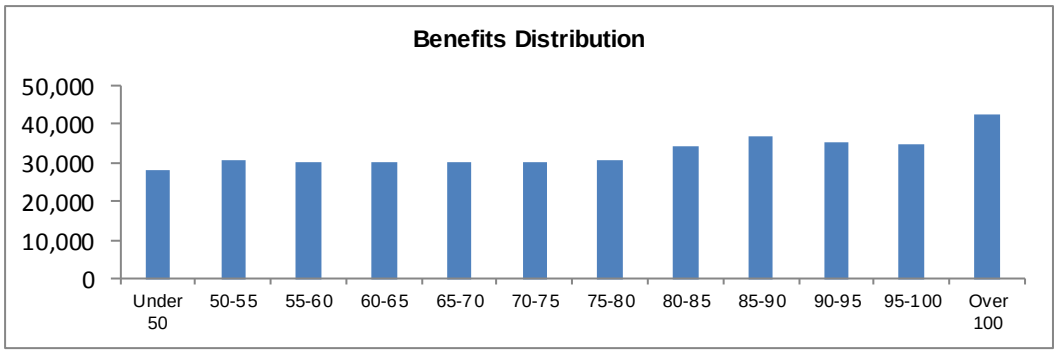
| Age | *Years of Service* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 to 4 | 5 to 9 | 10 to 14 | 15 to 19 | 20 to 24 | 25 to 29 | 30 to 34 | 35 to 39 | 40 & Up | Total |
| **Under 25** | 141 | | | | | | | | | 141 |
| Avg. Pay | $38,893 | | | | | | | | | $38,893 |
| **25 to 29** | 528 | 72 | | | | | | | | 600 |
| Avg. Pay | $43,102 | $51,844 | | | | | | | | $44,151 |
| **30 to 34** | 370 | 347 | 70 | | | | | | | 787 |
| Avg. Pay | $44,601 | $57,195 | $68,109 | | | | | | | $52,245 |
| **35 to 39** | 206 | 216 | 298 | 62 | | | | | | 782 |
| Avg. Pay | $42,260 | $56,328 | $69,065 | $76,424 | | | | | | $59,069 |
| **40 to 44** | 94 | 115 | 184 | 341 | 50 | | | | | 784 |
| Avg. Pay | $39,409 | $52,848 | $67,373 | $77,852 | $78,443 | | | | | $67,153 |
| **45 to 49** | 59 | 73 | 119 | 214 | 250 | 51 | | | | 766 |
| Avg. Pay | $39,890 | $49,587 | $62,766 | $76,825 | $82,734 | $87,577 | | | | $71,845 |
| **50 to 54** | 3 | 22 | 33 | 84 | 120 | 206 | 29 | | | 497 |
| Avg. Pay | $39,634 | $49,858 | $67,356 | $69,569 | $76,688 | $86,121 | $89,102 | | | $78,088 |
| **55 to 59** | | 2 | 17 | 27 | 51 | 76 | 80 | 20 | | 273 |
| Avg. Pay | | $57,309 | $60,318 | $70,389 | $76,870 | $84,248 | $89,072 | $91,748 | | $81,775 |
| **60 & up** | | 1 | | 10 | 16 | 10 | 12 | 12 | 4 | 65 |
| Avg. Pay | | $34,545 | | $60,360 | $64,921 | $74,753 | $88,447 | $91,389 | $90,055 | $76,041 |
| **Total** | 1,401 | 848 | 721 | 738 | 487 | 343 | 121 | 32 | 4 | 4,695 |
| Avg. Pay | $42,560 | $55,059 | $67,216 | $75,981 | $79,605 | $85,591 | $89,017 | $91,613 | $90,055 | $62,416 |

# Oklahoma Police Pension and Retirement System

## Retirees, Beneficiaries, & Disableds

| | Number | | | Annual Benefits | | |
|---|---|---|---|---|---|---|
| Age | Male | Female | Total | Male | Female | Total |
| Under 50 | 100 | 48 | 148 | $ 3,015,739 | $ 1,131,060 | $ 4,146,799 |
| 50-55 | 293 | 61 | 354 | 8,962,438 | 1,846,280 | 10,808,718 |
| 55-60 | 449 | 85 | 534 | 13,612,471 | 2,564,701 | 16,177,172 |
| 60-65 | 572 | 112 | 684 | 17,763,693 | 2,935,578 | 20,699,271 |
| 65-70 | 595 | 111 | 706 | 18,274,249 | 2,935,451 | 21,209,700 |
| 70-75 | 431 | 96 | 527 | 13,155,968 | 2,732,537 | 15,888,505 |
| 75-80 | 286 | 46 | 332 | 9,037,778 | 1,184,630 | 10,222,408 |
| 80-85 | 167 | 25 | 192 | 5,940,492 | 694,023 | 6,634,515 |
| 85-90 | 109 | 11 | 120 | 4,091,787 | 314,564 | 4,406,351 |
| 90-95 | 46 | 3 | 49 | 1,663,368 | 62,414 | 1,725,782 |
| 95-100 | 11 | 0 | 11 | 383,187 | 0 | 383,187 |
| Over 100 | 1 | 0 | 1 | 42,644 | 0 | 42,644 |
| Total | 3,060 | 598 | 3,658 | $ 95,943,814 | $ 16,401,238 | $ 112,345,052 |



# Oklahoma Police Pension and Retirement System

## Deferred Vesteds

| Age | Number | | | Annual Benefits | | |
|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total |
| Under 35 | 0 | 0 | 0 | $ 0 | $ 0 | $ 0 |
| 35-40 | 18 | 6 | 24 | 227,731 | 90,295 | 318,026 |
| 40-45 | 32 | 7 | 39 | 511,291 | 123,507 | 634,798 |
| 45-50 | 34 | 4 | 38 | 565,178 | 78,653 | 643,831 |
| 50-55 | 18 | 1 | 19 | 263,963 | 41,997 | 305,960 |
| Over 55 | 10 | 2 | 12 | 210,646 | 29,145 | 239,791 |
| Total | 112 | 20 | 132 | $ 1,778,809 | $ 363,597 | $ 2,142,406 |

## DOP Participants

| Age | Number | | | Annual Benefits | | |
|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total |
| Under 50 | 2 | 0 | 2 | $ 88,482 | $ 0 | $ 88,482 |
| 50-55 | 2 | 0 | 2 | 90,599 | 0 | 90,599 |
| 55-60 | 4 | 0 | 4 | 200,316 | 0 | 200,316 |
| Over 60 | 6 | 0 | 6 | 165,805 | 0 | 165,805 |
| Total | 14 | 0 | 14 | $ 545,202 | $ 0 | $ 545,202 |

## Oklahoma Police Pension and Retirement System

| | Actuarial Valuation as of 7/1/2017 | Actuarial Valuation as of 7/1/2016 | % Change |
|---|---|---|---|
| 1. Active members | | | |
| a. Number | 4,695 | 4,679 | 0.3% |
| b. Annual compensation | $ 313,087,696 | $ 312,751,104 | 0.1% |
| c. Average annual compensation | $ 66,685 | $ 66,841 | (0.2%) |
| d. Average age | 40.0 | 39.8 | 0.5% |
| e. Average service | 12.0 | 11.9 | 0.8% |
| 2. Non-vested terminated members | | | |
| a. Number | 721 | 669 | 7.8% |
| b. Total contribution balances | $ 2,828,626 | $ 2,303,957 | 22.8% |
| c. Average balance | $ 3,923 | $ 3,444 | 13.9% |
| 3. Vested terminated members | | | |
| a. Number | 132 | 132 | 0.0% |
| b. Annual deferred benefits | $ 2,142,406 | $ 2,240,935 | (4.4%) |
| c. Average annual deferred benefit | $ 16,230 | $ 16,977 | (4.4%) |
| 4. Retired members | | | |
| a. Number | 2,769 | 2,683 | 3.2% |
| b. Annual retirement benefits | $ 89,877,094 | $ 86,029,836 | 4.5% |
| c. Average annual retirement benefit | $ 32,458 | $ 32,065 | 1.2% |
| 5. Beneficiaries | | | |
| a. Number | 748 | 727 | 2.9% |
| b. Annual retirement benefits | $ 20,035,851 | $ 19,615,818 | 2.1% |
| c. Average annual retirement benefit | $ 26,786 | $ 26,982 | 0.7% |
| 6. Disabled members | | | |
| a. Number | 141 | 140 | 0.7% |
| b. Annual retirement benefits | $ 2,432,107 | $ 2,333,193 | 4.2% |
| c. Average annual retirement benefit | $ 17,249 | $ 16,666 | 3.5% |
| 7. DOP Participants | | | |
| a. Number | 14 | 19 | (26.3%) |
| b. Annual retirement benefits | $ 545,202 | $ 787,203 | (30.7%) |
| c. Average annual retirement benefit | $ 38,943 | $ 41,432 | (6.0%) |
| 8. Total members included in valuation | 9,220 | 9,049 | 1.9% |

## Oklahoma Police Pension and Retirement System

**Accrued Benefit**

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

**Actuarial Accrued Liability**

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

**Actuarial Assumptions**

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

**Actuarial Cost Method**

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

**Actuarial Gain (Loss)**

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two (2) Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

**Actuarial Present Value**

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

**Actuarial Valuation**

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

**Actuarial Value of Assets**

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

**Actuarially Equivalent**

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

**Amortization Payment**

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

**Deferred Vested Participant**

A vested member who has terminated employment prior to early or normal retirement age who does not withdraw his or her contributions and is, therefore, due a retirement benefit at a later date.

**Entry Age Actuarial Cost Method**

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

**Market Value of Assets**

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

**Normal Cost**

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

**Projected Benefits**

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

**Unaccrued Benefit**

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

**Unfunded Actuarial Accrued Liability**

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

**Withdrawal Liability**

The liability due to an active member terminating employment with a deferred vested benefit.