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Oakland Police and Fire Retirement System

Actuarial Valuation Report as of July 1, 2016

Produced by Cheiron

November 2016

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November 17, 2016

City of Oakland Police and Fire
Retirement System Board
150 Frank H. Ogawa Plaza
Oakland, CA 94612

Dear Members of the Board:

At your request, we have conducted an actuarial valuation of the Oakland Police and Fire Retirement System (PFRS, the Plan) as of July 1, 2016. This report contains information on the Plan's assets and liabilities. This report also discloses the employer contributions in accordance with the funding agreement between the City of Oakland and PFRS, based on the current financial status of the Plan. Your attention is called to the Foreword in which we refer to the general approach employed in the preparation of this report.

The purpose of this report is to present the results of the annual actuarial valuation of the Plan. This report is for the use of the Retirement Board and the auditors in preparing financial reports in accordance with applicable law and accounting requirements. Any other user of this report is not an intended user and is considered a third party.

Cheiron's report was prepared solely for the Retirement Board for the purposes described herein, except that the plan auditor may rely on this report solely for the purpose of completing an audit related to the matters herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

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

Sincerely,
Cheiron

Graham A. Schmidt, ASA, EA, FCA, MAAA
Consulting Actuary

Timothy S. Doyle, ASA, MAAA
Consulting Actuary

FOREWORD

Cheiron has performed the actuarial valuation of the Oakland Police and Fire Retirement System (PFRS, the Plan) as of July 1, 2016. The valuation is organized as follows:

- In Section I, the **Executive Summary,** we describe the purpose of an actuarial valuation, summarize the key results found in this valuation, and disclose important trends

- The **Main Body** of the report presents details on the Plan's

    - Section II - Assets
    - Section III - Liabilities
    - Section IV- Contributions
    - Section V - Head Count and Benefit Payment Projections

- In the **Appendices**, we conclude our report with detailed information describing plan membership (Appendix A), actuarial assumptions and methods employed in the valuation (Appendix B), a summary of pertinent plan provisions (Appendix C), and a glossary of key actuarial terms (Appendix D).

The results of this report rely on future plan experience conforming to the underlying assumptions. To the extent that actual plan experience deviates from the underlying assumptions, the results would vary accordingly.

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

SECTION I – EXECUTIVE SUMMARY

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

- The financial condition of the Plan,
- Past and expected trends in the financial progress of the Plan, and
- Calculation of the actuarially determined contributions for years beginning in Fiscal Year 2017-2018.

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

A. Valuation Basis

This valuation estimates the projected employer contributions in accordance with the funding agreement dated July 1, 2012 between the City of Oakland and the PFRS. Based on that agreement, employer contributions will be suspended until fiscal year 2017-2018, at which time they will resume at a level based upon the recommendation of the actuary. Section IV of this report shows the development of the employer contribution for fiscal year 2017-2018.

The Plan's funding policy is to contribute an amount equal to the sum of:

- The normal cost under the Entry Age Normal Cost Method (which is zero, as there are no active members),
- Amortization of the unfunded actuarial liability, and
- The Plan's expected administrative expenses.

This valuation was prepared based on the plan provisions shown in Appendix C. There have been no changes in plan provisions since the prior valuation.

A summary of the assumptions and methods used in the current valuation is shown in Appendix B. New Memorandums of Understanding (MOUs) went into effect for Police members since the previous valuation, increasing Police retirees' Cost of Living Adjustments (COLAs). There have been no other changes to the assumptions or methods since the prior valuation.

B. Key Findings of this Valuation

The key results of the July 1, 2016 actuarial valuation are as follows:

- The actuarially determined employer contribution amount for Fiscal Year 2017-2018 is $44.9 million, based on projecting the actuarial liabilities and the Actuarial Value of Assets to the end of the 2016-2017 Fiscal Year. This represents an increase of $7.6 million from the amount determined in the prior valuation for the same Fiscal Year.

  New Memorandums of Understanding (MOUs) went into effect for Police members between the previous and current valuation dates, increasing Police retirees' Cost of Living Adjustments (COLAs). The increase in the projected contribution is the combined result of asset and liability losses and the changes in Police MOUs described above.

- The City of Oakland issued Pension Obligation Bonds (POBs) in July 2012. The City then contributed $210 million from the bond proceeds to the Plan. These proceeds acted as prepayments for Oakland PFRS contributions from the fiscal year beginning July 1, 2012 through the fiscal year beginning July 1, 2016. Contributions will resume during the fiscal year beginning July 1, 2017, in accordance with the funding agreement dated July 1, 2012 between the City and the PFRS.

- During the year ended June 30, 2016, the return on Plan assets was -0.36% on a market value basis net of investment expenses, as compared to the 7.00% assumption for the 2015-2016 Plan year. This resulted in a market value loss on investments of $28.8 million. The Actuarial Value of Assets (AVA) is calculated as the expected Actuarial Value of Assets plus 20% of the difference between the Market Value and the expected Actuarial Value of Assets. This smoothed value of assets returned 6.88%, for an actuarial asset loss of $0.5 million.

- The Plan experienced a loss on the actuarial liability of $2.8 million, the net result of changes in the population. Combining the liability and asset gains, the Plan experienced a total loss of $3.3 million.

- New MOUs increased Police retirees' Cost of Living Adjustments (COLAs). These changes increased the Plan's actuarial liability by $40.6 million.

- The Plan's smoothed funded ratio, the ratio of actuarial assets over actuarial liability, decreased from 61.4% last year to 54.0% on an AVA basis as of June 30, 2016. The reduction in the funded ratio is primarily the result of no contribution being made to the fund during the year and the new MOUs for Police members.

SECTION I – EXECUTIVE SUMMARY

- The Plan's funded ratio decreased from 65.3% to 53.7% on a Market Value of Assets (MVA) basis. The decrease in the Market Value funded ratio was primarily the result of the lack of contributions and the effect of the new Police MOUs, as well as the market value loss on investments, compared to the 7.00% assumption.

- The unfunded actuarial liability (UAL) is the excess of the Plan's actuarial liability over the actuarial value of assets. The Plan experienced an increase in the UAL from $247.5 million to $309.4 million as of July 1, 2016.

- Overall participant membership decreased compared to last year. Twenty nine members died, 13 of whom had their benefits continue to a surviving spouse. In addition, 16 surviving beneficiaries died. There are no active members of the Plan.

- If the contribution were determined using a projected asset value based on the current market (i.e., non-smoothed) value of assets, the contribution for FY 2017-2018 would be $45.1 million. The contribution is larger than that determined using the projected AVA, because the current market value reflects the full amount of recent investment losses, while under the AVA projection a portion of those losses are deferred until years after FY 2017-2018.

SECTION I – EXECUTIVE SUMMARY

Below we present Table I-1 which summarizes all the key results of the valuation with respect to membership, assets and liabilities, and contributions. The results are presented and compared for both, the current and prior plan year.

TABLE I-1
Summary of Principal Plan Results
($ in thousands)

	July 1, 2015	July 1, 2016	% Change
Participant Counts			
Active Participants	0	0	
Participants Receiving a Benefit	961	929	-3.33%
Total	**961**	**929**	**-3.33%**
Annual Pay of Active Members	$ 0	$ 0	
Assets and Liabilities			
Actuarial Liability (AL)	$ 642,110	$ 672,916	4.80%
Actuarial Value of Assets (AVA)	394,573	363,550	-7.86%
Unfunded Actuarial Liability (UAL)	$ 247,537	$ 309,366	24.98%
Funded Ratio (AVA)	61.4%	54.0%	-7.42%
Funded Ratio (MVA)	65.3%	53.7%	-11.56%
Contributions			
Employer Contribution (FY2016-17)	$ 0	$ 0	0.00%
Employer Contribution (FY2017-18)	$ 37,285	$ 44,860	20.32%

C. Historical Trends

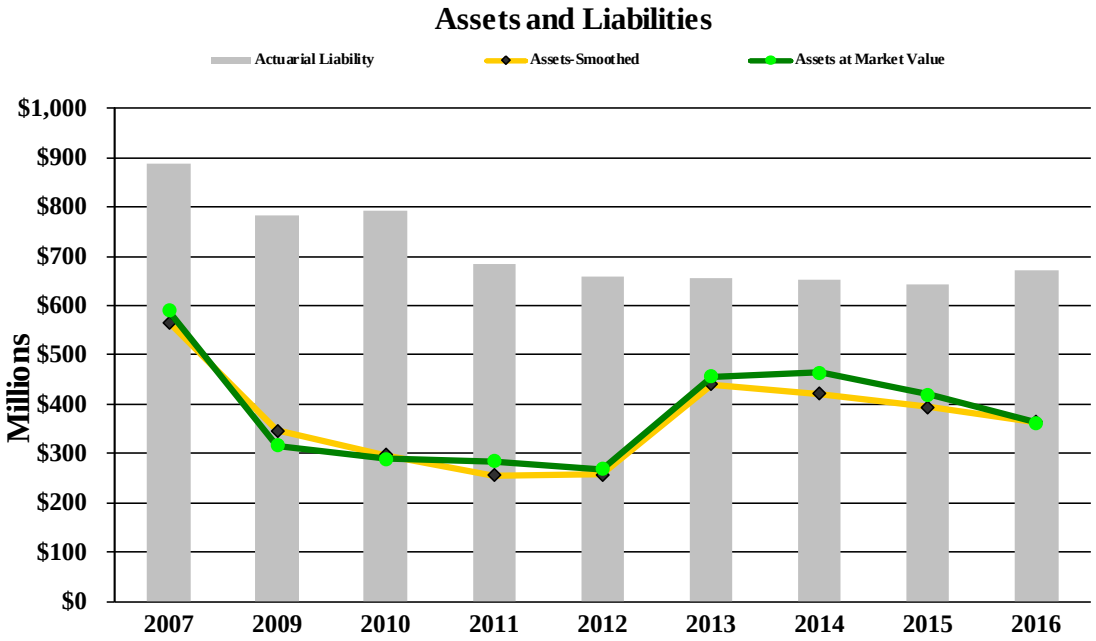
Despite the fact that for most retirement plans the greatest attention is given to the current valuation results and in particular, the size of the current unfunded actuarial liability and the employer contribution, it is important to remember that each valuation is merely a snapshot in the long-term progress of a pension fund. It is more important to judge a current year's valuation result relative to historical trends, as well as trends expected into the future.

SECTION I – EXECUTIVE SUMMARY

Assets and Liabilities

The chart below compares the Market Value of Assets (MVA) and Actuarial Value of Assets (AVA) to the Actuarial Liabilities. The percentages shown in the table below the chart are the ratios of the Actuarial Value of Assets to the Actuarial Liability (the funded ratio). We note that for the GASB disclosure report, this ratio is now disclosed using the MVA.

The funded ratio declined from 63.7% in 2007 to 37.5% in 2011 due to negative market returns and no contributions being made in that period ($417 million in proceeds from a POB were deposited in 1997 which acted as prepayments for 15 years of contributions). The funded ratio increased between 2012 and 2013 due to a $210 million contribution in July 2012. The funded ratio has decreased from 67.2% to 54.0% over the last three years due to assumption changes, liability losses, new Police MOUs, and the lack of contributions since the July 2012 payment.

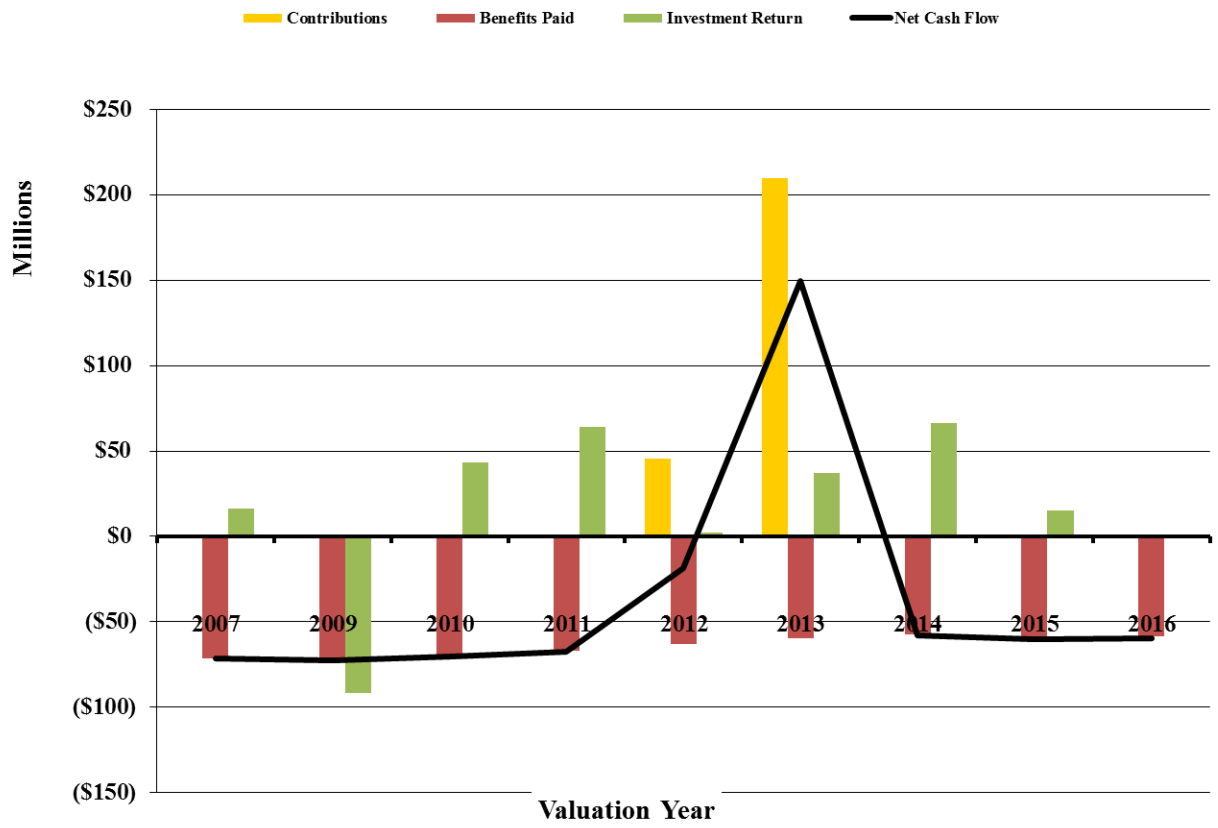


Valuation Year	2007	2009	2010	2011	2012	2013	2014	2015	2016
AVA Funded Ratio	63.7%	44.4%	37.6%	37.5%	39.1%	67.2%	64.6%	61.4%	54.0%
UAL (Millions)	$ 322.1	$ 435.3	$ 494.4	$ 426.8	$ 401.1	$ 215.0	$ 230.2	$ 247.5	$ 309.4

SECTION I – EXECUTIVE SUMMARY

Cash Flows

The chart below shows the Plan's cash flow, excluding investment returns (i.e., contributions less benefit payments and expenses). This is a critical measure, as it reflects the ability to have funds available to meet benefit payments without having to make difficult investment decisions, especially during volatile markets.



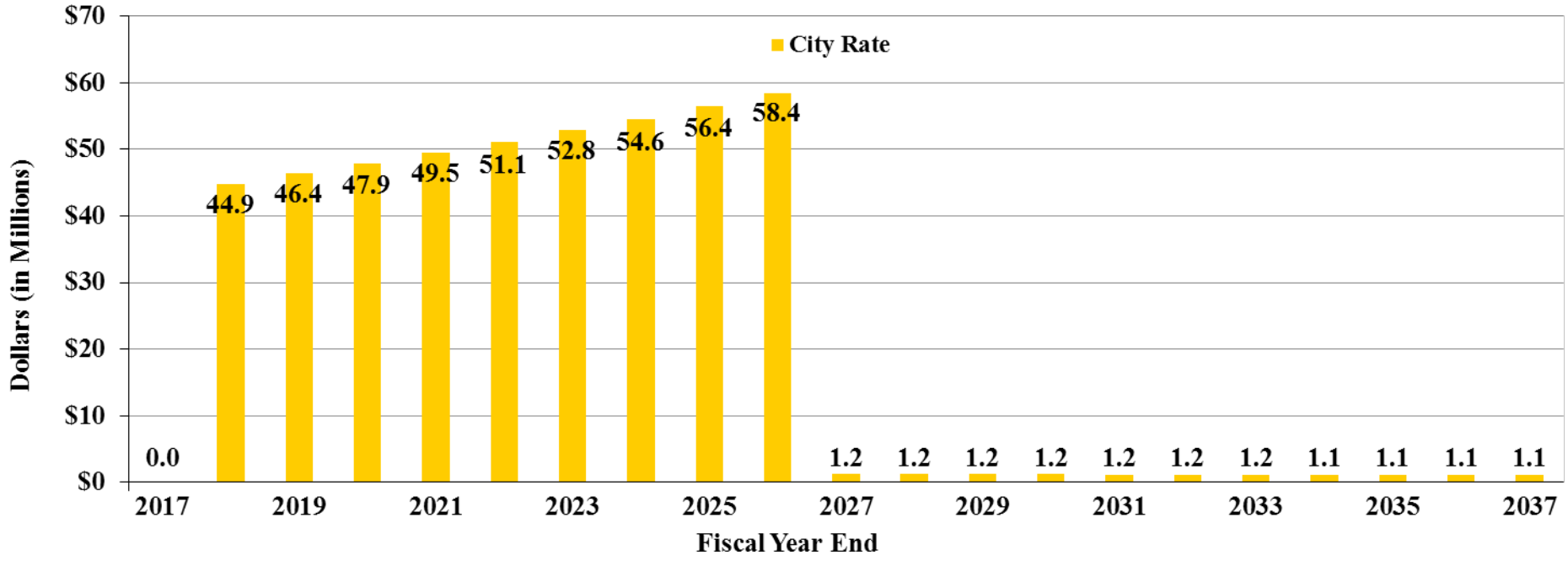
The contributions, benefit payments, investment returns, and net cash flow (NCF) excluding investment returns and expenses are represented by the scale on the left. The Plan's net cash flow has been negative five of the last six fiscal years primarily due to no contributions being made between 2007 and 2011, becoming positive in 2013 when a $210 million contribution was made.

A negative cash flow magnifies the losses during a market decline, hindering the Plan in its ability to absorb market fluctuations. The implications of a plan in negative cash flow are that the impact of market fluctuations can be more severe: as assets are being depleted to pay benefits in down markets, there is less principal available to be reinvested during favorable return periods. The Plan is expected to remain in a negative cash flow position going forward, since the Plan is closed.

D. Future Expected Financial Trends

The analysis of projected financial trends is perhaps the most important component of this valuation. In this section, we present our assessment of the implications of the July 1, 2016 valuation results in terms of benefit security (assets over liabilities) and contribution levels. All the projections in this section are based on the assumption that the Plan will exactly achieve the assumed rate of return each year (7.0% per year until 2027, then trending down to an annual return of 3.25% over 10 years).

Projection of Employer Contributions



The above graph shows that the City's contributions are expected to resume in fiscal 2017-2018, starting at $44.9 million and eventually increasing to $58.4 million as the current unfunded liability is fully amortized. This assumes that the annual payments by

SECTION I – EXECUTIVE SUMMARY

the City will equal the administrative expenses, plus an amount needed to amortize the remaining unfunded liability as a level percentage of overall Safety payroll by July 1, 2026, as is required under the City's charter.

After July 1, 2026, the UAL is expected to be fully amortized, and the contribution would generally be equal to the administrative expense, beginning in 2026-2027. However, under the current asset smoothing method there are still expected to be some deferred asset losses, which will not be recognized until after 2026; the deferred recognition of these losses is expected to add a small contribution amount to the administrative expenses in the final years of the graph on the previous page.

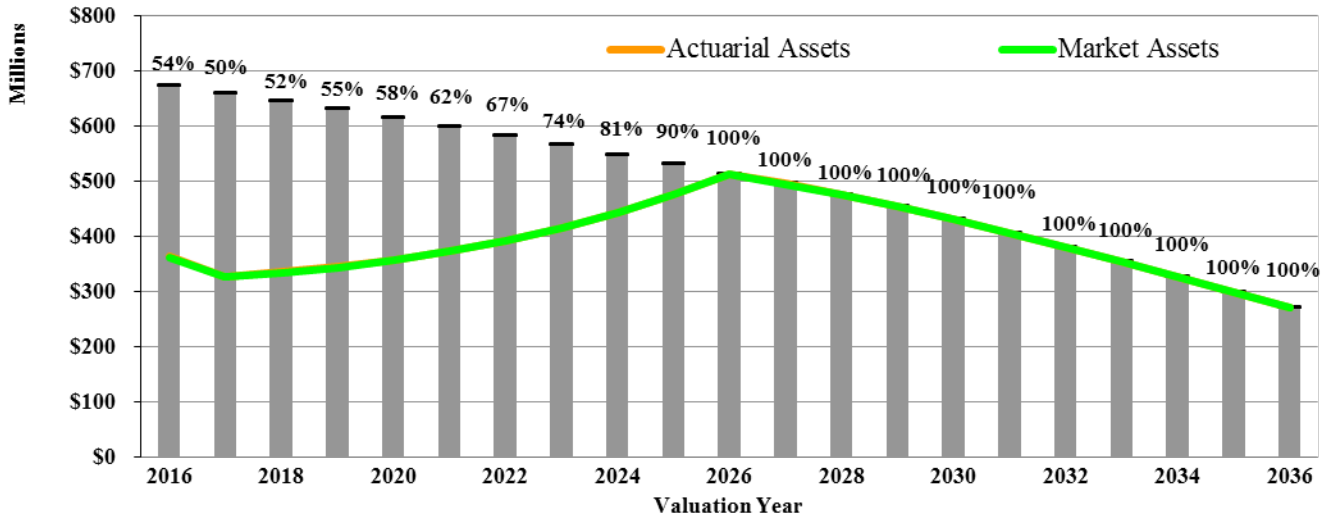
Note that the graph on the previous page does not forecast any future actuarial gains or losses or changes to the amortization policy. Even relatively modest losses relative to the assumed return could push the employer contribution rate over $70 million in the next few years. We also note that the occurrence of any future gains or losses in the years leading up to or following the required full amortization date (July 1, 2026) may require a reconsideration of the funding policy for those gains or losses, as otherwise these changes would need to be recognized over an extremely short period.

SECTION I – EXECUTIVE SUMMARY

Asset and Liability Projections:

The following graph shows the projection of assets and liabilities assuming that assets will earn the assumed rate of return each year during the projection period.

Projection of Assets and Liabilities



The graph shows that the projected funded status decreases for the next valuation, when contributions are assumed to resume. At that point, funded status increases as the current unfunded liability is fully amortized, assuming all actuarial assumptions are met.

SECTION II – ASSETS

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

In this section, we present detailed information on Plan assets including:

- **Disclosure** of Plan assets as of June 30, 2015 and June 30, 2016,
- Statement of the **changes** in market values during the year, and,
- Development of the **Actuarial Value of Assets**.

Disclosure

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

Table II-1 on the next page discloses and compares each component of the market asset value as of June 30, 2015 and June 30, 2016.

SECTION II – ASSETS

TABLE II-1
Statement of Assets at Market Value
June 30,
(in thousands)

	2015	2016
Cash and Cash Equivalents:	$ 3,108	$ 2,536
Receivables:		
Interest Receivable	$ 325	$ 271
Dividends Receivable	301	262
Investments Receivable	5,254	3,743
Retired Members and Beneficiaries	0	3,288
Miscellaneous	177	167
Total Receivables	6,057	7,731
Investments, at Fair Value:		
Short-term Investments	8,970	6,897
Bonds	71,539	63,787
Domestic Equities and Mutual Funds	206,303	174,113
International Equities and Mutual Funds	48,115	40,223
Alternative Investments	83,970	73,592
Securities Lending Collateral	55,226	45,042
Total Investments	474,123	403,653
Total Assets	483,288	413,920
Liabilities:		
Accounts Payable	59	42
Benefits Payable	4,767	4,834
Investments Payable	3,587	2,056
Accrued Investment Management Fees	395	335
Securities Lending Liabilities	55,226	45,042
Total Liabilities	64,034	52,309
Market Value of Assets	**$ 419,254**	**$ 361,611**

SECTION II – ASSETS

Changes in Market Value

The components of asset change are:

- Contributions (employer and employee)
- Benefit payments
- Expenses (investment and administrative)
- Investment income (realized and unrealized)

Table II-2 shows the components of a change in the market value of assets during 2015 and 2016.

TABLE II-2
Changes in Market Values
June 30,
(in thousands)

	2015	2016
Contributions		
Contributions of Plan Members	$ 0	$ 0
Contributions from the City	0	0
Total Contributions	0	0
Investment Income		
Miscellaneous Income	103	3,593
Investment Income	15,335	(1,419)
Total Investment Income	15,439	2,174
Disbursements		
Benefit Payments	(59,008)	(58,441)
Administrative Expenses	(985)	(1,376)
Total Disbursments	(59,993)	(59,817)
Net increase (Decrease)	(44,554)	(57,643)
Net Assets Held in Trust for Benefits:		
Beginning of Year	463,808	419,254
End of Year	$ 419,254	$ 361,611
Approximate Return	3.5%	-0.4%

SECTION II – ASSETS

Actuarial Value of Assets (AVA)

The actuarial value of assets represents a "smoothed" value developed by the actuary to reduce the volatile results which could develop due to short-term fluctuations in the market value of assets. For this Plan, the actuarial value of assets is calculated on a modified market-related value. The actuarial value of assets recognizes one-fifth of the difference between the expected asset value (based on the 7.00% return assumption from 2015-2016) and the actual market value each year. The actuarial value is restricted to fall between 90% and 110% of the market value.

Table II-3
Development of Actuarial Value of Assets
(in thousands)

1) Calculate Expected Actuarial Value of Assets		
a) Value of Actuarial Value of Assets - July 1, 2015	$	394,573
b) Total Contributions and Misc Income		3,593
c) Administrative Expense		(1,376)
d) Benefit Payments		(58,441)
e) Expected Investment Earnings		25,686
f) Value of Actuarial Value of Assets - July 1, 2016 [1a + 1b + 1c + 1d + 1e]	$	364,034
2) Calculate Final Actuarial Value of Assets		
a) Value of Market Value of Assets - July 1, 2016	$	361,611
b) Excess of MVA over Expected AVA [2a - 1f]		(2,423)
c) Preliminary AVA [1f + 0.2 * 2b]		363,550
d) 90% of MVA [90% * 2a]		325,450
e) 110% of MVA [110% * 2a]		397,772
3) Final Actuarial Value of Assets [2c, not less than 2d or greater than 2e]	**$**	**363,550**

SECTION II – ASSETS

Investment Performance

The following table calculates the investment related gain/loss for the plan year on both a Market Value and an Actuarial Value basis. The Market Value gain/loss is an appropriate measure for comparing the actual asset performance to the previous valuation's 7.00% assumption.

TABLE II-4
Asset Gain/(Loss)
(in thousands)

	Market Value	Actuarial Value
July 1, 2015 value	**$ 419,254**	**$ 394,573**
Contributions of Plan Members	0	0
Contributions from the City	0	0
Miscellaneous Income	3,593	3,593
Benefit Payments	(58,441)	(58,441)
Administrative Expenses	(1,376)	(1,376)
Expected Investment Earnings (7.00%)	27,413	25,686
Expected Value June 30, 2016	**$ 390,443**	**$ 364,034**
Investment Gain / (Loss)	(28,832)	(485)
July 1, 2016 value	**361,611**	**$ 363,550**
Return	-0.36%	6.88%

SECTION III – LIABILITIES

In this section, we present detailed information on Plan liabilities including:

- **Disclosure** of Plan liabilities at July 1, 2015 and July 1, 2016,
- Statement of **changes** in these liabilities during the year.

Disclosure

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them. Note that these liabilities are not applicable for settlement purposes, including the purchase of annuities and the payment of lump sums.

- **Present Value of Future Benefits:** Used for measuring all future Plan obligations, the obligations of the Plan earned as of the valuation date and those to be earned in the future by current plan participants under the current Plan provisions, if all assumptions are met.

- **Actuarial Liability:** Used for funding calculations, this liability is calculated taking the Present Value of Future Benefits and subtracting the present value of future Normal Costs under an acceptable actuarial funding method. Because the Plan has no active members, the Actuarial Liability is equal to the Present Value of Future Benefits (i.e., all benefits are fully accrued).

- **Unfunded Actuarial Liability:** The excess of the Actuarial Liability over the Actuarial Value of Assets.

Table III-1 below discloses each of these liabilities for the current and prior valuations.

TABLE III-1
Liabilities/Net (Surplus)/Unfunded
(in thousands)

	July 1, 2015	July 1, 2016
Present Value of Future Benefits		
Active Participant Benefits	$ 0	$ 0
Retiree and Inactive Benefits	642,110	672,916
Present Value of Future Benefits (PVB)	**$ 642,110**	**$ 672,916**
Actuarial Liability		
Present Value of Future Benefits (PVB)	$ 642,110	$ 672,916
Present Value of Future Normal Costs (PVFNC)	0	0
Actuarial Liability (AL = PVB – PVFNC)	**$ 642,110**	**$ 672,916**
Actuarial Value of Assets (AVA)	394,573	363,550
Net (Surplus)/Unfunded (AL – AVA)	**$ 247,537**	**$ 309,366**

SECTION III – LIABILITIES

Changes in Liabilities

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

- New hires since the last valuation (not applicable for this Plan)
- Benefits accrued since the last valuation (not applicable for this Plan)
- Plan amendments
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, dying, or receiving COLA adjustments at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method or software

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

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

TABLE III-2
Changes in Actuarial Liability
(in thousands)

Actuarial Liability at July 1, 2015	$	642,110
Actuarial Liability at July 1, 2016	$	672,916
Liability Increase (Decrease)	$	30,806
Change due to:		
Actuarial Methods / Software Changes	$	0
Assumption Change		40,636
Accrual of Benefits		0
Actual Benefit Payments		(58,441)
Interest		45,781
Data Corrections		0
Actuarial Liability (Gain)/Loss	$	2,830

SECTION III – LIABILITIES

Table III-3
Liabilities by Group as of July 1, 2016
(in thousands)

	Police	Fire	Total
Actuarial Accrued Liability			
Active	$ 0	$ 0	$ 0
Service Retirees	249,822	94,137	343,958
Disabled Retirees	105,127	96,957	202,084
Beneficiaries	69,191	57,682	126,873
Total Accrued Liability	$ 424,140	$ 248,775	$ 672,916

SECTION III – LIABILITIES

TABLE III-4
Development of Actuarial Gain / (Loss)
(in thousands)

1. Unfunded Actuarial Liability at Start of Year (not less than zero)	$	247,537
2. Employer Normal Cost at Start of Year		0
3. Change in Unfunded Actuarial Liability Due to Changes in Assumptions		40,636
4. Interest on 1. 2. and 3. to End of Year		20,172
5. Contributions and Miscellaneous Income for Prior Year		3,593
6. Administrative Expenses		(1,376)
7. Interest on 4. and 5. to End of Year		76
8. Change in Unfunded Actuarial Liability Due to Changes in Actuarial Methods		0
9. Change in Unfunded Actuarial Liability Due to Changes in Plan Design		0
10. Change in Unfunded Actuarial Liability Due to Data Corrections		0
11. Expected Unfunded Actuarial Liability at End of Year [1. + 2. + 3. +4. - 5. - 6. - 7. + 8. + 9. + 10.]	$	306,051
12. Actual Unfunded Actuarial Liability at End of Year (not less than zero)		309,366
13. Unfunded Actuarial Liability Gain / (Loss) [11. – 12.]	$	(3,315)

SECTION IV – CONTRIBUTIONS

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

For this Plan, the actuarial funding method used to determine the normal cost and the unfunded actuarial liability is the **Entry Age Normal** cost method.

The normal cost rate is determined with the normal cost percentage equal to the total Projected Value of Benefits at Entry Age, divided by Present Value of Future Salary at Entry Age. Since there are no longer any active employees, the normal cost for this plan is $0.

The unfunded actuarial liability is the difference between the EAN actuarial liability and the actuarial value of assets. For the contribution projections, the UAL payment is based on the unfunded liability of the Plan being fully amortized by June 30, 2026, in accordance with the City Charter. Amortization payments are determined based on an assumption that payments will increase by 3.25% each year, reflecting the assumed ultimate rate of increase in overall City Safety member salaries.

An amount equal to the expected administrative expenses for the Plan is added directly to the actuarial cost calculation.

Table IV-1 on the next page shows the employer contribution amount for the 2017-2018 Fiscal Year. The projected assets and liabilities assume that all actuarial assumptions are met and that no contributions are made between now and June 30, 2017.

For this calculation, we have shown the contribution amount using both the projected actuarial and market value of assets. The current funding policy uses the AVA to determine the UAL and the associated amortization payment. We have included the contribution amount as determined using the current market value of assets to demonstrate what the actuarial cost would be if all deferred asset gains were fully recognized at the time the contributions commence. In both cases, the contribution is based on an assumption that the investment returns will exactly equal the assumed rate of return during the 2016-2017 Fiscal Year.

SECTION IV – CONTRIBUTIONS

TABLE IV-I
Development of Projected 2017-2018 Employer Contribution Amount
(in thousands)

	Actuarial Value of Assets	Market Value of Assets
1. Value of Assets at June 30, 2016:	$ 363,550	$ 361,611
a. Expected Contributions and Misc Income	$ 0	$ 0
b. Expected Administrative Expense	$ (952)	$ (952)
c. Expected Benefit Payments	$ (57,642)	$ (57,642)
d. Expected Investment Earnings	$ 23,432	$ 23,297
2. Expected Value of Assets at June 30, 2017:	$ 328,388	$ 326,314
a. Excess of Expected MVA over Expected AVA	$ (2,074)	
b. Preliminary AVA [Expected AVA + 20% * 2a]	$ 327,973	
c. 90% of Expected MVA	$ 293,682	
d. 110% of Expected MVA	$ 358,945	
3. Final Expected AVA [2b, not less than 2c or greater than 2d]	$ 327,973	$ 326,314
4. Entry Age Liability at June 30, 2016:	$ 672,916	$ 672,916
5. Expected Benefit Payments	$ (57,642)	$ (57,642)
6. Expected Interest	$ 45,121	$ 45,121
7. Expected Entry Age Liability at June 30, 2017:	$ 660,394	$ 660,394
8. Projected Unfunded Actuarial Liability: (7) - (3)	332,421	334,081
9. Funded Ratio: (3) / (7)	49.7%	49.4%
10. Unfunded Actuarial Liability Amortization at Middle of Year as a Level Percentage of Payroll (9 Years Remaining) as of June 30, 2017:	43,881	44,100
11. Expected Administrative Expenses for Fiscal 2017-2018:	$979	$979
12. Total Contribution: (10) + (11)	44,860	45,079

SECTION V – HEADCOUNT AND BENEFIT PAYMENT PROJECTIONS

Table V-1
Benefit Payment and Headcount Projection

Fiscal Year Ending June 30,	Police		Fire		Total	
	Count	Benefits (in thousands)	Count	Benefits (in thousands)	Count	Benefits (in thousands)
2017	545.0	$ 33,508	384.0	$ 24,134	929.0	57,642
2018	528.1	$ 34,231	366.0	$ 23,640	894.1	57,871
2019	511.3	$ 34,743	348.4	$ 23,144	859.8	57,887
2020	494.7	$ 35,051	331.5	$ 22,644	826.2	57,695
2021	478.2	$ 34,889	315.1	$ 22,137	793.3	57,026
2022	461.9	$ 34,693	299.1	$ 21,620	761.0	56,313
2023	445.8	$ 34,461	283.6	$ 21,089	729.5	55,550
2024	429.9	$ 34,189	268.6	$ 20,542	698.6	54,731
2025	414.2	$ 33,871	254.0	$ 19,979	668.2	53,850
2026	398.6	$ 33,503	239.8	$ 19,396	638.4	52,899
2027	383.0	$ 33,078	226.1	$ 18,793	609.1	51,871
2028	367.5	$ 32,587	212.7	$ 18,170	580.1	50,757
2029	351.8	$ 32,026	199.7	$ 17,524	551.5	49,550
2030	336.1	$ 31,386	187.0	$ 16,857	523.1	48,243
2031	320.2	$ 30,662	174.8	$ 16,165	495.0	46,827
2032	304.1	$ 29,846	162.8	$ 15,451	467.0	45,297
2033	287.8	$ 28,935	151.2	$ 14,713	439.1	43,649
2034	271.3	$ 27,926	140.0	$ 13,953	411.3	41,878
2035	254.5	$ 26,816	129.0	$ 13,171	383.5	39,987
2036	237.6	$ 25,608	118.4	$ 12,370	355.9	37,978
2037	220.4	$ 24,305	108.1	$ 11,553	328.5	35,858
2038	203.3	$ 22,916	98.1	$ 10,724	301.4	33,639
2039	186.1	$ 21,452	88.5	$ 9,888	274.6	31,340
2040	169.2	$ 19,930	79.3	$ 9,054	248.5	28,984
2041	152.6	$ 18,367	70.6	$ 8,228	223.2	26,595
2042	136.5	$ 16,783	62.3	$ 7,419	198.8	24,202
2043	121.0	$ 15,198	54.6	$ 6,635	175.5	21,833
2044	106.2	$ 13,634	47.4	$ 5,883	153.6	19,517
2045	92.4	$ 12,110	40.8	$ 5,171	133.2	17,281
2046	79.5	$ 10,647	34.8	$ 4,502	114.3	15,149

SECTION V – HEADCOUNT AND BENEFIT PAYMENT PROJECTIONS

Table V-1
Benefit Payment and Headcount Projection (Continued)

Fiscal Year Ending June 30,	Police		Fire		Total	
	Count	Benefits (in thousands)	Count	Benefits (in thousands)	Count	Benefits (in thousands)
2047	67.8	$ 9,262	29.4	$ 3,883	97.1	13,145
2048	57.1	$ 7,969	24.6	$ 3,317	81.7	11,286
2049	47.6	$ 6,779	20.3	$ 2,806	67.9	9,586
2050	39.2	$ 5,700	16.7	$ 2,352	55.9	8,052
2051	31.9	$ 4,734	13.5	$ 1,953	45.4	6,688
2052	25.6	$ 3,884	10.9	$ 1,607	36.5	5,492
2053	20.3	$ 3,148	8.7	$ 1,311	29.0	4,459
2054	16.0	$ 2,520	6.8	$ 1,061	22.8	3,581
2055	12.4	$ 1,996	5.3	$ 853	17.7	2,848
2056	9.5	$ 1,565	4.2	$ 681	13.6	2,246
2057	7.2	$ 1,215	3.2	$ 542	10.4	1,758
2058	5.4	$ 936	2.5	$ 431	7.9	1,367
2059	4.1	$ 717	1.9	$ 341	5.9	1,058
2060	3.0	$ 546	1.4	$ 269	4.5	815
2061	2.2	$ 415	1.1	$ 211	3.3	626
2062	1.7	$ 315	0.8	$ 165	2.5	480
2063	1.2	$ 238	0.6	$ 128	1.8	366
2064	0.9	$ 179	0.5	$ 98	1.3	277
2065	0.7	$ 133	0.3	$ 74	1.0	207
2066	0.5	$ 97	0.2	$ 55	0.7	152
2067	0.3	$ 69	0.2	$ 40	0.5	109
2068	0.2	$ 47	0.1	$ 28	0.3	75
2069	0.1	$ 31	0.1	$ 19	0.2	50
2070	0.1	$ 19	0.1	$ 13	0.1	31
2071	0.1	$ 11	0.0	$ 8	0.1	18
2072	0.0	$ 6	0.0	$ 4	0.1	10
2073	0.0	$ 3	0.0	$ 2	0.0	5
2074	0.0	$ 1	0.0	$ 1	0.0	2
2075	0.0	$ 0	0.0	$ 0	0.0	1
2076	0.0	$ 0	0.0	$ 0	0.0	0

APPENDIX A – MEMBERSHIP INFORMATION

	July 1, 2015			July 1, 2016		
Active Participants	**Police**	**Fire**	**Total**	**Police**	**Fire**	**Total**
Number	0	0	0	0	0	0
Number Vested	0	0	0	0	0	0
Average Age	0.0	0.0	0.0	0.0	0.0	0.0
Average Service	0.0	0.0	0.0	0.0	0.0	0.0
Average Pay	$0	$0	$0	$0	$0	$0
Service Retirees						
Number	275	143	418	268	129	397
Average Age	72.9	79.6	75.2	73.6	80.0	75.7
Average Annual Benefit	$63,427	$70,838	$65,963	$68,602	$73,664	$70,247
Disabled Retirees						
Number	131	119	250	124	118	242
Average Age	72.8	74.1	73.4	73.3	74.9	74.1
Average Annual Benefit	$60,810	$65,827	$63,198	$65,477	$68,757	$67,076
Beneficiaries						
Number	152	141	293	153	137	290
Average Age	80.7	82.8	81.7	81.3	83.2	82.2
Average Annual Benefit	$45,212	$49,653	$47,349	$49,101	$51,798	$50,375
All Inactives						
Number	558	403	961	545	384	929
Average Age	75.0	79.1	76.7	75.7	79.6	77.3
Average Annual Benefit	$57,851	$61,946	$59,568	$62,416	$64,355	$63,218

Data pertaining to active and inactive Members and their beneficiaries as of the valuation date was supplied by the Plan Administrator on electronic media.

APPENDIX A – MEMBERSHIP INFORMATION

Changes in Plan Membership: Police

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2015	0	275	131	152	558
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(7)	(7)	(5)	(19)
New Beneficiary	0	0	0	6	6
July 1, 2016	**0**	**268**	**124**	**153**	**545**

Changes in Plan Membership: Fire

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2015	0	143	119	141	403
Retired	0	0	0	0	0
Disabled	0	(3)	3	0	0
Deceased	0	(11)	(4)	(11)	(26)
New Beneficiary	0	0	0	7	7
July 1, 2016	**0**	**129**	**118**	**137**	**384**

Changes in Plan Membership: All

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2015	0	418	250	293	961
Retired	0	0	0	0	0
Disabled	0	(3)	3	0	0
Deceased	0	(18)	(11)	(16)	(45)
New Beneficiary	0	0	0	13	13
July 1, 2016	**0**	**397**	**242**	**290**	**929**

APPENDIX A – MEMBERSHIP INFORMATION

Service Retired Participants

Age	Police		Fire		Total	
	Number	Total Annual Benefit	Number	Total Annual Benefit	Number	Total Annual Benefit
< 50	0	$0	0	$0	0	$0
50-54	0	$0	0	$0	0	$0
55-59	0	$0	0	$0	0	$0
60-64	14	$912,329	0	$0	14	$912,329
65-69	68	$4,810,265	18	$1,139,889	86	$5,950,154
70-74	106	$6,821,368	34	$2,501,394	140	$9,322,762
75-79	42	$2,880,652	14	$1,078,122	56	$3,958,773
80-84	12	$1,038,360	21	$1,562,564	33	$2,600,924
85-89	15	$1,044,038	21	$1,555,010	36	$2,599,048
90-94	9	$731,580	16	$1,268,832	25	$2,000,412
95-99	2	$146,633	4	$311,492	6	$458,126
100+	0	$0	1	$85,396	1	$85,396
Total	268	$18,385,223	129	$9,502,700	397	$27,887,923

Disability Retired Participants

Age	Police		Fire		Total	
	Number	Total Annual Benefit	Number	Total Annual Benefit	Number	Total Annual Benefit
< 50	0	$0	0	$0	0	$0
50-54	0	$0	0	$0	0	$0
55-59	0	$0	0	$0	0	$0
60-64	2	$125,118	3	$214,062	5	$339,180
65-69	49	$3,224,474	30	$1,841,545	79	$5,066,020
70-74	37	$2,285,171	35	$2,412,226	72	$4,697,396
75-79	17	$1,154,919	23	$1,707,860	40	$2,862,780
80-84	8	$532,415	13	$925,319	21	$1,457,733
85-89	5	$351,489	8	$634,869	13	$986,357
90-94	6	$445,529	5	$306,267	11	$751,796
95-99	0	$0	1	$71,208	1	$71,208
100+	0	$0	0	$0	0	$0
Total	124	$8,119,114	118	$8,113,356	242	$16,232,470

APPENDIX A – MEMBERSHIP INFORMATION

Beneficiaries

Age	Police		Fire		Total	
	Number	Total Annual Benefit	Number	Total Annual Benefit	Number	Total Annual Benefit
< 50	0	$0	0	$0	0	$0
50-54	0	$0	0	$0	0	$0
55-59	2	$106,763	2	$128,495	4	$235,258
60-64	8	$441,236	4	$243,734	12	$684,970
65-69	19	$856,379	10	$559,110	29	$1,415,489
70-74	21	$958,284	14	$704,648	35	$1,662,932
75-79	11	$477,599	15	$779,053	26	$1,256,652
80-84	23	$1,243,200	24	$1,179,665	47	$2,422,865
85-89	35	$1,729,418	32	$1,552,430	67	$3,281,849
90-94	25	$1,212,390	26	$1,322,831	51	$2,535,221
95-99	8	$444,859	9	$548,002	17	$992,861
100+	1	$42,281	1	$78,291	2	$120,571
Total	153	$7,512,409	137	$7,096,259	290	$14,608,668

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

The assumptions and methods used in the actuarial valuation as of July 1, 2016 are:

Actuarial Method

The Entry Age Normal Actuarial Cost Method is used. Under this method, the Plan's Actuarial Liability (AL) is determined as the Present Value of Future Benefits (PVFB) less the Present Value of Future Normal Costs (PVFNC). Since all of the Plan's members are retired, the AL and the PVFB are the same.

The excess of the AL over the Actuarial Value of Assets (AVA) is the Unfunded Actuarial Liability (UAL). In accordance with the Plan's funding agreement with the City of Oakland, the UAL must be amortized by July 1, 2026, with contributions resuming in the 2017-2018 fiscal year. The projected fiscal year 2017-2018 contribution has been calculated using level percent of pay amortization, based on total projected City payroll for all Safety employees.

Actuarial Value of Plan Assets

In determining the recommended employer contribution to the PFRS, we use a smoothed actuarial value of assets. The asset smoothing method dampens the volatility in asset values that could occur because of the fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process. Assets are assumed to be used exclusively for the provision of retirement benefits and expenses.

The actuarial value of assets is equal to 100% of the *expected actuarial value of assets* plus 20% of the difference between the current market value of assets and the expected actuarial value of assets. In no event will the actuarial value of assets ever be less than 90% of the market value of assets or greater than 110% of the market value of assets.

The expected actuarial value of assets is equal to the prior year's actuarial value of assets increased with actual contributions made, decreased with actual disbursements made, all items (prior assets, contributions, and disbursements) further adjusted with expected investment returns for the year.

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Assumptions

The assumptions used in this report reflect the results of an Experience Study performed by Cheiron covering the period from July 1, 2011 through June 30, 2014 and adopted by the Board. More details on the rationale for the demographic and economic assumptions can be found in the Experience Analysis presented to the Board on December 17, 2014. There were no changes to the assumptions from the prior valuation, other than the changes in the projected COLAs as a result of the new Police MOU.

1. Rate of Return

The expected annual rates of return, net of investment expenses, on all Plan assets are shown in the table below. The equivalent single discount rate for these returns using the Plan's expected projected benefit payments is 6.44%.

Benefit Payment Year	Expected Return
2016-2026	7.000%
2027	6.625%
2028	6.250%
2029	5.875%
2030	5.500%
2031	5.125%
2032	4.750%
2033	4.375%
2034	4.000%
2035	3.625%
2036+	3.250%

2. Inflation

The assumed rate of general inflation is 2.75% (entire US) and local inflation is 2.85% (Bay Area). The general inflation rate is used in the determination of the investment return assumptions. The local inflation rate is used in the determination of the growth in expenses and salaries (which determine the COLA increases).

3. Administrative Expenses

Annual administrative expenses are assumed to be $952,031, growing at 2.85% per year.

4. Cost-of-Living Adjustments

Cost-of-living adjustments are based on salary increases for a retiree's rank at retirement.

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

The long-term rate of salary increase is assumed to be 3.25% (2.85% inflation plus 0.4% productivity). The following schedule shows salary increases based on the current Police and Fire contracts, which expire on June 30, 2019 and October 31, 2017, respectively. All increases shown after those dates are assumptions.

Post-Retirement Benefit Increases (Based on Salary Increases for Rank at Retirement)		
Date of Increase	Police	Fire
January 1, 2017	1.00%	n/a
May 1, 2017	4.00%	n/a
July 1, 2017	n/a	3.25%
January 1, 2018	2.50% & 1.00%	n/a
July 1, 2018	2.00%	3.25%
January 1, 2019	2.50%	n/a
Annual Increases Starting July 1, 2019	3.25%	3.25%

5. Rates of Termination

None.

6. Rates of Disability

None.

7. Rates of Retirement

None.

8. Rates of Mortality for Healthy Lives

CalPERS Healthy Table from the 2006-2011 Experience Study, excluding the 20-year projection using Scale BB.

9. Rates of Mortality for Disabled Retirees

CalPERS Industrial Disability Mortality Table from the 2006-2011 Experience Study, excluding the 20-year projection using Scale BB.

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

10. Mortality Improvement

The mortality tables are projected to improve with MP-2014 generational mortality improvement tables, with improvements projected from a base year of 2009 (the mid-point of the CalPERS base tables).

11. Survivor Continuance

30% of disabled retirees' deaths are assumed to be related to injuries arising out of the performance of duty, entitling the surviving spouse to a 100% continuance.

12. Changes in Assumptions Since the Last Valuation

New Memorandums of Understanding (MOUs) went into effect for Police members after the previous valuation, increasing Police retirees' Cost of Living Adjustments (COLAs). No other changes have been made to the actuarial assumptions.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

1. Plan Year

July 1 to June 30.

2. Membership

The Plan has been closed to new members since June 30, 1976.

3. Salary

Retirement allowances are based on the pensionable compensation attached to the average rank held during the three years immediately preceding retirement.

4. Employee Contributions

There are no active employees in the Plan, and thus no employee contributions.

5. Service Retirement

Eligibility
25 years of service, or 20 years of service and age 55, or age 65. A reduced early retirement is available with 20 years of service.

Benefit Amount
50% of Salary plus 1.67% for each additional year of service beyond that required for service retirement eligibility, to a maximum of 10 years. For retirements with less than 20 years of service, benefits are pro-rated.

6. Duty-Related Disability Retirement

Equivalent to service retirement benefit if 25 or more years of service.

7. Non-Duty Related Disability Retirement

Equivalent to service retirement benefit if age 55 is attained.

8. Post-Retirement Death Benefit

For retirees without a spouse at death, a $1,000 lump sum is paid to designated beneficiary.

9. Cost-of-Living Adjustments

Benefit increases are based on increases in salary for rank at retirement (see above definition of Salary).

APPENDIX C – SUMMARY OF PLAN PROVISIONS

10. Benefit Forms

Benefit is paid for the lifetime of the member. For non-duty related deaths after retirement, a 66-2/3% continuance is paid for the lifetime of the spouse. If the death is duty-related, a continuance of 100% is paid.

11. Changes in Plan Provisions Since the Last Valuation

None. Benefit amounts changed as a result of cost-of-living adjustments, but these were considered as part of the assumption changes for the current valuation.

APPENDIX D – GLOSSARY

1. Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs such as mortality, withdrawal, disability, retirement, changes in compensation, and rates of investment return.

2. Actuarial Cost Method

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

3. Actuarial Gain (Loss)

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

4. Actuarial Liability

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

5. Actuarial Present Value (Present Value)

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made.

6. Actuarial Valuation

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

APPENDIX D – GLOSSARY

7. Actuarial Value of Assets

The value of cash, investments, and other property belonging to a pension plan as used by the actuary for the purpose of an Actuarial Valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values.

8. Actuarially Equivalent

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

9. Amortization Payment

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

10. Entry Age Normal Actuarial Cost Method

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

11. Funded Ratio

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

12. 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.

13. Projected Benefits

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

14. Unfunded Actuarial Liability

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

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