

**EMPLOYEES' RETIREMENT SYSTEM OF THE STATE OF
HAWAII**

REPORT TO BOARD OF TRUSTEES ON THE 91ST ANNUAL
ACTUARIAL VALUATION

FOR THE YEAR ENDING JUNE 30, 2016

January 9, 2017

Board of Trustees
Employees' Retirement System of
The State of Hawaii
City Financial Tower
201 Merchant St., Ste. 1400
Honolulu, HI 96813-2980

Dear Trustees:

SUBJECT: ACTUARIAL VALUATION AS OF JUNE 30, 2016

We certify that the information contained in the 2016 actuarial valuation report is accurate and fairly presents the actuarial position of the Employees' Retirement System of the State of Hawaii (ERS) as of June 30, 2016. There have been no adjustments for events which occurred after this date.

All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, the results presented comply with the requirements of the Hawaii statutes and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board. The undersigned are independent actuaries. One or more of them are an Enrolled Actuary and/or a Member of the American Academy of Actuaries. All are experienced in performing valuations for large public retirement systems.

ACTUARIAL VALUATIONS

The primary purpose of the valuation report is to determine the adequacy of the current employer contribution rate through measuring the resulting funding period, to describe the current financial condition of ERS, and to analyze changes in ERS's condition. In addition, the report provides various summaries of the data. This report may not be appropriate for other purposes. The information required by ERS in connection with Governmental Accounting Standards Board Statement No. 67(GASB No.67) will be provided in a separate report.

Valuations are prepared annually, as of June 30th of each year, the last day of ERS's plan year and fiscal year.

FINANCING OBJECTIVES

Contribution rates are established by Law that, over time, are intended to remain level as a percent of payroll. The employee and employer contribution rates have been set by Law and are intended to provide for the normal cost plus the level percentage of payroll required to amortize the unfunded actuarial accrued liability (UAAL) over a reasonable amount of time, which will ensure benefit security and intergenerational equity.

PROGRESS TOWARD REALIZATION OF FINANCING OBJECTIVES

We have determined that the funding period for paying off the UAAL of the System (in aggregate) is 66 years. Because this period exceeds 30 years, the objectives set in State statute are currently not being realized. (Hawaii Revised Statutes §88-122(e)(1) state that the employer contribution rates are subject to adjustment when the funding period is in excess of 30 years.)

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) is a standard measure of a plan's funded status. The funded status alone is not appropriate for assessing the need for future contributions nor assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations. However, the trend (historical and projected) of the funded ratio is a strong metric to use for assessing the dependability of the current funding policy and its ability to accumulate assets to pay benefits when due. The funded ratio is currently 54.7% and this is lower than the funded ratio from the previous valuation, primarily due to the impact of the new actuarial assumptions.

The 2011 Legislature made significant changes to the future employer contribution rates. The employer contribution rate for Police and Fire employees increased to 25.00% in FY2016, and the employer contribution rate for All Other Employees increased to 17.00% in FY2016. Under current law, the contribution rates are expected to stay at these levels until the System is fully funded. The Legislature also made changes to the benefits and member contribution rates for employees hired after June 30, 2012. Because these changes result in significantly higher contributions towards the unfunded liability in the future than in the current year, we believe it is more appropriate to determine the funding period using an open group projection rather than a static mathematical formula, which assumes that all amortization payments in the future will be the same percentage of pay as in the current year.

The actuarial accrued liability, the unfunded actuarial accrued liability (UAAL), and the determination of the resulting funding period illustrate the progress toward the realization of financing objectives. The System's UAAL was expected to increase from the prior year based on the recognition of the new actuarial assumptions. In addition, the System had a liability experience loss which was caused by individual salary increases being larger than expected by the assumptions. The System also experienced a loss on its investments. As a result, the UAAL grew based on this actuarial valuation as of June 30, 2016, ERS's underfunded status as measured by the UAAL is now \$12.441 billion.

Because of the less favorable investment performance in FY2016, the System is now deferring \$929 million in investment losses (compared with \$42 million in deferred gains last year). If there are no significant investment gains or other actuarial gains over the next three years, the funded status of the System would be expected to decrease, as the remaining deferred investment losses are recognized.

Thus, given the plan's current contribution rates and the new tier of benefits, if all actuarial assumptions are met (including the assumption of the plan earning 7.00% on the actuarial valuation of assets), it is expected that:

1. The employer normal cost as a percentage of pay will decrease to the level of the newest tier as the old tier population declines and is replaced by new tier members,
2. The employer contribution will remain level throughout the amortization period,
3. Thus, the net amount available to amortize the UAAL will increase over time,
4. The unfunded actuarial accrued liability will increase in nominal dollars until the net amount for amortization is large enough to cover the interest charges, or approximately 2062, and then begin to decrease
5. The unfunded actuarial accrued liability will be fully amortized after 66 years, and
6. In the absence of benefit improvements, the funded ratio will remain relatively flat for 30-40 years before beginning to increase until it reaches 100%.

However, based on our professional experience and current industry standards, 66 years is an inappropriate amount of time to allow for amortizing the current UAAL. This amount of time would push significant costs into several future generations, and does not allow for any future adverse experience that may arise. In fact, a 66 year funding period would push funding for the current membership well past the point in which a large majority of them would have died. We recommend the contribution rates be increased to bring the funding period into a more appropriate range, with a target of 25 years.

BENEFIT PROVISIONS AND LEGISLATIVE CHANGES

This is the fourth valuation with members covered under the new benefit tier.

There have been no changes in the benefit provisions since the prior valuation. See Table 16 of this report for more details on the benefit provisions for members of the System.

ASSUMPTIONS AND METHODS

The actuarial assumptions used were adopted by the Board in December of 2016 based on the recommendations provided by an Experience Study performed by GRS.

Our Experience Study report dated July 5, 2016 provides details on the changes to the actuarial assumptions. A brief summary of the significant changes are shown below.

- Decrease the nominal investment return assumption to 7.00%.
- Decrease the inflation assumption from 3.00% to 2.5%.
- No change to the 1.00% general productivity component of the general wage inflation assumptions. However, consistent with the decrease in inflation, the nominal general wage inflation assumption will decrease from 4.00% to 3.50%. Extend the step-rate component in the salary assumption for General Employees and Teachers to 25 years.
- Replace the base mortality tables with client-specific mortality tables developed using the actual mortality experience of non-disabled retirees in ERS. Recommend to project the rates on a fully generational basis by Scale BB to account for future mortality improvements.
- Minor adjustments to the retirement, termination, and disability patterns for members consistent with experience and future expectations for active employees.

There was no change to the use of a 4-year smoothing technique to determine the actuarial value of assets, used for determining the funding period. However, we did add a provision to ensure that the gain or loss from an individual year is fully recognized within 4 years.

There was no change to the actuarial funding method. The Entry Age Normal cost method (EAN) is the current funding method being used to allocate the actuarial costs of the System. The Entry Age Normal method will generally produce relatively level contribution amounts as a percentage of payroll from year to year, and allocates costs among various generations of taxpayers in a reasonable manner. It is by far the most commonly used actuarial cost method for large public retirement systems.

Further detail on the assumptions and methods may be found in Table 18 of this report.

The actuarial assumptions represent estimates of future experience and are not market measures. The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. Based on the scope of this engagement, we have not performed analysis on the potential range of future measurements based on other factors. The actuarial calculations are intended to provide information for rational decision making.

In our opinion, the assumptions are internally consistent and are reasonably based on the actual experience of ERS.

DATA

Member data for retired, active, and inactive participants was supplied as of March 31, 2016, by ERS's staff. We have not subjected this data to any auditing procedures, but have examined the data for reasonableness and consistency with the prior year's data. Asset information was supplied by ERS's staff.

RESPONSIBILITY FOR TABLES AND SCHEDULES

The actuary is responsible for the information with respect to years after 1999 in the Required Supplementary Information, and the Notes to Required Supplementary Information in the Financial Section of the ERS's Comprehensive Annual Financial Report (CAFR). Information with respect to years prior to 2000 was supplied by ERS.

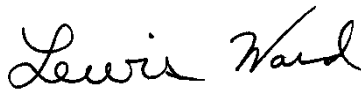
Tables and schedules in the Actuarial Section of the CAFR were generally prepared directly by the Actuary. However, certain of these tables were prepared by ERS utilizing information from this report. When the tables were prepared by ERS from our report, they are so noted.

The undersigned are independent actuaries and consultants. Mr. Newton is an Enrolled Actuary, a Member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.

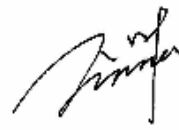
Sincerely,



Joseph P. Newton, FSA, EA
Senior Consultant & Actuary



Lewis Ward
Consultant



Linna Ye, ASA, MAAA
Actuary

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SECTION A

EXECUTIVE SUMMARY

Executive Summary

The following table summarizes the key results of the June 30, 2016 actuarial valuation of the Employees' Retirement System of the State of Hawaii (ERS).

Item	2016	2015
Membership		
• Number of		
- Active members	67,377	67,310
- Retirees and beneficiaries	45,506	44,283
- Inactive, vested	7,741	7,413
- Total	120,624	119,006
• Covered payroll for active members	\$4,118.4 million	\$3,952.6 million
• Actual benefit payments and refunds	\$1,245.5 million	\$1,181.3 million
Assets		
• Actuarial (smoothed) value	\$14,998.7 million	\$14,463.7 million
• Market value	\$14,070.0 million	\$14,505.5 million
• Return on actuarial value	5.6%	7.9%
• Return on market value	(1.2%)	3.9%
• Employer contributions during fiscal year	\$756,558,222	\$717,792,981
• External cash flow %	(1.9%)	(1.8%)
Actuarial Information		
• Total normal cost % (employee + employer)	13.98%	11.66%
• Unfunded actuarial accrued liability (UAAL)	\$12,440.5 million	\$8,774.7 million
• Funded ratio (based on smoothed assets)	54.7%	62.2%
• Funded ratio (based on market assets)	51.3%	62.4%
• Funding period (years)*	66.0	26.0
• Employer contribution rate % of projected payroll** For FY beginning July 1	17.91%	17.89%

* Funding Period based on actuarial value of assets, scheduled increases in employer contribution rates, and an open group projection reflecting changes in benefits and future member contribution rates.

** Weighted average of 25.0% Contribution Rate for Police and Firefighters and 17.0% Contribution Rate for All Other Employees.

SECTION B

INTRODUCTION

Introduction

The results of the June 30, 2016 actuarial valuation of ERS are presented in this report.

The primary purpose of the valuation report is to determine the adequacy of the current employer contribution rates through measuring the resulting funding period, to describe the current financial condition of ERS, and to analyze changes in ERS's condition.

In preparing this valuation, Gabriel, Roeder, Smith & Company (GRS) has relied on employee data and asset information provided by the staff of ERS. While not verifying the data at their source, GRS has performed such tests for consistency and reasonableness as has been deemed necessary to be satisfied with the appropriateness of using the data supplied.

Section C discusses the funded status of ERS. Section D analyzes the change in the UAAL. Section G discusses the disclosure requirements of GASB No. 67.

Sections E, F, H, and I discuss background information used in the preparation of this report-- benefit provisions, actuarial assumptions and methods, financial information, and membership data. Section K contains the actuarial certification.

All the tables referenced by the other sections appear in Section L.

SECTION C
FUNDED STATUS

Funded Status

Table 1 shows the development of the Plan's liabilities and funded status for the current year and compares it with those of the prior year.

The calculation of the funded status involves the following steps and includes the following comments:

- The actuarial present value of future benefits is determined for the present members, including retired members, beneficiaries, inactive members, and active members. This amounts to \$32.4 billion. Table 2 shows the development of this total for the current year and the prior year.
- The individual entry age normal funding method is used to allocate the actuarial present value of future benefits between that portion due for the current year (the normal cost), prior years (the actuarial accrued liability) and future years (the present value of future normal cost). Under the individual entry age normal cost method, the current and future normal costs are determined as a level percentage of payroll. Table 3 shows an analysis of the normal cost for the current year and the prior year. The amount needed to fund the current and future normal costs is 25.72% of pay for Police and Fire employees and 12.46% for All Other employees. It includes all of the employees' contribution (if any) and the employers' normal cost rate.
- In previous valuations, the impact of the new tier of benefits could be seen in the decline of the normal cost for Police and Fire Employees from one valuation to the next. However, the impact cannot be seen this year due to the impact of the new actuarial assumptions. Next year, we would expect the year-to-year decrease in the normal cost to resume.
- A part of the normal cost is paid by the employee contributions of 12.40% of pay for Police and Firefighters, leaving 13.32% of pay to be funded by the employers. Thus the current year's employer normal cost for Police and Firefighters is deemed to be 13.32% of the valuation payroll. As for the All Other Employees group, the average weighted effective employee contribution rate is 4.89% of pay, leaving 7.57% of pay to be funded by the employers. This is shown in Line 3 of Table 1.

- The UAAL is \$12.441 billion for 2016, an increase from \$8.775 billion in 2015. As indicated in Table 1, the UAAL equals the difference between the total actuarial accrued liability (Item 7) and current actuarial assets (Item 8).
- In determining the number of years that will be required to amortize the UAAL, an assumption is made concerning future growth of the ERS covered payroll. Payroll can grow from intrinsic growth in the pay of individual members and it can also grow due to active membership growth. In determining the funding period of the System, we have assumed that the number of active members will remain constant in our open group projection.
- As shown in Item 10 of Table 1 and on Table 9c, the period to fund the UAAL is Infinite (i.e. the UAAL is never expected to be paid off) for Police and Fire and 59 years for the All Other Employees group. The aggregate funding period for ERS is 66 years. Since the aggregate funding period based on the contribution rates exceeds 30 years, the rates are not adequate to meet the requirements of Hawaii Revised Statutes §88-122(e)(1).

As of the valuation date, ERS has a funded ratio of 54.7%, based on the actuarial value of assets.

Due to the significant changes in the future contribution rates and benefits for employees hired after June 30, 2012, the ERS funding policy uses an open group projection for determining how many years it will take to eliminate the unfunded liabilities of the System. The System is expected to be fully funded in 2082 which is 66 years from now. Therefore, the funding period is equal to 66 years. The open group projection assumes that the number of active members will remain constant and that there will be no actuarial gains or losses on liabilities or investments.

SECTION D

ANALYSIS OF CHANGES

Analysis of Changes

Section C has noted that the unfunded actuarial accrued liability (UAAL) is \$12.441 billion as of June 30, 2016 compared to the \$8.775 billion UAAL for 2015.

Table 7 develops the estimated yield for the year based on two measures of asset values. Table 9b takes the information contained in Table 6 and develops the expected value of actuarial assets for this valuation, based on the prior year's investment return assumption of 7.65%.

As shown in Item 5 of Table 9b, the expected value of actuarial assets as of June 30, 2016 is \$15.308 billion. As developed in Table 6, the actual value of actuarial assets as of the valuation date is \$14.999 billion (as repeated in Item 6 of Table 9b). Thus the asset loss for the year is the difference between the actual value and the expected value, or \$310 million (as shown in Item 7). This asset loss for the year is a direct reflection of the estimated yield for the year based on the value of actuarial assets, namely 5.59% (as shown in Item B4 of Table 7) being less than the assumed rate of return.

The actuarial asset valuation method is intended to smooth out year-to-year fluctuations in the market return. The expected actuarial value of assets is calculated and compared to the actual market value of assets. One fourth of the difference between these numbers is then recognized and added to the expected actuarial value of assets to get the final actuarial value of assets. This method has the advantage of more quickly converging towards the market value in years when the returns go in the opposite direction of the prior years, as was the case this year. It is important to point out that the UAAL and the funded ratio disclosed in this report would be significantly different if measured on the market value instead of the actuarial value of assets. However, over time, the two values will converge.

After a mediocre year in FY 2015, the investment markets did poorly in FY 2016 with a return of -1.18% on the market value of assets. The rate of return for the actuarial value was 5.59%, which is more than the market return due to the smoothing methodology used in the determination of the actuarial value of assets. The actuarial value of assets exceeds the market value of assets by \$929 million, so there are \$929 million in deferred investment losses still to be recognized in the actuarial value of assets. Please note that as of the last valuation there was \$42 million in deferred gains, and all of the deferred investment gains were recognized or offset by investment losses in this valuation.

Table 9a indicates that there was an increase in the liabilities of the System of \$2.916 billion due to the adoption of new actuarial assumptions. Since the total unanticipated change in the unfunded actuarial accrued liability was \$3.523 billion (item 7), this means there was a total actuarial experience loss for the 2015/2016 plan year of \$607 million. As noted above, the actuarial investment loss was equal to \$310 million. This means that there was a liability loss during the year equal to \$297 million. This experience loss is due to larger than expected salary increases for both employee groups.

Table 9c shows the current year's valuation results plus a 30-year open group projection of the System's assets and liabilities. As discussed previously, this projection assumes no actuarial gains or losses in the actuarial liabilities or the actuarial value of assets. In addition, the projection assumes the current employer contribution rates will continue and reflects the changes to the benefits and member contribution rates of employees hired after June 30, 2012. As may be seen by examining this table, the unfunded liability of the System (Column 7) is expected to continually grow throughout the 30 years shown in the projection. If more years of the projection were shown, the reader would see the UAAL is expected to be eliminated in fiscal year 2082, which is 66 years from this valuation. Therefore, for the purpose of satisfying Hawaii Revised Statutes §88-122(e)(1) the funding period is considered to be 66 years.

SECTION E

ERS ASSETS

ERS Assets

Table 4 presents a summary of the market value of assets held by the ERS. About 74% of the total assets available for benefits are held in equities (including alternative investments) and real estate compared to about 77% last year. Table 5 shows a reconciliation of the assets from the beginning of the prior year to the valuation date.

Table 6 shows the development of the Actuarial Value of Assets (AVA). An actuarial value is used in order to dampen some of the year-to-year fluctuations which would occur if the market value were used instead. The method used, determines the actuarial value of assets as the expected actuarial value of assets plus 25% of the difference between the actual market value of assets and the expected actuarial value of assets.

Table 7 shows an estimate of the ERS's dollar-weighted rate of return for the year. This is shown on (i) the market value of assets (reflecting all realized and unrealized gains and losses), and (ii) the actuarial value of assets. While the dollar-weighted market return this year was -1.18%, the return on the actuarial value was 5.59%. The difference between these is due to the smoothing effect of the AVA valuation method.

Table 9b determines the asset gain or loss for the year, based on the difference between the actual fund return and the prior year's assumed rate of 7.65%.

Finally, Table 13 shows a history of cash flows for the trust.

SECTION F

BENEFIT PROVISIONS

Benefit Provisions

Table 16 summarizes the provisions of ERS used in this valuation. Table 17 is a historical record of prior legislative changes starting with changes effective in 1999. There were significant changes made by the 2011 Legislature to the benefit provisions of the System for employees hired after June 30, 2012. Because the Board has chosen to use the Individual Entry Age Normal Cost method, the normal cost and the growth of the accrued liabilities will be slowly impacted by the changes in the benefit provisions, as members under the new tier are hired to replace members who are covered under the older tier of benefits.

There have been no changes to the benefit provisions since the last valuation that had an actuarial impact on the valuation.

Legislation was also enacted in 2011 that impacted the employer contribution rates beginning in fiscal year 2013. The employer contribution rates for Police and Fire employees are 25.00% in FY 2016 and beyond while the employer contribution rates for All Other Employees will increase according to the following schedule are 17.00% in FY 2016 and beyond.

This valuation reflects benefits promised to members by the ERS's statutes. There are no ancillary benefits - retirement type benefits not required by the ERS's statutes but which might be deemed an ERS liability if continued beyond the availability of funding by the current funding source.

Act 179/2004 was adopted during FY2003/2004 and established the new Hybrid class that became effective on July 1, 2006. Current participants had the choice to elect to move to the new class or stay in the current plan. There were 26,228 plan members who elected to so transfer. The Hybrid class membership has since grown to more than 46,000 members.

SECTION G

GASB DISCLOSURE

GASB Disclosure

The Governmental Accounting Standards Board (GASB) has issued Statement No. 67 which provides the manner in which the actuarial condition of a public sector retirement plan is to be disclosed in the system's financial statements. This new standard replaces GASB No. 25, and went into effect for the ERS for fiscal years ending on or after June 30, 2014.

Similar to last year, we will provide a separate accounting report with the required disclosures under this new standard.

SECTION H

ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Assumptions and Methods

In determining costs and liabilities, actuaries use assumptions about the future, such as rates of salary increase, probabilities of retirement, termination, death and disability, and an investment return assumption. The ERS's Board adopts the assumptions used, taking into account the actuary's recommendations.

In addition to the actuarial assumptions, the actuary also makes use of an actuarial funding method to allocate costs to particular years. In common with most public sector plans, ERS uses the entry age normal method (individual normal cost). This method produces a relatively level pattern of funding for individual employees over time. We believe this method is appropriate for ERS.

As discussed previously, ERS's Board adopted new actuarial assumptions in December 2016 to be used effective with the June 30, 2016 actuarial valuation.

The changes in the actuarial assumptions resulted in a \$2,916 million increase in the liabilities of the system.

Please see Table 18 for a complete description of the actuarial assumptions and methods.

SECTION I

MEMBERSHIP DATA

Membership Data

Membership data was provided in electronic files, via a secured file transfer protocol, by the staff. Data for active members include sex, birthdate, service, pay rate as of March 2016, employer entity and accumulated employee contributions. Data for inactive, nonretired members was similar, but also includes the members' unreduced benefit. For retired members, data includes status (service retiree, disabled retiree or beneficiary), sex, birthdate, pension amount, pension COLA amount, form of payment, beneficiary sex and birthdate if applicable, and date of retirement.

While not verifying the correctness of the data at the source, we performed various tests to ensure the internal consistency of the data and its overall reasonableness. Membership statistics are summarized in Table 12a. Table 12b summarizes certain active member data, and the age/service distribution of active members is shown in Table 19. Tables 30-43 show various distributions of retirees.

Since last year, the number of active members increased by 67 members from 67,310 to 67,377. These 67,377 active members are distributed as follows:

Category	Number	% of Total
(1)	(2)	(3)
Police & Fire	5,087	7.5%
Contributory	983	1.5%
Noncontributory	15,062	22.4%
Hybrid	<u>46,245</u>	<u>68.6%</u>
Total	67,377	100.00%

Covered payroll (which is the annualized pay for all active members on the census date) increased 4.2% since last year. ERS also provided the actual aggregate payroll for fiscal year 2016 on which contributions were received (this includes payroll for members who terminated and retired during the year). This aggregate payroll amount is adjusted by the payroll growth rate and the average growth in active membership during the year to produce the *projected FY 2017 payroll for contribution purposes*, as shown in Item 1 of Table 1.

Average age of the active members is 47.8 years as of June 30, 2015, compared to 47.9 years as of June 30, 2016, while average service increased from 13.2 years to 13.3 years.

SECTION J

SUMMARY AND CLOSING COMMENTS

Summary and Closing Comments

To summarize the results of the actuarial valuation of the Employees' Retirement System as of June 30, 2016, it is our opinion that if all assumptions are met going forward, the present assets plus future required contributions will be sufficient to provide the benefits specified in the law. However, the new actuarial assumptions have resulted in pushing out the year at which the plan is expected to be fully funded. Last year the ERS was expected to eliminate the unfunded liability of the System (be fully funded) in 2041 which was 26 years from the valuation date. This year's valuation shows that the ERS is expected to be fully funded in 2082, which is forty-one years later than last year (66 years from this year's valuation date).

Thus, the current contribution rates are not sufficient to eliminate the UAAL over a period of 30 years or less as specified by Hawaii Revised Statute 88-122(e)(1).

Based on our professional experience and current industry standards, 66 years is an inappropriate amount of time to allow for amortizing the current UAAL. This amount of time would push significant costs into several future generations, and does not allow for any future adverse experience that may arise. We recommend the contribution rates be increased to bring the funding period into a more appropriate range, with a target of at least 25 years.

SECTION K

ACTUARIAL CERTIFICATION STATEMENT

Actuarial Certification Statement

	Police and Firefighters June 30, 2016 (1)	All Other Employees June 30, 2016 (2)	All Employees June 30, 2016 (3)
1. Gross normal cost as a percentage of pay	25.72%	12.46%	13.98%
2. Present value of future benefits			
a. Active employees	\$ 3,592,697,672	\$ 13,894,316,159	\$ 17,487,013,831
b. Inactive members	67,016,533	635,569,722	702,586,255
c. Pensioners and beneficiaries	2,489,252,856	11,738,951,676	14,228,204,532
d. Total	<u>\$ 6,148,967,061</u>	<u>\$ 26,268,837,557</u>	<u>\$ 32,417,804,618</u>
3. Present value of future employee and employer contributions			
a. Present value of future normal costs	\$ 1,137,109,364	\$ 3,841,461,625	\$ 4,978,570,989
b. Present value of future employee contributions	568,905,568	1,632,054,382	2,200,959,950
c. Present value of future employer normal costs (Item 3a - Item 3b)	\$ 568,203,796	\$ 2,209,407,243	\$ 2,777,611,039
4. Actuarial accrued liability (Item 2d - Item 3a)	\$ 5,011,857,697	\$ 22,427,375,932	\$ 27,439,233,629
5. Actuarial value of assets			
a. Annuity Savings Fund	\$ 916,686,396	\$ 1,557,869,900	\$ 2,474,556,296
b. Pension Accumulation Fund	2,001,964,287	10,522,228,477	12,524,192,764
c. Total	<u>\$ 2,918,650,683</u>	<u>\$ 12,080,098,377</u>	<u>\$ 14,998,749,060</u>
6. Unfunded actuarial accrued liability	\$ 2,093,207,014	\$ 10,347,277,555	\$ 12,440,484,569
7. Adequacy of contribution rates			
a. Statutory Contribution Rate for Fiscal Year Fiscal Year 2017	25.00%	17.00%	17.91%
b. Funding Period in years as of June 30, 2016*	Infinite	59	66

* The Funding Period is calculated using an open group projection which reflects the impact of both the new employer contribution rates schedule and the benefits and member contribution rates for employees hired after June 30, 2012.

Actuarial Certification Statement

The actuarial valuation as of June 30, 2016 is based on the provisions of Chapter 88 of the Hawaii Revised Statutes, as amended. The assumptions used in the cost calculations were those adopted by the Board of Trustees on December 12, 2016 based on the actuary's actuarial experience investigation report covering the five-year period July 1, 2010 – June 30, 2015. The actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures.

In our opinion, the comparison of the current contribution policies to ERS's liabilities were calculated in accordance with the provisions of Chapter 88 regarding the funding of the Employees' Retirement System on an actuarial reserve basis.

All of our work conforms with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of state law and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board. The undersigned is an independent actuary and consultant. Mr. Newton is an Enrolled Actuary, a Member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries. Finally, he is experienced in performing valuations for large public retirement systems.



Joseph P. Newton, FSA, EA, MAAA
Senior Consultant & Actuary

SECTION L

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Development of Employer Cost

	Police and Firefighters June 30, 2016 (1)	All Other Employees June 30, 2016 (2)	All Employees June 30, 2016 (3)
1. Projected FY 2017 payroll for contribution purposes	\$ 484,128,704	\$ 3,774,799,913	\$ 4,258,928,617
2. Gross normal cost (Table 3)	25.72%	12.46%	13.98%
3. Employer normal cost rate (Table 3)	13.32%	7.57%	8.23%
4. Present value future benefits (Table 2)	\$ 6,148,967,061	\$ 26,268,837,557	\$ 32,417,804,618
5. Present value future employer normal cost	\$ 568,203,796	\$ 2,209,407,243	\$ 2,777,611,039
6. Present value future employee contributions	\$ 568,905,568	\$ 1,632,054,382	\$ 2,200,959,950
7. Actuarial accrued liability (Item 4 - Item 5 - Item 6)	\$ 5,011,857,697	\$ 22,427,375,932	\$ 27,439,233,629
8. Actuarial value of assets	\$ 2,918,650,683	\$ 12,080,098,377	\$ 14,998,749,060
9. Unfunded actuarial accrued liability (UAAL) (Item 7 - Item 8)	\$ 2,093,207,014	\$ 10,347,277,555	\$ 12,440,484,569
10. Funding Period*	Infinite	59	66

	Police and Firefighters June 30, 2015 (1)	All Other Employees June 30, 2015 (2)	All Employees June 30, 2015 (3)
1. Projected FY 2016 payroll for contribution purposes	\$ 463,302,817	\$ 3,708,099,091	\$ 4,171,401,908
2. Gross normal cost (Table 3)	20.39%	10.53%	11.66%
3. Employer normal cost rate (Table 3)	8.04%	5.76%	6.02%
4. Present value future benefits (Table 2)	\$ 4,977,235,226	\$ 22,062,844,503	\$ 27,040,079,729
5. Present value future employer normal cost	\$ 318,529,975	\$ 1,550,192,702	\$ 1,868,722,677
6. Present value future employee contributions	\$ 516,410,798	\$ 1,416,550,868	\$ 1,932,961,666
7. Actuarial accrued liability (Item 4 - Item 5 - Item 6)	\$ 4,142,294,453	\$ 19,096,100,933	\$ 23,238,395,386
8. Actuarial value of assets	\$ 2,775,337,302	\$ 11,688,332,975	\$ 14,463,670,277
9. Unfunded actuarial accrued liability (UAAL) (Item 7 - Item 8)	\$ 1,366,957,151	\$ 7,407,767,958	\$ 8,774,725,109
10. Funding Period*	27	25	26

* The Funding Period is calculated using an open group projection which reflects the impact of both the new employer contribution rates schedule and the benefits and member contribution rates for employees hired after June 30, 2012. Please refer to Table 9c for the full projection.

Actuarial Present Value of Future Benefits

	Police and Firefighters June 30, 2016 (1)	All Other Employees June 30, 2016 (2)	All Employees June 30, 2016 (3)
1. Active members			
a. Service retirement benefits	\$ 3,448,659,766	\$ 12,706,944,580	\$ 16,155,604,346
b. Termination Benefits	102,331,078	806,508,688	908,839,766
c. Survivor benefits	19,051,626	141,603,947	160,655,573
d. Disability retirement benefits	22,655,202	239,258,944	261,914,146
e. Total	\$ 3,592,697,672	\$ 13,894,316,159	\$ 17,487,013,831
2. Retired members			
a. Service retirement	\$ 2,331,689,444	\$ 10,903,901,755	\$ 13,235,591,199
b. Disability retirement	30,740,070	221,253,328	251,993,398
c. Beneficiaries	126,823,342	613,796,593	740,619,935
d. Total	\$ 2,489,252,856	\$ 11,738,951,676	\$ 14,228,204,532
3. Inactive members			
a. Vested terminations	\$ 63,183,996	\$ 565,038,743	\$ 628,222,739
b. Nonvested terminations	3,832,537	70,530,979	74,363,516
c. Total	\$ 67,016,533	\$ 635,569,722	\$ 702,586,255
4. Total actuarial present value of future benefits	\$ 6,148,967,061	\$ 26,268,837,557	\$ 32,417,804,618

	Police and Firefighters June 30, 2015 (1)	All Other Employees June 30, 2015 (2)	All Employees June 30, 2015 (3)
1. Active members			
a. Service retirement benefits	\$ 2,665,186,345	\$ 10,240,759,922	\$ 12,905,946,267
b. Termination Benefits	85,772,444	731,959,892	817,732,336
c. Survivor benefits	42,053,042	255,744,079	297,797,121
d. Disability retirement benefits	12,769,956	98,503,689	111,273,645
e. Total	\$ 2,805,781,787	\$ 11,326,967,582	\$ 14,132,749,369
2. Retired members			
a. Service retirement	\$ 1,987,033,692	\$ 9,516,257,391	\$ 11,503,291,083
b. Disability retirement	29,157,877	180,700,290	209,858,167
c. Beneficiaries	101,639,064	507,003,334	608,642,398
d. Total	\$ 2,117,830,633	\$ 10,203,961,015	\$ 12,321,791,648
3. Inactive members			
a. Vested terminations	\$ 49,917,185	\$ 471,817,363	\$ 521,734,548
b. Nonvested terminations	3,705,621	60,098,543	63,804,164
c. Total	\$ 53,622,806	\$ 531,915,906	\$ 585,538,712
4. Total actuarial present value of future benefits	\$ 4,977,235,226	\$ 22,062,844,503	\$ 27,040,079,729

Analysis of Normal Cost

	Police and Firefighters June 30, 2016 <u>(1)</u>	All Other Employees June 30, 2016 <u>(2)</u>	All Employees June 30, 2016 <u>(3)</u>
1. Normal cost as a percent of pay			
a. Service retirement benefits	22.83%	9.35%	10.90%
b. Deferred termination benefits	1.15%	0.95%	0.97%
c. Refunds	0.89%	1.28%	1.24%
d. Disability retirement benefits	0.31%	0.38%	0.37%
e. Survivor benefits	0.19%	0.15%	0.15%
f. Administrative Expenses	0.35%	0.35%	0.35%
g. Total	<u>25.72%</u>	<u>12.46%</u>	<u>13.98%</u>
2. Employee contribution rate	12.40%	4.89%	5.75%
3. Effective employer normal cost rate (Item 1g - Item 2)	13.32%	7.57%	8.23%

	Police and Firefighters June 30, 2015 <u>(1)</u>	All Other Employees June 30, 2015 <u>(2)</u>	All Employees June 30, 2015 <u>(3)</u>
1. Normal cost as a percent of pay			
a. Service retirement benefits	17.56%	8.00%	9.10%
b. Deferred termination benefits	0.84%	0.69%	0.71%
c. Refunds	1.32%	1.36%	1.35%
d. Disability retirement benefits	0.18%	0.17%	0.17%
e. Survivor benefits	0.49%	0.31%	0.33%
f. Administrative Expenses	N/A	N/A	N/A
g. Total	<u>20.39%</u>	<u>10.53%</u>	<u>11.66%</u>
2. Employee contribution rate	12.35%	4.77%	5.64%
3. Effective employer normal cost rate (Item 1g - Item 2)	8.04%	5.76%	6.02%

Plan Net Assets
(Assets at Market or Fair Value)

Item	Valuation as of	
	June 30, 2016	June 30, 2015
1. Cash and cash equivalents	\$ 524,140,752	\$ 656,459,323
2. Receivables:		
a. Accounts receivable and others	\$ 5,546,300	\$ 7,436,038
b. Investment sale proceeds	197,451,653	93,202,906
c. Accrued income	49,758,195	45,817,527
d. Employer contributions	78,921,403	67,055,380
e. Member contributions	-	-
f. Subtotal	<u>\$ 331,677,551</u>	<u>\$ 213,511,851</u>
3. Investments		
a. Equity securities	\$ 8,541,857,929	\$ 9,261,462,836
b. Fixed income securities	3,117,134,649	2,807,089,435
c. Real estate investments	967,131,489	1,188,494,377
d. Real estate mortgages	-	-
e. Alternative investments	1,010,360,689	888,218,644
f. Subtotal	<u>\$ 13,636,484,756</u>	<u>\$ 14,145,265,292</u>
4. Other		
a. Invested securities lending collateral	\$ 1,268,719,491	\$ 1,232,818,935
b. Equipment at cost, net of depreciation	6,287,484	8,297,696
c. Other assets	-	-
d. Subtotal	<u>\$ 1,275,006,975</u>	<u>\$ 1,241,116,631</u>
5. Total assets	\$ 15,767,310,034	\$ 16,256,353,097
6. Liabilities		
a. Bank overdraft	\$ -	\$ -
b. Accounts payable	46,683,310	50,822,998
c. Investment commitments payable	211,762,793	219,884,122
d. Due to employers	-	-
e. Securities lending collateral	1,268,719,491	1,232,818,935
f. Notes payable	170,165,523	247,362,486
g. Total liabilities	<u>\$ 1,697,331,117</u>	<u>\$ 1,750,888,541</u>
7. Total market value of assets available for benefits (Item 5 - Item 6g)	\$ 14,069,978,917	\$ 14,505,464,556

Reconciliation of Plan Net Assets

	Year Ending	
	June 30, 2016	June 30, 2015
1. a. Value of assets at beginning of year	\$ 14,505,464,556	\$ 14,203,015,303
b. Adjustment due to post valuation changes in CAFR assets	-	-
c. Adjusted value of assets at beginning of year	\$ 14,505,464,556	\$ 14,203,015,303
2. Revenue for the year		
a. Contributions		
i. Member contributions	\$ 236,801,861	\$ 223,505,419
ii. Employer contributions	756,558,222	717,792,981
iii. Total	\$ 993,360,083	\$ 941,298,400
b. Income		
i. Interest, dividends, and other income	\$ 395,497,731	\$ 370,265,240
ii. Investment expenses	(38,084,467)	(44,844,759)
iii. Net	\$ 357,413,264	\$ 325,420,481
c. Net realized and unrealized gains (loss)	\$ (526,781,374)	\$ 231,015,994
d. Net income (loss)	\$ (169,368,110)	\$ 556,436,475
e. Total revenue	\$ 823,991,973	\$ 1,497,734,875
3. Expenditures for the year		
a. Refunds	\$ 12,927,672	\$ 10,507,888
b. Benefit payments	1,232,589,353	1,170,744,770
c. Administrative and miscellaneous expenses	13,960,587	14,032,964
d. Total expenditures	\$ 1,259,477,612	\$ 1,195,285,622
4. Increase (decrease) in net assets (Item 2e - Item 3d)	\$ (435,485,639)	\$ 302,449,253
5. Value of assets at end of year (Item 1c + Item 4)	\$ 14,069,978,917	\$ 14,505,464,556

Employees' Retirement System of the State of Hawaii

Development of Actuarial Value of Assets

	Year Ending June 30, 2016						
1. Actuarial value of assets, beginning of year	\$ 14,463,670,277						
2. Net new investments							
a. Contributions	\$ 993,360,083						
b. Benefits paid	(1,232,589,353)						
c. Refunds	(12,927,672)						
d. Subtotal	(252,156,942)						
3. Market value of assets at end of year	\$ 14,069,978,917						
4. Expected return on actuarial value of assets	\$ 1,096,825,773						
5. Expected actuarial value of assets, end of year	\$ 15,308,339,108						
6. Excess/(shortfall) return (Item 3-Item 5)	\$ (1,238,360,191)						
7. Development of amounts to be recognized as of June 30, 2016:							
	Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
		(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
	2013	\$ 0	\$ 0	\$ 0	1	\$ 0	\$ 0
	2014	0	0	0	2	0	0
	2015	41,794,279	(41,794,279)	0	3	0	0
	2016	(1,280,154,470)	41,794,279	(1,238,360,191)	4	(309,590,048)	(928,770,143)
	Total	\$ (1,238,360,191)	\$ 0	\$ (1,238,360,191)		\$ (309,590,048)	\$ (928,770,143)
8. Actuarial value of assets as of June 30, 2016 (Item 3 - Item 7)	\$ 14,998,749,060						
9. Ratio of actuarial value to market value	106.6%						
10. Asset gain (loss) for year (Item 8 - Item 5)	\$ (309,590,048)						

Estimation of Yields

	June 30, 2016 (1)	June 30, 2015 (2)
A. Market value yield		
1. Beginning of year market assets	\$ 14,505,464,556	\$ 14,203,015,303
2. Investment income		
a. Change in assets (Item 3 - Item 1)	\$ (435,485,639)	\$ 302,449,253
b. Cash Flow*	<u>(266,117,529)</u>	<u>(239,954,258)</u>
c. Total investment income based on market value (Item 2a less Item 2b)	\$ (169,368,110)	\$ 542,403,511
3. End of year market assets	\$ 14,069,978,917	\$ 14,505,464,556
4. Estimated dollar weighted market value yield (net of investment and administrative expenses)	(1.18%)	3.85%
B. Actuarial value yield		
1. Beginning of year actuarial assets	\$ 14,463,670,277	\$ 13,641,755,300
2. Investment income (based on asset valuation method)		
a. Change in assets (Item 3 - Item 1)	\$ 535,078,783	\$ 821,914,977
b. Cash Flow*	<u>(266,117,529)</u>	<u>(239,954,258)</u>
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 801,196,312	\$ 1,061,869,235
3. End of year actuarial assets	\$ 14,998,749,060	\$ 14,463,670,277
4. Estimated actuarial value yield (net of investment and administrative expenses)	5.59%	7.85%

*Prior to 2016 the cash flow excluded administrative expenses.

Allocation of Cash and Investments

	<u>June 30, 2016</u>	<u>June 30, 2015</u>
	(1)	(2)
1. Cash and short-term equivalents	3.7%	4.4%
2. Fixed income securities	22.0%	19.0%
3. Equity securities	60.4%	62.6%
4. Real estate	6.8%	8.0%
5. Other	<u>7.1%</u>	<u>6.0%</u>
6. Total investments	100.0%	100.0%

Total Experience Gain or Loss

Item	Police and Firefighters	All Other Employees	All Employees
(1)	(2)	(3)	(4)
A. Calculation of total actuarial gain or loss			
1. Unfunded actuarial accrued liability (UAAL), as of June 30, 2015	\$ 1,366,957,151	\$ 7,407,767,958	\$ 8,774,725,109
2. Normal cost for the year (employer and employee)	\$ 96,382,956	\$ 387,895,543	\$ 484,278,499
3. Less: contributions and assessments for the year	\$ (181,517,115)	\$ (811,842,968)	\$ (993,360,083)
4. Interest at 7.65 %			
a. On UAAL	\$ 104,572,222	\$ 566,694,249	\$ 671,266,471
b. On normal cost	3,686,648	14,837,005	18,523,653
c. On contributions	(6,943,030)	(31,052,994)	(37,996,024)
d. Total	\$ 101,315,840	\$ 550,478,260	\$ 651,794,100
5. Expected UAAL as of June 30, 2016 (Sum of Items 1 - 4)	\$ 1,383,138,832	\$ 7,534,298,793	\$ 8,917,437,625
6. Actual UAAL as of June 30, 2016	\$ 2,093,207,014	\$ 10,347,277,555	\$ 12,440,484,569
7. Total gain (loss) for the year (Item 5 - Item 6)	\$ (710,068,182)	\$ (2,812,978,762)	\$ (3,523,046,944)
B. Source of gains and losses			
8. Asset gain (loss) for the year (Table 9b)	\$ (60,244,038)	\$ (249,346,010)	\$ (309,590,048)
9. Gain (loss) due to change in actuarial assumptions	(558,258,724)	(2,357,663,953)	(2,915,922,677)
10. Gain (loss) due to change in actuarial method	-	-	-
11. Other liability gain (loss)	(91,565,420)	(205,968,799)	(297,534,219)
12. Change in benefit provisions	-	-	-
13. Total gain (loss) for the year	\$ (710,068,182)	\$ (2,812,978,762)	\$ (3,523,046,944)

Investment Experience Gain or Loss

Item (1)	June 30, 2016 (2)	June 30, 2015 (3)
1. Actuarial assets, beginning of year	\$ 14,463,670,277	\$ 13,641,755,300
2. Total contributions during year	\$ 993,360,083	\$ 941,298,400
3. Benefits and refunds paid	\$ (1,245,517,025)	\$ (1,181,252,658)
4. Assumed net investment income at 7.65%		
a. Beginning of year assets	\$ 1,106,596,855	\$ 1,057,236,035
b. Contributions	38,492,703	36,475,313
c. Benefits and refunds paid	<u>(48,263,785)</u>	<u>(45,773,540)</u>
d. Total	\$ 1,096,825,773	\$ 1,047,937,808
5. Expected actuarial assets, end of year (Sum of items 1 through 4)	\$ 15,308,339,108	\$ 14,449,738,850
6. Actual actuarial assets, end of year	\$ 14,998,749,060	\$ 14,463,670,277
7. Asset gain (loss) for year (Item 6 - Item 5)	\$ (309,590,048)	\$ 13,931,427
8. Asset gain (loss) as a percent of actuarial value of assets, end of year (Item 7 / Item 6)	(2.06%)	0.10%

Projection Results Based on June 30, 2016 Actuarial Valuation

Valuation as of June 30,	Employer Contribution Rate for Fiscal Year Following Valuation Date	Compensation (in Millions)	Employer Contributions (in Millions)	Actuarial Accrued Liability (AAL, in Millions)	Actuarial Value of Assets (AVA, in Millions)	Unfunded Actuarial Accrued Liability (UAAL, in Millions)	Funded Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2016	17.91%	\$ 4,258.9	\$ 763	\$ 27,439	\$ 14,997	\$ 12,443	54.7%
2017	17.91%	4,348.5	779	28,504	15,626	12,878	54.8%
2018	17.91%	4,449.4	797	29,643	16,318	13,325	55.0%
2019	17.91%	4,557.6	816	30,785	17,002	13,783	55.2%
2020	17.90%	4,672.8	837	31,929	17,676	14,252	55.4%
2021	17.90%	4,793.9	858	33,074	18,341	14,733	55.5%
2022	17.90%	4,920.0	881	34,220	18,995	15,224	55.5%
2023	17.90%	5,052.4	904	35,365	19,639	15,726	55.5%
2024	17.89%	5,190.1	929	36,510	20,271	16,239	55.5%
2025	17.89%	5,333.8	954	37,651	20,889	16,763	55.5%
2026	17.88%	5,484.6	981	38,788	21,492	17,296	55.4%
2027	17.88%	5,642.6	1,009	39,921	22,081	17,840	55.3%
2028	17.87%	5,807.9	1,038	41,051	22,658	18,393	55.2%
2029	17.87%	5,981.2	1,069	42,179	23,223	18,956	55.1%
2030	17.87%	6,162.1	1,101	43,307	23,779	19,528	54.9%
2031	17.86%	6,351.0	1,134	44,436	24,328	20,108	54.7%
2032	17.86%	6,547.3	1,169	45,565	24,869	20,696	54.6%
2033	17.86%	6,750.8	1,205	46,694	25,404	21,290	54.4%
2034	17.85%	6,963.1	1,243	47,827	25,935	21,891	54.2%
2035	17.85%	7,184.2	1,282	48,964	26,466	22,498	54.1%
2036	17.85%	7,414.0	1,323	50,108	26,999	23,109	53.9%
2037	17.85%	7,653.7	1,366	51,261	27,538	23,723	53.7%
2038	17.85%	7,904.3	1,411	52,429	28,088	24,340	53.6%
2039	17.85%	8,165.8	1,458	53,614	28,656	24,959	53.4%
2040	17.85%	8,438.4	1,506	54,823	29,246	25,577	53.3%
2041	17.85%	8,722.4	1,557	56,060	29,866	26,194	53.3%
2042	17.86%	9,017.3	1,610	57,331	30,523	26,808	53.2%
2043	17.86%	9,324.0	1,665	58,642	31,225	27,417	53.2%
2044	17.86%	9,643.1	1,722	59,998	31,977	28,021	53.3%
2045	17.86%	9,974.2	1,781	61,406	32,790	28,616	53.4%

Projection assumes all assumptions exactly met, including a 7.00% annual return on the current actuarial value of assets.

Employer Covered Payroll

	Police and Firefighters		All Other Employees		All Employees	
	March 31, 2016	March 31, 2015	March 31, 2016	March 31, 2015	March 31, 2016	March 31, 2015
	(1)	(2)	(3)	(4)	(5)	(6)
State of Hawaii	\$ 17,908,897	\$ 18,291,445	\$ 3,061,089,645	\$ 2,936,749,528	\$ 3,078,998,542	\$ 2,955,040,973
City & County of Honolulu	281,944,051	268,669,616	323,490,569	311,186,022	605,434,620	579,855,638
Board of Water Supply	-	-	34,433,281	32,996,367	34,433,281	32,996,367
County of Hawaii	72,227,466	67,752,957	92,713,105	89,977,778	164,940,571	157,730,735
County of Maui	59,694,442	58,156,017	97,111,961	94,295,056	156,806,403	152,451,073
County of Kauai	26,318,063	25,286,077	51,420,172	49,272,169	77,738,235	74,558,246
Total All Employers	\$ 458,092,919	\$ 438,156,112	\$ 3,660,258,733	\$ 3,514,476,920	\$ 4,118,351,652	\$ 3,952,633,032

Schedule of Funding Progress

Valuation Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial		Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
			Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
June 30, 2001	\$ 9,516.0	\$ 10,506.9	\$ 991.0	90.6%	\$ 2,444.2	40.5%
June 30, 2002	9,415.2	11,210.2	1,795.1	84.0%	2,671.7	67.2%
June 30, 2003	9,074.0	11,952.1	2,878.1	75.9%	2,826.7	101.8%
June 30, 2004	8,797.1	12,271.3	3,474.2	71.7%	2,865.1	121.3%
June 30, 2005	8,914.8	12,986.0	4,071.1	68.6%	3,041.1	133.9%
June 30, 2006 *	9,529.4	14,661.4	5,132.0	65.0%	3,238.3	158.5%
June 30, 2007 **	10,589.8	15,696.5	5,106.8	67.5%	3,507.0	145.6%
June 30, 2008	11,381.0	16,549.1	5,168.1	68.8%	3,782.1	136.6%
June 30, 2009	11,400.1	17,636.4	6,236.3	64.6%	4,030.1	154.7%
June 30, 2010	11,345.6	18,483.7	7,138.1	61.4%	3,895.7	183.2%
June 30, 2011 **	11,942.8	20,096.9	8,154.2	59.4%	3,916.0	208.2%
June 30, 2012	12,242.5	20,683.4	8,440.9	59.2%	3,890.0	217.0%
June 30, 2013	12,748.8	21,243.7	8,494.9	60.0%	3,906.7	217.4%
June 30, 2014	13,641.8	22,220.1	8,578.3	61.4%	3,991.6	214.9%
June 30, 2015**	14,463.7	23,238.4	8,774.7	62.2%	4,171.4	210.4%
June 30, 2016**	14,998.7	27,439.2	12,440.5	54.7%	4,258.9	292.1%

Note : Dollar amounts in millions.

* Assumption changes and new Hybrid class effective June 30, 2006.

** New assumption effective on valuation date.

Membership Data

	Police and Firefighters		All Other Employees		All Employees	
	June 30, 2016	June 30, 2015	June 30, 2016	June 30, 2015	June 30, 2016	June 30, 2015
	(1)	(2)	(3)	(4)	(5)	(6)
1. Active members						
a. Number	5,087	5,044	62,290	62,266	67,377	67,310
b. Total salary	\$ 458,092,919	\$ 438,156,112	\$ 3,660,258,732	\$ 3,514,476,920	\$ 4,118,351,651	\$ 3,952,633,032
c. Average salary	\$ 90,052	\$ 86,867	\$ 58,762	\$ 56,443	\$ 61,124	\$ 58,723
d. Average age	42.5	42.3	48.3	48.3	47.9	47.8
e. Average service	14.3	14.2	13.2	13.1	13.3	13.2
2. Inactive members						
a. Number	366	361	7,375	7,052	7,741	7,413
b. Total annual deferred benefits	\$ 6,084,027	\$ 5,620,538	\$ 69,037,725	\$ 67,095,426	\$ 75,121,752	\$ 72,715,964
c. Average annual deferred benefit	\$ 16,623	\$ 15,569	\$ 9,361	\$ 9,514	\$ 9,704	\$ 9,809
3. Service retirees						
a. Number	3,331	3,267	36,726	35,796	40,057	39,063
b. Total annual benefits	\$ 173,883,842	\$ 164,846,594	\$ 940,185,518	\$ 898,802,303	\$ 1,114,069,360	\$ 1,063,648,897
c. Average annual benefit	\$ 52,202	\$ 50,458	\$ 25,600	\$ 25,109	\$ 27,812	\$ 27,229
4. Disabled retirees						
a. Number	135	135	1,462	1,459	1,597	1,594
b. Total annual benefits	\$ 2,852,210	\$ 2,780,590	\$ 18,585,276	\$ 17,951,655	\$ 21,437,486	\$ 20,732,245
c. Average annual benefit	\$ 21,127	\$ 20,597	\$ 12,712	\$ 12,304	\$ 13,424	\$ 13,006
5. Beneficiaries						
a. Number	285	270	3,567	3,356	3,852	3,626
b. Total annual benefits	\$ 10,053,859	\$ 9,105,407	\$ 55,514,373	\$ 50,132,644	\$ 65,568,232	\$ 59,238,051
c. Average annual benefit	\$ 35,277	\$ 33,724	\$ 15,563	\$ 14,938	\$ 17,022	\$ 16,337

Historical Summary of Active Member Data

Year Ending June 30,	Active Members		Total Salaries		Average Salary		Average Age	Average Service
	Number	Percent Increase	Amount in \$ Millions	Percent Increase	\$ Amount	Percent Increase		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1996	56,985	-2.6%	\$ 1,990.1	-4.5%	\$ 34,923	-1.9%		
1997	57,044	0.1%	2,019.3	1.5%	35,399	1.4%		
1998	57,797	1.3%	2,135.9	5.8%	36,955	4.4%		
1999	58,387	0.9%	2,186.5	2.4%	37,448	1.3%		
2000	59,191	1.4%	2,275.3	4.1%	38,440	2.6%	45.5	13.0
2001	59,992	1.4%	2,350.2	3.3%	39,175	1.9%	45.6	13.3
2002	62,208	3.7%	2,568.7	9.3%	41,292	5.4%	45.8	13.2
2003	62,292	0.1%	2,718.4	5.8%	43,640	5.7%	46.0	13.1
2004	62,573	0.5%	2,755.5	1.4%	44,037	0.9%	46.0	13.0
2005	63,073	0.8%	2,924.5	6.1%	46,368	5.3%	46.3	13.0
2006	64,069	1.6%	3,113.7	6.5%	48,599	4.8%	46.4	13.0
2007	65,251	1.8%	3,340.5	7.3%	51,194	5.3%	46.5	13.0
2008	66,589	2.1%	3,601.7	7.8%	54,089	5.7%	46.6	12.9
2009	67,912	2.0%	3,838.0	6.6%	56,514	4.5%	46.8	12.9
2010	65,890	-3.0%	3,713.6	-3.2%	56,360	-0.3%	47.1	13.2
2011	65,310	-0.9%	3,731.4	0.5%	57,133	1.4%	47.4	13.4
2012	65,599	0.4%	3,706.1	-0.7%	56,497	-1.1%	47.6	13.5
2013	66,226	1.0%	3,720.8	0.4%	56,184	-0.6%	47.7	13.5
2014	67,206	1.5%	3,871.0	4.0%	57,600	2.5%	47.8	13.5
2015	67,310	0.2%	3,952.6	2.1%	58,723	1.9%	47.8	13.2
2016	67,377	0.1%	4,118.4	4.2%	61,124	4.1%	47.9	13.3

History of Cash Flow

Year Ending June 30,	Contributions			Expenditures				External Cash Flow for the Year ²	Market Value of Assets	External Cash Flow as Percent of Market Value
	Employee	Employer	Total	Benefit Payments	Refunds	Administrative Expenses ¹	Total			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2004	\$ 55.1	\$ 235.7	\$ 290.8	\$ (636.2)	\$ (2.3)	\$ (10.5)	\$ (649.0)	\$ (358.2)	\$ 8,565.4	(4.2%)
2005	57.1	328.7	385.8	(676.3)	(3.4)	(7.3)	(687.0)	(301.2)	9,195.9	(3.3%)
2006	56.3	423.4	479.7	(720.5)	(2.5)	(8.5)	(731.5)	(251.8)	9,932.4	(2.5%)
2007	144.7	454.5	599.2	(761.0)	(3.5)	(9.6)	(774.1)	(174.9)	11,434.3	(1.5%)
2008	163.4	488.8	652.2	(792.3)	(3.7)	(10.7)	(806.7)	(154.5)	10,846.8	(1.4%)
2009	184.5	578.6	763.1	(839.1)	(3.5)	(12.3)	(854.9)	(91.8)	8,818.0	(1.0%)
2010	360.0	547.6	907.6	(906.4)	(7.8)	(12.2)	(926.4)	(18.8)	9,821.6	(0.2%)
2011	231.0	534.9	765.9	(960.2)	(7.9)	(13.3)	(981.4)	(215.5)	11,642.3	(1.9%)
2012	178.8	548.4	727.2	(1,015.4)	(7.2)	(11.6)	(1,034.2)	(307.0)	11,285.9	(2.7%)
2013	185.8	581.4	767.2	(1,060.6)	(7.2)	(12.3)	(1,080.1)	(312.9)	12,357.8	(2.5%)
2014	206.1	653.1	859.2	(1,122.4)	(8.5)	(12.6)	(1,143.5)	(284.3)	14,203.0	(2.0%)
2015	223.5	717.8	941.3	(1,170.7)	(10.5)	(14.0)	(1,195.2)	(253.9)	14,505.5	(1.8%)
2016	\$ 236.8	\$ 756.6	\$ 993.4	\$ (1,232.6)	\$ (12.9)	\$ (14.0)	\$ (1,259.5)	\$ (266.1)	\$ 14,070.0	(1.9%)

Amounts in \$ millions

¹ Excludes investment expenses² Column (9) = Column (4) + Column (8)

Solvency Test

	<u>June 30, 2016</u>	<u>June 30, 2015</u>
	(1)	(2)
1. Actuarial accrued liability (AAL)		
a. Active member contributions	\$ 2,150,455,931	\$ 1,981,835,121
b. Retirees and beneficiaries	14,228,204,532	12,321,791,648
c. Active and inactive members	<u>11,060,573,166</u>	<u>8,934,768,617</u>
d. Total	\$ 27,439,233,629	\$ 23,238,395,386
2. Actuarial value of assets	\$ 14,998,749,060	\$ 14,463,670,277
3. Cumulative portion of AAL covered		
a. Active member contributions	100%	100%
b. Retirees and beneficiaries	90%	100%
c. Active and inactive members	0%	2%

Highlights of Last Five Annual Actuarial Valuations
2012 through 2016

Item	Valuation Date: June 30				
	2012	2013	2014	2015	2016
Number of active members	65,599	66,226	67,206	67,310	67,377
Number of inactive members	6,909	7,312	8,105	7,413	7,741
Number of pensioners	37,830	38,741	39,680	40,657	41,654
Number of beneficiaries	2,944	3,071	3,407	3,626	3,852
Average monthly contributory member pension amount	\$ 2,315	\$ 2,414	\$ 2,508	\$ 2,621	\$ 2,730
Average monthly noncontributory member pension amount	\$ 1,538	\$ 1,562	\$ 1,585	\$ 1,611	\$ 1,637
Average monthly hybrid member pension amount	\$ 2,090	\$ 2,092	\$ 2,088	\$ 2,114	\$ 2,139
Average monthly beneficiary amount	\$ 1,219	\$ 1,247	\$ 1,304	\$ 1,361	\$ 1,419
Total actuarial value of assets (\$millions)	\$ 12,242	\$ 12,749	\$ 13,642	\$ 14,464	\$ 14,999
Unfunded actuarial accrued liability (\$millions)	\$ 8,440.9	\$ 8,494.9	\$ 8,578.3	\$ 8,774.7	\$ 12,440.5
Funding Period (in years) ⁽¹⁾	30.0	28.0	26.0	26.0	66.0
Item (Dollar amounts in millions)	Fiscal Year				
	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Employer contributions ⁽²⁾	\$ 548.4	\$ 581.4	\$ 653.1	\$ 717.8	\$ 756.6

⁽¹⁾ Beginning with the 2011 valuation, the funding period was determined using an open group projection. Prior valuations determined the remaining amortization based on the assumption that the amortization payment would remain constant as a percentage of pay.

⁽²⁾ Beginning with the fiscal year beginning July 1, 2005 a dollar contribution amount is not determined under the provisions of Act 181/2004. Instead a fixed percentage of payroll is contributed (15.75% for Police and Fire, 13.75% for All Others). Beginning July 1, 2008, the percentages increased to 19.70% for Police and Fire, 15.00% for All Others. Beginning July 1, 2012, the percentages increased to 22.0% for Police and Fire, 15.5% for All Others. Beginning July 1, 2013, the percentages increased to 23.0% for Police and Fire, 16.0% for All Others. Beginning July 1, 2014, the percentages increased to 24.0% for Police and Fire, 16.5% for All Others. Beginning July 1, 2015, the percentages increased to 25.0% for Police and Fire, 17.0% for All Others.

**Summary of Benefit Provisions
(For Members Hired Prior to 7/1/2012)**

	<u>Noncontributory</u>	<u>Contributory</u>	<u>Hybrid</u>
Employee Contributions	No employee contributions	7.8% of salary	6.0% of salary
Normal Retirement			
Eligibility	Age 62 and 10 years credited service; or Age 55 and 30 years credited service	Age 55 and 5 years credited service	Age 62 and 5 years credited service; or Age 55 and 30 years credited service
Benefit	1 ¼% of average final compensation times years of credited service (Average final compensation or AFC is an average of the highest salaries during any three years of credited service, excluding any salary paid in lieu of vacation or if ERS membership occurred prior to 1/1/71, AFC may be an average of the highest salaries during any five years of credited service including any salary paid in lieu of vacation.)	2% of average final compensation times years of credited service (Average final compensation or AFC is an average of the highest salaries during any three years of credited service, excluding any salary paid in lieu of vacation or if ERS membership occurred prior to 1/1/71, AFC may be an average of the highest salaries during any five years of credited service including any salary paid in lieu of vacation.)	2% of average final compensation times years of credited service, split formula for unconverted noncontributory service at 1 ¼% (Average final compensation or AFC is an average of the highest salaries during any three years of credited service, excluding any salary paid in lieu of vacation or if ERS membership occurred prior to 1/1/71, AFC may be an average of the highest salaries during any five years of credited service including any salary paid in lieu of vacation.)

	<u>Noncontributory</u>	<u>Contributory</u>	<u>Hybrid</u>
Early Retirement			
Eligibility	Age 55 and 20 years credited service	Any age and 25 years credited service	Age 55 with 20 years credited service
Benefit	Maximum allowance reduced 6% per year under age 62	Maximum allowance reduced 5% per year under age 55 plus 4% per year under age 50	Maximum allowance reduced 5% for each year under age 62
Deferred Vesting			
Eligibility	10 years credited service	5 years credited service and contributions left in the ERS	5 years credited service and contributions left in the ERS
Benefit	Accrued maximum allowance payable at age 65	Accrued maximum allowance payable at age 55	Accrued maximum allowance payable at age 62
Annuity Savings Account			
Interest	Not applicable	4.5% per annum on employee contributions and accrued interest	4.5% per annum on employee contributions and accrued interest
Eligibility	Not applicable	Requests refund and forfeits future retirement benefit	Requests refund and forfeits future retirement benefit
Benefit			
- Terminates with less than 5 years credited service	Not applicable	Return of member's contributions and accrued interest	Return of member's contributions and accrued interest
- Terminates with 5 or more years of credited service	Not applicable	Return of member's contributions and accrued interest	Return of member's Hybrid contributions and accrued interest, both times 150%. Return of non-Hybrid balance transfers and accrued interest.

	<u>Noncontributory</u>	<u>Contributory</u>	<u>Hybrid</u>
Ordinary Disability			
Eligibility	10 years credited service	10 years credited service	10 years credited service
Benefit	1 ¼% of AFC times years of credited service, unreduced for age (Minimum is 12.5% AFC)	1 ¾% of AFC times years of credited service, unreduced for age (Minimum is 30% AFC)	2% of AFC times years of credited service, unreduced for age, split formula for unconverted noncontributory service at 1 ¼% (Minimum is 25% AFC)
Service-Connected Disability			
Eligibility	Any age or credited service	Any age or credited service	Any age or credited service
Benefit	Accrued maximum allowance, but not less than 15% AFC. For accidents that occur on or after July 1, 2004, lifetime pension of 35% of AFC.	Totally disabled: lifetime pension of 66 2/3% AFC plus annuity. Occupationally disabled: same benefit (66 2/3% pension plus annuity) paid for 3 years and then pension is reduced to 33 1/3% AFC if not totally disabled. For accidents on or after July 7, 1998, lifetime pension of 50% of AFC plus refund of member's contributions and accrued interest.	Lifetime pension of 35% of AFC plus refund of member's contributions and accrued interest.

	Noncontributory	Contributory	Hybrid
Ordinary Death			
Eligibility	Active employee at time of death with at least 10 years of credited service	Active employee at time of death with at least 1 year of service	Active employee at time of death with at least 5 years of service
Benefit	<p>Surviving spouse/reciprocal beneficiary and dependent children receive a benefit equal to a percentage of member's accrued maximum allowance unreduced for age; or</p> <p>Option B (100% Joint and Survivor) benefit for surviving spouse if member was eligible for retirement at time of death and a percentage of member's accrued maximum allowance unreduced for age for the dependent children</p>	<p>Lump sum payment of member's contributions and accrued interest plus a percentage of the salary earned in the 12 months preceding death; or</p> <p>Option 3 (50% Joint and Survivor) benefit if member was not eligible for retirement at the time of death, credited with 10 years of service, and one beneficiary designated (benefit calculated using the ordinary disability retirement formula); or</p> <p>Option 2 (100% Joint and Survivor) benefit if member was eligible for retirement at the time of death and one beneficiary designated</p>	<p>Return of member's Hybrid contributions and accrued interest (both times 150%) plus return of non-Hybrid balance transfers and accrued interest; or</p> <p>Option 3 (50% Joint Survivor) lifetime benefit if credited with at least 10 years of service and one beneficiary designated; or</p> <p>Option 2 (100% Joint Survivor) lifetime monthly benefit if member was eligible for service retirement at time of death, and one beneficiary designated</p>

	Noncontributory	Contributory	Hybrid
Service-Connected Death			
Eligibility	Any age or service	Any age or service	Any age or service
Benefit	<p>Surviving spouse/reciprocal beneficiary receives pension equal to 30% of AFC (until remarriage or re-entry into a new reciprocal beneficiary relationship); additional benefits payable to surviving dependent children (up to age 18)</p> <p>If there is no spouse/reciprocal beneficiary or dependent children, no benefit is payable.</p>	<p>Lump sum payment of member's contributions and accrued interest, plus pension of 50% AFC to surviving spouse/reciprocal beneficiary (until remarriage or re-entry into a new reciprocal beneficiary relationship);</p> <p>If there is no surviving spouse or reciprocal beneficiary, surviving dependent children (up to age 18) or dependent parents shall be eligible for a monthly benefit.</p> <p>If there is no spouse/reciprocal beneficiary or dependent children/parents, the ordinary death benefit shall be payable to the designated beneficiary.</p>	<p>Lump sum payment of member's contributions and accrued interest, plus pension of 50% AFC to surviving spouse/reciprocal beneficiary (until remarriage or re-entry into a new reciprocal beneficiary relationship);</p> <p>If there is no surviving spouse or reciprocal beneficiary, surviving dependent children (up to age 18) or dependent parents shall be eligible for a monthly benefit.</p> <p>If there is no spouse/reciprocal beneficiary or dependent children/parents, the ordinary death benefit shall be payable to the designated beneficiary.</p>

For members hired after June 30, 2011, the interest crediting rate on employee contributions and accrued interest is 2.0% per annum.

The plan provisions summarized above apply to teachers and most State and County employees. Special provisions applicable to other groups of employees are outlined below:

- A. Police officers, firefighters, investigators of the Department of the Prosecuting Attorney and the Attorney General, narcotic enforcement investigators, and public safety investigators contribute 12.2% of their monthly salary to the ERS instead of 7.8%. These members may retire at age 55 with 5 years of credited service or at any age with 25 years of credited service and receive a retirement benefit of 2 ½% of average final compensation (AFC) for each year of such service up to a maximum of 80% AFC, provided the last 5 years of credited service in any of these occupations.
- B. Judges, elected officials, and legislative officers may retire at age 55 with at least 5 years of credited service, or at any age with at least 10 years of credited service and receive a pension of 3 ½% of AFC for each year of such service plus an annuity from their contributions allocable to the period of such service. This benefit cannot exceed 75% of the AFC. Judges hired after June 30, 1999 require 25 years of credited service in order to retire before age 55.
- C. Sewer workers in specified classifications, water safety officers, and emergency medical technicians (EMTs) may retire at any age if they are credited with 25 years of such service with the last 5 or more years in these occupations. (The 25-year feature is phased in through 7/1/2008 for EMTs.)
- D. Sewer workers in specified classifications, water safety officers, and emergency medical technicians (EMTs) that transfer to the Hybrid class contribute 9.75% of their monthly salary to the ERS. These members may retire at age 62 with 5 years of credited service or at any age if they are credited with 25 years of such service with the last 5 or more years in these occupations.

**Summary of Benefit Provisions
(For Members Hired After 6/30/2012)**

	Contributory (for Police/Fire)	Contributory (for Judges/Elected Officers)	Hybrid
Employee Contributions	14.2% of base pay earnings	9.8% of base pay earnings	8.0% of base pay earnings 11.75% of base pay earnings for Sewer workers, water safety officers, and emergency medical technicians (EMTs)
Normal Retirement Eligibility	Age 60 and 10 years credited service	Age 60 and 10 years credited service	Age 65 and 10 years credited service; or Age 60 and 30 years credited service Sewer workers, water safety officers, and EMTs may retire with 25 years credited service at age 55.
Benefit	2.25% of average final compensation times years of credited service. (Average final compensation or AFC is an average of the highest base pay earnings during any five years of credited service, excluding any salary paid in lieu of vacation.) Maximum is 80% of AFC.	3.0% of average final compensation times years of credited service (Average final compensation or AFC is an average of the highest base pay earnings during any five years of credited service, excluding any salary paid in lieu of vacation.) Maximum is 75% of AFC.	1.75% of average final compensation times years of credited service (Average final compensation or AFC is an average of the highest base pay earnings during any five years of credited service, excluding any salary paid in lieu of vacation.)

	Contributory (for Police Fire)	Contributory (for Judges/Elected Officers)	Hybrid
Early Retirement			
Eligibility	Age 55 and 25 years credited service	Age 55 and 25 years credited service Any age with 10 years for elected officers	Age 55 with 20 years credited service Sewer workers, water safety officers, and emergency medical technicians (EMTs) may retire with 25 years credited service.
Benefit	Maximum allowance reduced 6% per year under age 60	Maximum allowance reduced 6% per year under age 60	Maximum allowance reduced 5% for each year under age 65
Deferred Vesting			
Eligibility	10 years credited service and contributions left in the ERS	10 years credited service and contributions left in the ERS	10 years credited service and contributions left in the ERS
Benefit	Accrued maximum allowance payable at age 60	Accrued maximum allowance payable at age 60	Accrued maximum allowance payable at age 65
Annuity Savings Account			
Interest	2.0% per annum	2.0% per annum	2.0% per annum
Eligibility	Requests refund and forfeits future retirement benefit	Requests refund and forfeits future retirement benefit	Requests refund and forfeits future retirement benefit
Benefit			
- Terminates with less than 10 years credited service	Return of member's contributions and accrued interest	Return of member's contributions and accrued interest	Return of member's contributions and accrued interest
- Terminates with 10 or more years of credited service	Return of member's contributions and accrued interest	Return of member's contributions and accrued interest	Return of member's contributions and accrued interest, both times 120%

	interest	interest	
	Contributory (for Police Fire)	Contributory (for Judges/Elected Officers)	Hybrid
Ordinary Disability			
Eligibility	10 years credited service	10 years credited service	10 years credited service
Benefit	1 ¾% of AFC times years of credited service, unreduced for age (Minimum is 30% AFC)	3.0% of AFC times years of credited service, unreduced for age (Minimum is 30% AFC)	1 ¾% of AFC times years of credited service, unreduced for age (Minimum is 25% AFC)
Service-Connected Disability			
Eligibility	Any age or credited service	Any age or credited service	Any age or credited service
Benefit	Lifetime pension of 50% of AFC plus refund of member's contributions and accrued interest.	Lifetime pension of 50% of AFC plus refund of member's contributions and accrued interest.	Lifetime pension of 35% of AFC plus refund of member's contributions and accrued interest.

	Contributory (for Police Fire)	Contributory (for Judges/Elected Officers)	Hybrid
Ordinary Death			
Eligibility	Active employee at time of death with at least 1 years of credited service	Active employee at time of death with at least 1 years of credited service	Active employee at time of death with at least 10 years of service
Benefit	Lump sum payment of member's contributions and accrued interest plus a percentage of the salary earned in the 12 months preceding death; or Option 3 (50% Joint Survivor) lifetime benefit if credited with at least 10 years of service and one beneficiary designated; or Option 2 (100% Joint Survivor) lifetime monthly benefit if member was eligible for service retirement at time of death, and one beneficiary designated	Lump sum payment of member's contributions and accrued interest plus a percentage of the salary earned in the 12 months preceding death; or Option 3 (50% Joint Survivor) lifetime benefit if credited with at least 10 years of service and one beneficiary designated; or Option 2 (100% Joint Survivor) lifetime monthly benefit if member was eligible for service retirement at time of death, and one beneficiary designated	Return of member's Hybrid contributions and interest; or Option 3 (50% Joint Survivor) lifetime benefit if credited with at least 10 years of service and one beneficiary designated; or Option 2 (100% Joint Survivor) lifetime monthly benefit if member was eligible for service retirement at time of death, and one beneficiary designated

	Contributory (for Police Fire)	Contributory (for Judges/Elected Officers)	Hybrid
Service-Connected Death			
Eligibility	Any age or service	Any age or service	Any age or service
Benefit	<p>Same for all members.</p> <p>Lump sum payment of member's contributions and interest, plus pension of 50% AFC to surviving spouse/reciprocal beneficiary (until remarriage or re-entry into a new reciprocal beneficiary relationship);</p> <p>If there is no surviving spouse or reciprocal beneficiary, surviving dependent children (up to age 18) or dependent parents shall be eligible for a monthly benefit.</p> <p>If there is no spouse/reciprocal beneficiary or dependent children/parents, the ordinary death benefit shall be payable to the designated beneficiary.</p>		

Post Retirement Benefit

Each retiree's original retirement allowance is increased by 1 ½% (if their membership date is after June 30, 2012) or 2 ½% (if their membership date is before July 1, 2012) on each July 1 beginning the calendar year after retirement. This cumulative benefit is not compounded.

Retirement Options**Contributory or Hybrid Member**

Maximum Allowance: The member receives a lifetime maximum allowance and at death the difference between the value of the member's contributions at the time of retirement and the retirement allowance paid prior to death is paid to the designated beneficiary(ies) or estate.

Option One: The member receives a reduced lifetime allowance based on age and at death, the difference between the initial insurance reserve and the retirement allowance paid prior to death is paid to the designated beneficiary(ies) or estate.

Option Two (100% Joint and Survivor with Pop-Up): The member receives a reduced lifetime allowance based on ages of both the member and the sole beneficiary and at death of the member; the same allowance is paid to the designated beneficiary for life. Should the designated beneficiary predecease the retiree, another beneficiary cannot be named, the benefit will revert back to the Maximum Allowance, and all payments will cease at the retiree's death.

Option Three (50% Joint and Survivor with Pop-Up): This allowance is similar to Option Two. The member receives a reduced lifetime allowance which is higher than Option Two and is based on ages of both the member and the sole beneficiary; however, at death of the member one-half of the allowance is paid to the designated beneficiary for life. Like Option Two, should the designated beneficiary predecease the retiree, another beneficiary cannot be named, the benefit will revert back to the Maximum Allowance, and all payments will cease at the retiree's death.

Option Four: This option allows the member to devise an allowance that will provide a benefit according to the member's specifications. It requires certification by the Actuary and approval of the Board of Trustees. The following Option Four allowances have been approved:

Combination of Options Five and Maximum Allowance: The member receives a reduced lifetime allowance and is allowed to withdraw the pre-1987 nontaxable contribution, 50% of accumulated contributions, or 75% of accumulated contributions (Hybrid class members are not allowed the 75% option); at death, the difference between the value of the member's contributions at the time of retirement and the retirement allowance paid prior to death is paid to the designated beneficiary(ies) or estate.

Combination of Options Five and One: The member receives a reduced lifetime allowance and is allowed to withdraw the pre-1987 nontaxable contributions, 50% of accumulated contributions, or 75% of accumulated contributions (Hybrid class members are not allowed the 75% option); at death, the difference between the initial insurance reserve and the retirement allowance paid prior to death is paid to the designated beneficiary(ies) or estate.

Combination of Options Five and Two: The member receives a reduced lifetime allowance based on ages of both member and the sole beneficiary, and is allowed to withdraw the pre-1987 nontaxable contributions, 50% of accumulated contributions, or 75% of accumulated contributions (Hybrid class members are not allowed the 75% option); at death of the member, the same allowance is paid to the designated beneficiary for life. As in the case of Option Two, should the designated beneficiary predecease the retiree, another beneficiary cannot be named, the benefit will revert back to the Maximum Allowance (as adjusted for the contribution withdrawal), and all payments will cease at the retiree's death.

Combination of Options Five and Three: The member receives a reduced lifetime allowance based on ages of both member and the sole beneficiary, and is allowed to withdraw the pre-1987 nontaxable contributions, 50% of accumulated contributions, or 75% of accumulated contributions (Hybrid class members are not allowed the 75% option); at death of the member, one-half of the allowance is paid to the designated beneficiary for life. As in the case of Option Three, should the designated beneficiary predecease the retiree, another beneficiary cannot be named, the benefit will revert back to the Maximum Allowance (as adjusted for the contribution withdrawal), and all payments will cease at the retiree's death.

Option Five: The member receives a reduced lifetime allowance and is allowed to withdraw all accumulated contributions; at death, the retirant is entitled to the pension for the entire month that death occurs.

Option Four and Option Five are restricted to those members with at least ten years of credited service excluding unused sick leave credit.

Regardless of the option selected, should death occur during the first year of retirement, the designated beneficiary may elect to receive benefits as if death had occurred immediately prior to retirement in lieu of the death benefits described above.

Noncontributory Member

Maximum Allowance: The member receives a lifetime pension and at death, the retirant is entitled to the pension for the entire month that death occurs.

Option A (50% Joint and Survivor with Pop-Up): The member receives a reduced lifetime pension and at death of the member, one-half of the pension is paid to the sole designated beneficiary for life. Should the designated beneficiary predecease the retiree, another beneficiary cannot be named, the benefit will revert back to the Maximum Allowance, and all payments will cease at the retiree's death.

Option B (100% Joint and Survivor with Pop-up): The member receives a reduced lifetime pension and at death of the member, the same pension is paid to the sole designated beneficiary for life. Like Option A, should the designated beneficiary predecease the retiree, another beneficiary cannot be named, the benefit will revert back to the Maximum Allowance, and all payments will cease at the retiree's death.

Option C (Ten-Year Guarantee): The member receives a reduced lifetime pension. Should death occur within ten years of retirement, the same pension will be paid to the designated beneficiary for the balance of the ten-year period. Should the designated beneficiary predecease the retiree, another beneficiary can be named.

Regardless of the option selected, should death occur during the first year of retirement, the designated beneficiary may elect to receive benefits as if death had occurred immediately prior to retirement in lieu of the death benefits described above.

Summary of Plan Changes

Act 65, effective July 1, 1999

Requires judges who enter or re-enter service after June 30, 1999 to be at least 55 years old and five years of service or have 25 years of service to rehire.

Act 100, effective June 30, 1999

Uses actuarial investment earnings in excess of a ten percent (10%) actuarial investment yield rate to reduce the employer's contribution requirements by \$147.0 million and \$50.6 million for fiscal years ending June 30, 2000 and 2001, respectively.

Act 284, effective June 30, 2001

Provide an increase in pension benefits for current retirees with military service who retired prior to July 2, 1989. A retirant who rendered honorable active military service could be granted up to 4 years of military service credits based upon his/her years of credited service under the ERS, not to exceed his/her actual years of military service. The years of military service credits granted are based on the following schedule:

- 0 years for retirants with less than 8 years of credited service
- Up to 2 years of retirants with 8 years or more of credited service
- Up to 3 years of retirants with 20 years or more of credited service
- Up to 4 years of retirants with 25 years or more of credited service

For each year of military service credits granted on the schedule above, the retirant will be provided a \$36.00 increase in his/her monthly pension or retirement allowance.

Act 199, effective June 30, 2003

Emergency Medical Technicians (EMTs) are allowed to retire with an unreduced benefit after 25 years of service regardless of age, of which the last five or more years prior to retirement must be in that capacity. This feature is phased in one year at a time, July 1, 2003 through June 30, 2008.

Act 177, effective July 1, 2004

This Act allows police officers with a permanent service-connected disability to retain the 2-1/2% benefit multiplier for each year of service as a police officer.

Act 179, effective July 1, 2004

This Act increased the Noncontributory service-connected disability formula to 35% of average final compensation. The Act also changed the methodology for crediting interest on contributions for terminated members so that interest continues to accrue until the date of refund. The Act adds a “pop-up” feature to the joint & survivor benefit options if the beneficiary predeceases the retiree.

This Act also created the new Hybrid class which became effective July 1, 2006.

Act 181, effective July 1, 2004

This Act establishes fixed employer contribution rates as a percentage of compensation effective July 1, 2005. Employers will contribute 15.75% for their police officers and firefighters and 13.75% for other employees.

Act 183, effective July 1, 2004

This Act amends the ERS statutes to comply with the federal tax limits on compensation retroactive to July 1, 1996.

Act 56, effective December 1, 2004

This Act amends the ERS statutes to allow the automatic cost-of-living-adjustment to be reflected when determining actuarial equivalent optional forms of payment.

Act 256, effective July 5, 2007

Legislation was enacted to remove the statutory salary increase assumption from the statutes and to grant the System's Board of Trustees the authority to set the salary increase assumption. As a result of this legislation, the Board has adopted effective with this valuation the salary increase assumption recommended by GRS as a result of the Experience Study performed in 2006.

Legislation was also enacted to increase the employer contribution rates to the System. Effective July 1, 2008, the employer contribution rate for Police and Fire employees will increase from 15.75% to 19.70% and the rate for All Other employees will increase from 13.75% to 15.00%.

Act 163, effective June 23, 2011

Legislation was enacted that increased the future employer contribution rates to ERS. Employers of Police and Fire employees will contribute 22% of pay in FY 2013, 23% in FY 2014, 24% in FY 2015, and 25% in FY 2016 and beyond. Employers of All Other Employees will contribute 15.5% of pay in FY 2013, 16.0% in FY 2014, 16.5% in FY 2015, and 17.0% in FY 2016 and beyond.

Legislation was enacted that made numerous changes to the benefits and member contribution rates for employees hired after June 30, 2012. Key changes are shown below:

Benefit Provision	Police & Fire Employees	All Other Employees
Benefit Multiplier	2.25%	1.75%
Normal Retirement	Age 55 with 25 years of service, or age 60 with 10 years of service	Age 60 with 30 years of service, or age 65 with 10 years of service
Post-Retirement Increase	1.5%	1.5%
Hybrid Match	N/A	120%
Average Final Compensation	Highest 5 annual base salaries	Highest 5 annual base salaries
Eligibility for Deferred Benefit	10 years of service	10 years of service
Member Contribution Rate	14.20%	8.00%

Similar changes were also made to the benefits of Judges, Legislative Officers, etc.

Similar changes were also made to those employees in the All Other Employees group who are eligible to retire at 25 years of service including the addition of a minimum age requirement (55).

Finally, legislation was enacted that set the investment return assumption for the June 30, 2011 valuation at 7.75% (the rate recommended in the Experience Study presented to the Board in December of 2010). In addition, the legislation granted ERS's Board the authority to set this assumption for valuations after 2011.

Act 152, effective June 26, 2012

Legislation was enacted to require employers to pay additional contributions if a retiring employee, who was first employed prior to July 1, 2012 and who was last employed by the employer, has significant non-base pay increases included in their average final compensation. The additional contribution is equal to the actuarial present value of the additional benefits earned due to the "excessive" non-base pay increases.

Act 153, effective June 26, 2012

Legislation was enacted to eliminate most types of non-base pay from the definition of compensation for employees hired after June 30, 2012. For the impacted employees, non-base pay compensation will be excluded in determining both the contributions made by and on behalf of these employees and the benefits they will earn in the System.

Summary of Actuarial Methods and Assumptions

Basis for assumption setting: The actuarial assumptions were adopted by the Board on December 12, 2016. Rationale for the recommendations are in the most recent experience study dated July 5, 2016.

I. Valuation Date

The valuation date is June 30th of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The normal cost and actuarial accrued liability are determined using the Entry Age Actuarial Cost Method. The actuarial accrued liability is assigned to years prior to the valuation, and the normal cost is assigned to the year following the valuation. The remaining costs are assigned to future years. The normal cost and accrued liability are determined on an individual basis.

The normal cost is the level percentage of payroll contribution required to accumulate the needed funds to pay all expected benefits. This percentage of payroll is then applied to the total compensation for the prior year for all active members, and is then adjusted for the payroll growth assumption.

The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability (UAAL) is the excess of the actuarial accrued liability over the actuarial value of assets.

III. Funding of Unfunded Actuarial Accrued Liability

Since the State statutes governing the System establish the employee and employer contribution rates, the actuarial valuation determines the number of years required to amortize (or fund) the UAAL. Because of the legislated increases in future employer contribution rates and the new tier of benefits for employees hired after June 30, 2012, an open group projection of liabilities and assets was used to determine the length of time until the UAAL is eliminated. The open group projection assumed that the number of active members would remain static (i.e. each active employee who leaves employment due to termination, retirement, death or disability, would be replaced by exactly one new employee.

Because of this methodology for determining the funding period, any change in the unfunded actuarial accrued liability due to (i) actuarial gains and losses, (ii) changes in actuarial assumptions, or (iii) amendments, affects the funding period.

Please see Section VIII of this table for a description of the new entrant profile used in the open group projection.

IV. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a four-year phase-in of actual investment return in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continue to be recognized on their original timeframe. The expected actuarial value of assets is calculated net of investment expenses, and the expected investment return is equal to the assumed investment return rate multiplied by the prior year's actuarial value of assets, adjusted for contributions, benefits paid, and refunds.

V. New Entrant Profile

For the purposes of determining the funding period, an open group projection is used which replaces on a one-to-one basis each active member who leaves employment with an average new hire. The average new hire is determined based on a new entrant profile, which is created from the valuation data by determining the entry age and entry pay for anyone with seven or less years of service as of the valuation date. Each group of new hires' salaries is assumed to grow at the General Wage Inflation of 3.50% over the salaries of the previous year's group.

The new entrant profile for members assumed to be hired during the year following the valuation date for the Police and Fire Employees and the All Other Employees are shown in the table below.

New Entrant Profile for Police & Fire Employees		
Entry Age	# of Employees	Average Salary
20-24	199	\$42,080
25-29	421	41,841
30-34	286	41,807
35-39	136	42,273
40-44	47	42,310
45-49	17	43,503
50-54	6	45,708
55-59	1	40,632
Total	1,113	41,993

It is assumed that 92.7% of new hires will be male.

New Entrant Profile for All Other Employees		
Entry Age	# of Employees	Average Salary
15-19	19	\$26,410
20-24	1,433	37,250
25-29	3,459	40,108
30-34	2,759	42,208
35-39	2,388	43,097
40-44	1,954	41,537
45-49	1,785	40,980
50-54	1,449	42,278
55-59	1,169	45,146
60-64	484	46,511
65-69	52	47,971
Total	16,951	41,610

It is assumed that 40.0% of new hires will be male.

VI. Actuarial Assumptions

A. Economic Assumptions

1. Investment return: 7.00% per year, compounded annually, composed of an assumed 2.50% inflation rate and a 4.50% net real rate of return (net of investment expenses).
2. General Wage Inflation: 3.50% per annum.

3. Salary increase rates: As shown below

Years of Service	General Employees		Teachers	
	Service-related Component	Total Rate Including 2.50% Inflation Component and 1.00% Productivity Component	Service-related Component	Total Rate Including 2.50% Inflation Component and 1.25% Productivity Component
1	3.00%	6.50%	2.00%	5.75%
2	3.00%	6.50%	1.75%	5.50%
3	2.00%	5.50%	1.75%	5.50%
4	1.50%	5.00%	1.50%	5.25%
5	1.50%	5.00%	1.00%	4.75%
6	1.25%	4.75%	1.00%	4.75%
7	1.25%	4.75%	0.75%	4.50%
8	1.00%	4.50%	0.75%	4.50%
9	1.00%	4.50%	0.50%	4.25%
10	1.00%	4.50%	0.50%	4.25%
11	0.75%	4.25%	0.50%	4.25%
12	0.75%	4.25%	0.50%	4.25%
13	0.50%	4.00%	0.25%	4.00%
14	0.50%	4.00%	0.25%	4.00%
15	0.50%	4.00%	0.25%	4.00%
16	0.50%	4.00%	0.25%	4.00%
17	0.50%	4.00%	0.25%	4.00%
18	0.50%	4.00%	0.25%	4.00%
19	0.50%	4.00%	0.25%	4.00%
20	0.25%	3.75%	0.25%	4.00%
21	0.25%	3.75%	0.25%	4.00%
22	0.25%	3.75%	0.25%	4.00%
23	0.25%	3.75%	0.25%	4.00%
24	0.25%	3.75%	0.25%	4.00%
25 or more	0.00%	3.50%	0.00%	3.75%

3. Salary increase rates (continued):

Years of Service	Police & Firefighters	
	Service-related Component	Total Annual Rate of Increase Including 2.50% Inflation Component and 2.5% General Increase Rate
1	2.00%	7.00%
2	2.00%	7.00%
3 or more	0.00%	5.00%

Salary increases are assumed to occur once a year, on July 1. Therefore the pay used for the period between the valuation date and the first anniversary of the valuation date is equal to the reported pay for the prior year, annualized if necessary, and then increased by the salary increase assumption. To adjust the pays received as of March 31st to the June 30th valuation date, the reported pay for each member is increased by 1%.

B. Demographic Assumptions

1. Mortality rates:

Active Members: Multiples of the RP 2014 mortality table for active employees based on the occupation of the member as follows:

Type	General Employees	Teachers	Police and Fire
	Male & Female	Male & Female	Male & Female
Ordinary	75%	55%	58%
% of Ordinary	41%	52%	24%
Choosing Annuity			
Duty Related	5%	5%	12%

Healthy Retirees: The 2016 Public Retirees of Hawaii mortality table, generational projection using the BB projection table from the year 2016 and with multipliers based on plan and group experience. The following are sample rates of the base table as of 2016 with the corresponding multipliers:

Healthy Annuitant Mortality Rates Before Projection (Multiplier Applied)						
Age	General Employees		Teachers		Police and Fire	
	Male	Female	Male	Female	Male	Female
50	0.1626%	0.1140%	0.1463%	0.1012%	0.1951%	0.1140%
55	0.3963%	0.1937%	0.3567%	0.1720%	0.4756%	0.1937%
60	0.6301%	0.2735%	0.5671%	0.2428%	0.7561%	0.2735%
65	0.9489%	0.3532%	0.8540%	0.3136%	1.1387%	0.3532%
70	1.3733%	0.7404%	1.2360%	0.6574%	1.6480%	0.7404%
75	2.1071%	1.3116%	1.8964%	1.1645%	2.5285%	1.3116%
80	3.6268%	2.2573%	3.2641%	2.0041%	4.3522%	2.2573%
85	6.6210%	4.1830%	5.9589%	3.7138%	7.9452%	4.1830%
90	12.1005%	8.2371%	10.8905%	7.3133%	14.5206%	8.2371%
Multiplier	100%	107%	90%	95%	120%	107%
Setback	0	0	0	0	0	0

The following table provides the life expectancy for individuals retiring in future years based on the assumption with full generational projection:

<u>Life Expectancy for an Age 65 Retiree in Years</u>				
	<u>Year of Retirement</u>			
<u>Gender</u>	<u>2020</u>	<u>2025</u>	<u>2030</u>	<u>2035</u>
<u>General Retirees</u>				
Male	23.2	23.7	24.2	24.7
Female	26.4	26.8	27.2	27.5
<u>Teachers</u>				
Male	24.0	24.5	25.0	25.5
Female	27.3	27.7	28.0	28.3
<u>Police and Fire</u>				
Male	21.8	22.3	22.8	23.3
Female	26.4	26.8	27.2	27.5

Disabled retirees: Base Table for healthy retiree's occupation, set forward 5 years, generational projection using the BB projection table from the year 2016. Minimum mortality rate of 3.5% for males and 2.5% for females.

- Disability rates – The assumed total disability rates at select ages are multiples of the client specific table that follows:

<u>Age</u>	<u>Male & Female</u>
25	0.000%
30	0.001%
35	0.008%
40	0.026%
45	0.064%
50	0.146%
55	0.198%
60	0.217%

Note: The disability rates project the percentage of employees at each age that is assumed to become disabled before retiring. Multiples of the rates above are assumed to be ordinary disability or accidental disability, and varies by employee group as follows:

	<u>General Employees</u>	<u>Teachers</u>	<u>Police and Fire</u>
<u>Type</u>	<u>Male & Female</u>	<u>Male & Female</u>	<u>Male & Female</u>
Ordinary	210%	75%	70%
Accidental	30%	5%	75%

3. Termination Rates - Same male and female rates, based solely on the member's service. Rates reflect terminations for causes other than death, disability or retirement. Employees eligible for retirement are assumed to have no probability of termination. Sample rates are shown below:

Years of Service	Expected Terminations per 1000 Lives (Male & Female)		
	General Employees	Teachers	Police & Fire
0	185.9	243.6	110.0
1	152.5	200.8	95.0
2	124.6	164.7	37.0
3	101.6	134.4	30.1
4	82.9	109.4	26.1
5	67.9	89.0	23.3
6	56.1	72.5	21.0
7	47.0	59.5	19.2
8	40.1	49.4	17.7
9	35.1	41.7	16.4
10	31.5	36.0	15.2
11	29.1	31.9	14.1
12	27.6	29.0	13.2
13	26.6	27.0	12.3
14	25.9	25.7	11.5
15	25.5	24.8	10.8
16	25.1	24.0	10.1
17	24.5	23.2	9.5
18	23.9	22.4	8.9
19	23.0	21.4	8.3
20	22.0	20.2	7.7
21	20.8	18.7	7.2
22	19.5	17.1	6.8
23	18.3	15.4	6.3
24	17.4	13.6	5.8
25	16.8	12.1	0.0
26	16.8	10.9	0.0
27	16.8	10.4	0.0
28	16.8	10.7	0.0
29	16.8	10.0	0.0
30 and more	0.0	0.0	0.0

4. Retirement rates - Separate male and female rates, based on age. Sample rates are shown below:

Contributory Members

Expected Retirements per 100 Lives

Age	General Employees				Teachers				Police/Fire
	Unreduced Retirement		Reduced Retirement		Unreduced Retirement		Reduced Retirement		Unreduced Retirement
	Male	Female	Male	Female	Male	Female	Male	Female	Male & Female
45	0	0	0	0	0	0	0	0	12.5
46	0	0	0	0	0	0	0	0	12.5
47	0	0	0	0	0	0	0	0	12.5
48	0	0	0	0	0	0	0	0	12.5
49	0	0	0	0	0	0	0	0	12.5
50	0	0	0	0	0	0	1	0	15.0
51	0	0	2	1	0	0	1	1	15.0
52	0	0	2	1	0	0	1	1	15.0
53	0	0	2	1	0	0	2	2	15.0
54	0	0	3	2	0	0	3	3	15.0
55	25	20	3	2	20	18			20.0
56	25	20			15	16			20.0
57	16	13			15	16			20.0
58	16	13			15	16			22.0
59	13	13			15	16			25.0
60	13	15			14	18			30.0
61	13	15			14	18			30.0
62	28	25			14	25			30.0
63	20	20			14	20			30.0
64	20	20			14	15			30.0
65	20	20			20	25			100.0
66	18	20			15	25			
67	18	20			15	20			
68	18	20			15	20			
69	18	20			15	20			
70	20	20			15	20			
71	20	20			15	20			
72	20	20			15	20			
73	20	20			15	20			
74	20	20			15	20			
75	100	100			100	100			

Noncontributory Members

Age	Expected Retirements per 100 Lives							
	General Employees				Teachers			
	Unreduced		Reduced		Unreduced		Reduced	
	Male	Female	Male	Female	Male	Female	Male	Female
55	20	11	1	1	10	13	1	2
56	18	11	1	1	10	7	1	2
57	13	11	1	1	10	8	1	2
58	10	11	1	1	10	10	2	2
59	10	11	2	2	10	20	3	3
60	10	14	3	3	10	11	5	5
61	11	18	4	4	10	16	7	5
62	20	20			16	25		
63	20	20			12	20		
64	12	20			10	15		
65	14	20			20	25		
66	20	20			15	25		
67	20	20			15	25		
68	20	20			15	25		
69	20	20			15	25		
70	20	20			15	25		
71	20	20			15	25		
72	20	20			15	25		
73	20	20			15	25		
74	20	20			15	25		
75	100	100			100	100		

Note: Retirement rates for the 25&out group age 50-54 are 10% for male and 11% for female.

Hybrid Members

Age	Expected Retirements per 100 Lives							
	General Employees				Teachers			
	Unreduced		Reduced		Unreduced		Reduced	
Male	Female	Male	Female	Male	Female	Male	Female	
55	16	18	1	1	20	16	2	2
56	10	13	1	1	13	10	2	2
57	10	13	1	1	13	10	2	2
58	14	13	1	2	13	12	2	2
59	14	13	2	2	13	12	3	3
60	14	13	2	4	14	14	3	5
61	14	15	3	4	14	18	3	10
62	21	20			22	30		
63	18	20			14	20		
64	18	20			14	20		
65	21	20			20	25		
66	18	18			15	25		
67	18	18			15	25		
68	18	18			15	25		
69	18	18			15	25		
70	20	20			15	25		
71	20	20			15	25		
72	20	20			15	25		
73	20	20			15	25		
74	20	20			15	25		
75	100	100			100	100		

Note: Retirement rates for the 25&out group age 50-54 are 6% for both male and female.

For members hired after June 30, 2012 the retirement rates for members once they reach unreduced retirement eligibility are increased 10% (multiplicative) for each year the member is beyond the age the member would have been eligible under the Hybrid provisions for members hired prior to June 30, 2012.

C. Other Assumptions

1. Projected payroll for contributions: The aggregate projected payroll for the fiscal year following the valuation date is calculated by increasing the actual payroll paid during the previous fiscal year by the payroll growth rate and multiplying by the ratio of current active members to the average number of active members during the previous fiscal year.
2. Age difference: Male members are assumed to be four years older than their spouses, and female members are assumed to be four years younger than their spouses.
3. Marriage Assumption: While not implicitly used in the valuation, 100% of active members are assumed to be married when setting other benefit election and eligibility assumptions.
4. Percent electing annuity on death for contributory participants (when eligible): All of the spouses of married participants who die after becoming eligible for a retirement benefit are assumed to elect an annuity or a refund, whichever is more valuable at time of participant's death.
5. Payment Option: Future healthy retirees are assumed to choose the life only payment option. 50% of future disabled retirees are assumed to choose the 100% Joint and Survivor option.
6. Percent electing deferred termination benefit: vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.
7. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt when eligible for early retirement.
8. Administrative expenses: Administrative expenses are assumed to be 0.35% of active member payroll.
9. Reemployment, purchase of service, transfers: No recognition is made of (i) future member reimbursements upon reemployment, (ii) future purchase of additional service, or (iii) special transfer provisions.
10. Sick Leave: It is assumed that all members will have their benefit service increased by sick leave and the following loads will be applied by group:

General Employees	3.75%
Teachers	4.25%
Police and Fire	5.00%

11. COLA delay: It is assumed that the first COLA will be received 9 months after retirement. Teachers are assumed to receive COLA 12 months after retirement,
12. There will be no recoveries once disabled.
13. No surviving spouse will remarry and there will be no children's benefit.
14. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
15. Decrement timing: Retirements and terminations of Teachers are assumed to occur at the beginning of the year. All other decrements are assumed to occur mid-year.
16. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
17. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
18. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
19. Benefit Service: All members are assumed to accrue 1 year of service each year. Exact fractional service is used to determine the amount of benefit payable.
20. Police officers, firefighters, investigators of the Department of the Prosecuting Attorney and the Attorney General, narcotic enforcement investigators, and public safety investigators hired prior to June 30, 2012 are not assumed to retire at age 55 unless they have 10 years of service.

VII. Participant Data

Participant data was supplied in electronic files for (i) active members, (ii) inactive vested members, who are entitled to a future deferred benefit, (iii) members and beneficiaries receiving benefits.

Salary supplied for the current year was based on the actual pensionable earnings for the 12-month period ending the March preceding the valuation date. This pay was increased by 1% to reflect the three month difference from March to June. For members with less than one year of service, the base pay rate provided in the data was used.

VIII. Dates of Adoption of Assumptions and Methods

The actuarial assumptions and methods were adopted by the Board of Trustees on December 12, 2016 as recommended by Gabriel, Roeder, Smith & Company (GRS).

IX. Changes in Assumptions and Methods since Prior Valuation

The actuarial assumptions have been materially revised since the prior valuation. The major changes were (i) a decrease in the investment return assumption from 7.65% to 7.00%, and (ii) the mortality assumption was modified to assume longer life expectancies as well as to reflect continuous mortality improvement (generational mortality improvement). Please see our Experience Study report dated July 5, 2016 for a more extensive discussion of the changes in the actuarial assumptions and the rationale for the current assumptions.

SECTION M

STATISTICAL TABLES

STATISTICAL TABLES

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**Distribution of Active Members by Age and by Years of Service - All Employees
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	342 \$39,942	230 \$40,759	72 \$40,256	19 \$43,358	10 \$37,636	2 \$42,986	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	675 \$40,325
25-29	885 \$43,345	940 \$43,523	736 \$45,041	547 \$49,017	283 \$54,275	323 \$58,230	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,714 \$46,689
30-34	739 \$46,366	833 \$46,523	729 \$48,142	687 \$51,037	596 \$55,417	2,230 \$58,009	347 \$60,127	2 \$43,291	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	6,163 \$52,980
35-39	476 \$45,868	605 \$45,521	584 \$48,899	541 \$51,856	478 \$55,980	2,405 \$58,484	2,130 \$63,211	268 \$66,679	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	7,487 \$56,886
40-44	357 \$45,591	439 \$46,275	447 \$49,343	426 \$51,326	357 \$57,120	1,835 \$58,131	2,191 \$63,325	1,802 \$70,951	254 \$73,857	2 \$57,593	0 \$0	0 \$0	0 \$0	8,110 \$60,795
45-49	295 \$44,132	388 \$44,858	355 \$49,396	317 \$48,766	314 \$56,610	1,580 \$57,441	1,870 \$61,321	1,918 \$69,610	1,976 \$76,185	438 \$77,636	0 \$0	0 \$0	0 \$0	9,451 \$63,981
50-54	248 \$47,769	296 \$47,463	325 \$47,959	250 \$50,605	257 \$55,452	1,506 \$55,214	1,560 \$57,733	1,324 \$63,887	1,751 \$72,355	2,087 \$76,831	252 \$78,762	8 \$92,845	8 \$92,845	9,864 \$64,256
55-59	208 \$45,591	246 \$50,699	264 \$53,704	251 \$50,504	204 \$56,708	1,205 \$54,660	1,350 \$56,339	1,298 \$59,775	1,460 \$67,146	1,893 \$73,788	1,077 \$78,317	171 \$69,695	171 \$69,695	9,627 \$63,765
60-64	116 \$50,501	157 \$54,214	168 \$50,614	183 \$49,445	180 \$58,716	1,007 \$56,907	1,111 \$57,299	1,023 \$59,493	1,101 \$66,787	1,262 \$72,301	793 \$81,548	651 \$80,548	651 \$80,548	7,752 \$65,299
65 & Over	56 \$57,266	57 \$51,001	72 \$57,452	112 \$61,674	78 \$62,792	587 \$58,039	718 \$58,012	641 \$62,868	541 \$67,627	639 \$74,787	359 \$81,440	674 \$92,005	674 \$92,005	4,534 \$69,188
Total	3,722 \$45,085	4,191 \$45,869	3,752 \$48,427	3,333 \$50,813	2,757 \$56,212	12,680 \$57,313	11,277 \$60,331	8,276 \$65,570	7,083 \$71,177	6,321 \$74,858	2,481 \$79,847	1,504 \$84,514	1,504 \$84,514	67,377 \$61,124

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, All
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
25-29	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
30-34	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	13 \$51,250	149 \$52,807	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	162 \$52,682
35-39	0 \$0	0 \$0	0 \$0	2 \$50,430	0 \$0	35 \$43,740	862 \$58,551	102 \$57,215	0 \$0	0 \$0	0 \$0	0 \$0	1,001 \$57,881
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	30 \$54,085	920 \$59,346	590 \$62,333	87 \$60,081	1 \$69,966	0 \$0	0 \$0	1,628 \$60,377
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	20 \$50,485	759 \$56,922	738 \$61,844	680 \$66,472	154 \$60,592	0 \$0	0 \$0	2,351 \$61,415
50-54	0 \$0	0 \$0	1 \$91,614	0 \$0	1 \$6,502	12 \$44,167	710 \$53,666	618 \$58,874	694 \$64,753	725 \$67,367	79 \$68,008	3 \$75,636	2,843 \$61,377
55-59	0 \$0	0 \$0	1 \$37,415	0 \$0	0 \$0	7 \$48,400	571 \$51,677	620 \$54,694	683 \$62,699	744 \$66,963	310 \$72,162	39 \$70,312	2,975 \$61,025
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	13 \$39,756	429 \$51,915	446 \$54,927	540 \$62,934	532 \$66,442	252 \$76,969	209 \$73,331	2,421 \$62,511
65 & Over	0 \$0	0 \$0	0 \$0	1 \$22,824	0 \$0	6 \$62,086	307 \$53,243	311 \$56,300	301 \$62,080	343 \$71,468	157 \$75,998	255 \$90,750	1,681 \$66,938
Total	0 \$0	0 \$0	2 \$64,515	3 \$41,228	1 \$6,502	136 \$48,438	4,707 \$55,740	3,425 \$58,556	2,985 \$63,940	2,499 \$67,196	798 \$74,024	506 \$81,891	15,062 \$61,682

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, General Employees
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
25-29	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
30-34	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	12 \$50,594	101 \$48,483	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	26 \$37,981	462 \$54,937	69 \$54,008	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	24 \$53,497	594 \$56,287	321 \$57,683	60 \$52,866	1 \$69,966	0 \$0	0 \$0	0 \$0
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	18 \$47,672	583 \$53,044	495 \$58,797	400 \$62,052	134 \$58,399	0 \$0	0 \$0	0 \$0
50-54	0 \$0	0 \$0	0 \$0	0 \$0	1 \$6,502	10 \$41,634	571 \$49,575	496 \$54,947	507 \$60,273	493 \$62,565	71 \$66,700	3 \$75,636	3 \$56,854
55-59	0 \$0	0 \$0	1 \$37,415	0 \$0	0 \$0	6 \$48,481	473 \$48,733	514 \$51,317	540 \$58,438	598 \$62,999	229 \$68,890	37 \$67,114	37 \$57,233
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	12 \$37,703	352 \$49,092	358 \$50,417	419 \$56,921	431 \$61,467	200 \$71,900	177 \$69,969	177 \$57,921
65 & Over	0 \$0	0 \$0	0 \$0	1 \$22,824	0 \$0	5 \$53,651	248 \$48,439	257 \$51,477	232 \$55,292	251 \$63,250	112 \$68,788	160 \$80,519	160 \$59,103
Total	0 \$0	0 \$0	1 \$37,415	1 \$22,824	1 \$6,502	113 \$45,704	3,384 \$51,799	2,510 \$54,286	2,158 \$58,751	1,908 \$62,254	612 \$69,601	377 \$74,212	11,065 \$57,200

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, Teachers
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
25-29	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
30-34	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$59,119	48 \$61,905	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	49 \$61,848
35-39	0 \$0	0 \$0	0 \$0	2 \$50,430	0 \$0	9 \$60,378	400 \$62,725	33 \$63,920	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	444 \$62,711
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	6 \$56,437	326 \$64,919	269 \$67,881	27 \$76,113	0 \$0	0 \$0	0 \$0	0 \$0	628 \$66,588
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$75,810	176 \$69,769	243 \$68,049	280 \$72,786	20 \$75,285	0 \$0	0 \$0	0 \$0	721 \$70,531
50-54	0 \$0	0 \$0	1 \$91,614	0 \$0	0 \$0	2 \$56,834	139 \$70,468	122 \$74,836	187 \$76,899	232 \$77,571	8 \$79,615	0 \$0	0 \$0	691 \$75,461
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$47,917	98 \$65,887	106 \$71,067	143 \$78,788	146 \$83,200	81 \$81,413	2 \$129,476	2 \$0	577 \$76,786
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$64,385	77 \$64,820	88 \$73,274	121 \$83,755	101 \$87,672	52 \$96,465	32 \$91,923	32 \$0	472 \$81,463
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$104,263	59 \$73,434	54 \$79,257	69 \$84,904	92 \$93,890	45 \$93,942	95 \$107,982	95 \$0	415 \$90,840
Total	0 \$0	0 \$0	1 \$91,614	2 \$50,430	0 \$0	23 \$61,869	1,323 \$65,820	915 \$70,269	827 \$77,478	591 \$83,151	186 \$88,575	129 \$104,332	129 \$0	3,997 \$74,091

**Distribution of Active Members by Age and by Years of Service
Contributory Members, All
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	17 \$61,022	19 \$62,549	10 \$55,238	3 \$60,589	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	49 \$60,407
25-29	52 \$62,217	78 \$59,557	52 \$60,473	76 \$62,591	38 \$75,765	64 \$80,426	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	360 \$66,135
30-34	36 \$59,382	80 \$58,842	44 \$60,428	77 \$63,091	42 \$72,975	328 \$78,306	68 \$82,322	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	675 \$72,162
35-39	8 \$63,405	29 \$59,350	18 \$62,029	52 \$62,827	28 \$66,619	318 \$77,086	318 \$83,013	61 \$92,099	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	832 \$78,133
40-44	12 \$64,648	12 \$58,124	15 \$61,765	26 \$62,358	14 \$71,230	172 \$77,195	261 \$84,373	409 \$94,885	64 \$108,466	0 \$0	0 \$0	0 \$0	0 \$0	985 \$87,378
45-49	3 \$43,687	8 \$75,260	4 \$65,866	10 \$59,726	7 \$75,177	83 \$81,774	187 \$83,728	372 \$94,810	338 \$109,020	118 \$119,399	0 \$0	0 \$0	0 \$0	1,130 \$98,028
50-54	1 \$65,278	0 \$0	3 \$144,648	1 \$59,841	2 \$61,907	28 \$83,974	59 \$86,205	114 \$93,962	239 \$107,028	288 \$118,830	71 \$106,294	3 \$132,926	3 \$0	809 \$107,022
55-59	2 \$36,560	2 \$59,842	2 \$119,294	4 \$90,473	3 \$111,377	9 \$107,941	18 \$87,573	37 \$97,371	92 \$106,467	149 \$118,478	207 \$88,904	46 \$71,608	571 \$98,814	
60-64	2 \$105,610	1 \$194,063	0 \$0	1 \$59,841	0 \$0	13 \$102,228	14 \$123,136	24 \$107,308	34 \$122,232	52 \$129,151	123 \$89,104	140 \$80,711	404 \$97,090	
65 & Over	0 \$0	0 \$0	0 \$0	3 \$63,203	2 \$69,945	5 \$104,950	9 \$83,293	15 \$119,755	9 \$92,177	16 \$130,852	49 \$89,037	147 \$84,424	255 \$90,575	
Total	133 \$61,459	229 \$60,593	148 \$63,073	253 \$63,057	136 \$73,020	1,020 \$79,006	934 \$84,380	1,032 \$95,331	776 \$108,441	623 \$120,024	450 \$91,717	336 \$81,556	6,070 \$89,399	

**Distribution of Active Members by Age and by Years of Service
Contributory Members, General Employees
As of 06/30/2016**

Attained Age	Years of Credited Service												Total
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.
Under 25	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
25-29	0 \$0	0 \$0	0 \$0	2 \$59,842	0 \$0	1 \$77,859	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3 \$65,847
30-34	1 \$52,443	0 \$0	3 \$59,301	2 \$55,558	0 \$0	5 \$58,680	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	11 \$57,715
35-39	0 \$0	1 \$57,349	0 \$0	0 \$0	1 \$59,841	7 \$54,492	7 \$70,126	2 \$57,372	0 \$0	0 \$0	0 \$0	0 \$0	18 \$61,348
40-44	0 \$0	1 \$59,841	0 \$0	2 \$59,842	0 \$0	5 \$92,853	10 \$77,456	8 \$57,250	0 \$0	0 \$0	0 \$0	0 \$0	26 \$72,167
45-49	0 \$0	2 \$121,888	0 \$0	0 \$0	0 \$0	10 \$106,871	20 \$90,867	12 \$72,543	7 \$105,396	3 \$72,565	0 \$0	0 \$0	54 \$91,774
50-54	0 \$0	0 \$0	2 \$182,880	1 \$59,841	0 \$0	6 \$103,098	12 \$90,847	10 \$73,842	17 \$82,745	9 \$77,063	23 \$65,587	2 \$140,655	82 \$82,474
55-59	0 \$0	2 \$59,842	1 \$182,880	3 \$102,144	1 \$174,172	5 \$132,933	5 \$97,769	9 \$100,436	13 \$108,608	17 \$107,543	106 \$68,348	37 \$58,776	199 \$77,891
60-64	1 \$183,933	1 \$194,063	0 \$0	1 \$59,841	0 \$0	10 \$113,747	11 \$129,541	12 \$127,324	13 \$155,446	17 \$165,564	71 \$79,452	92 \$68,722	229 \$93,132
65 & Over	0 \$0	0 \$0	0 \$0	3 \$63,203	2 \$69,945	5 \$104,950	9 \$83,293	12 \$127,255	6 \$81,135	9 \$130,494	33 \$81,306	96 \$77,419	175 \$85,186
Total	2 \$118,188	7 \$96,387	6 \$121,090	14 \$69,015	4 \$93,476	54 \$96,873	74 \$92,384	65 \$94,470	56 \$108,285	55 \$122,337	233 \$73,294	227 \$71,413	797 \$84,400

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Teachers
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
25-29	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
30-34	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$54,123	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$54,123
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$65,747	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$65,747
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$91,908	1 \$62,630	0 \$0	0 \$0	0 \$0	0 \$0	2 \$77,269
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$59,606	0 \$0	0 \$0	0 \$0	1 \$59,606
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$202,000	3 \$71,848	4 \$116,375	34 \$85,857	2 \$99,321	44 \$90,928	
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$51,581	2 \$130,689	5 \$92,275	32 \$87,066	37 \$96,349	77 \$92,537	
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$72,778	0 \$0	2 \$169,234	11 \$100,225	46 \$93,793	60 \$97,137	
Total	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$54,123	0 \$0	5 \$96,803	6 \$89,925	12 \$110,412	77 \$88,412	85 \$95,036	186 \$92,948	

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Police and Firefighters
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	17 \$61,022	19 \$62,549	10 \$55,238	3 \$60,589	0 #DIV/0!	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	49 \$60,407
25-29	52 \$62,217	78 \$59,557	52 \$60,473	74 \$62,665	38 \$75,765	63 \$80,467	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	357 \$66,137
30-34	35 \$59,580	80 \$58,842	41 \$60,511	75 \$63,292	42 \$72,975	323 \$78,610	68 \$82,322	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	664 \$72,401
35-39	8 \$63,405	28 \$59,421	18 \$62,029	52 \$62,827	27 \$66,870	310 \$77,670	311 \$83,303	59 \$93,276	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	813 \$78,534
40-44	12 \$64,648	11 \$57,968	15 \$61,765	24 \$62,568	14 \$71,230	167 \$76,726	251 \$84,649	400 \$95,711	64 \$108,466	0 \$0	0 \$0	0 \$0	0 \$0	958 \$87,813
45-49	3 \$43,687	6 \$59,717	4 \$65,866	10 \$59,726	7 \$75,177	73 \$78,336	167 \$82,873	359 \$95,562	330 \$109,237	115 \$120,621	0 \$0	0 \$0	0 \$0	1,074 \$98,381
50-54	1 \$65,278	0 \$0	1 \$68,186	0 \$0	2 \$61,907	22 \$78,758	47 \$85,020	104 \$95,897	222 \$108,888	278 \$120,395	48 \$125,799	1 \$117,468	1 \$118,060	726 \$109,860
55-59	2 \$36,560	0 \$0	1 \$55,708	1 \$55,460	2 \$79,980	4 \$76,701	13 \$83,651	27 \$92,474	76 \$107,467	128 \$119,996	67 \$122,972	7 \$131,520	7 \$132,722	328 \$112,567
60-64	1 \$27,287	0 \$0	0 \$0	0 \$0	0 \$0	3 \$63,829	3 \$99,650	11 \$90,539	19 \$98,616	30 \$114,663	20 \$126,629	11 \$128,384	11 \$132,722	98 \$109,919
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$98,242	3 \$114,263	5 \$116,144	5 \$115,447	5 \$132,722	5 \$132,722	20 \$118,042
Total	131 \$60,593	222 \$59,464	142 \$60,622	239 \$62,708	132 \$72,400	965 \$78,032	860 \$83,691	962 \$95,382	714 \$108,609	556 \$120,003	140 \$124,195	24 \$129,747	24 \$129,747	5,087 \$90,052

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, All
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	325 \$38,840	211 \$38,796	62 \$37,840	16 \$40,128	10 \$37,636	2 \$42,986	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	626 \$38,753
25-29	833 \$42,166	862 \$42,072	684 \$43,868	471 \$46,827	245 \$50,942	259 \$52,745	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,354 \$44,602
30-34	703 \$45,699	753 \$45,214	685 \$47,353	610 \$49,515	554 \$54,086	1,889 \$54,531	130 \$56,908	2 \$43,291	0 \$0	0 \$0	0 \$0	0 \$0	5,326 \$50,558
35-39	468 \$45,569	576 \$44,824	566 \$48,481	487 \$50,690	450 \$55,318	2,052 \$55,852	950 \$60,812	105 \$61,105	0 \$0	0 \$0	0 \$0	0 \$0	5,654 \$53,584
40-44	345 \$44,928	427 \$45,942	432 \$48,912	400 \$50,608	343 \$56,544	1,633 \$56,198	1,010 \$61,511	803 \$65,092	103 \$63,988	1 \$45,220	0 \$0	0 \$0	5,497 \$56,156
45-49	292 \$44,137	380 \$44,217	351 \$49,209	307 \$48,409	307 \$56,186	1,477 \$56,168	924 \$60,399	808 \$65,102	958 \$71,495	166 \$63,760	0 \$0	0 \$0	5,970 \$58,546
50-54	247 \$47,698	296 \$47,463	321 \$46,919	249 \$50,568	254 \$55,594	1,466 \$54,756	791 \$59,260	592 \$63,328	818 \$68,674	1,074 \$71,958	102 \$67,927	2 \$58,536	6,212 \$60,004
55-59	206 \$45,679	244 \$50,624	261 \$53,264	247 \$49,857	201 \$55,892	1,189 \$54,293	761 \$59,098	641 \$62,519	685 \$66,300	1,000 \$72,207	560 \$77,810	86 \$68,392	6,081 \$61,815
60-64	114 \$49,534	156 \$53,318	168 \$50,614	182 \$49,388	180 \$58,716	981 \$56,533	668 \$59,378	553 \$61,101	527 \$67,157	678 \$72,538	418 \$82,084	302 \$85,467	4,927 \$64,062
65 & Over	56 \$57,266	57 \$51,001	72 \$57,452	108 \$61,991	76 \$62,604	576 \$57,590	402 \$61,088	315 \$66,643	231 \$73,897	280 \$75,648	153 \$84,592	272 \$97,279	2,598 \$68,545
Total	3,589 \$44,479	3,962 \$45,018	3,602 \$47,816	3,077 \$49,816	2,620 \$55,359	11,524 \$55,498	5,636 \$60,180	3,819 \$63,818	3,322 \$68,975	3,199 \$72,048	1,233 \$79,283	662 \$88,021	46,245 \$57,231

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, General Employees
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	160 \$35,797	141 \$36,104	62 \$37,840	15 \$39,502	10 \$37,636	2 \$42,986	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	390 \$36,459
25-29	522 \$39,778	568 \$39,978	425 \$41,892	274 \$44,923	137 \$48,850	168 \$51,623	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2,094 \$42,478
30-34	491 \$44,341	566 \$43,583	497 \$46,355	422 \$48,457	338 \$53,842	1,061 \$52,939	89 \$54,148	2 \$43,291	0 \$0	0 \$0	0 \$0	0 \$0	3,466 \$48,817
35-39	320 \$43,041	443 \$43,323	422 \$45,343	351 \$49,254	326 \$54,410	1,331 \$54,455	494 \$58,341	63 \$55,739	0 \$0	0 \$0	0 \$0	0 \$0	3,750 \$51,183
40-44	241 \$42,777	339 \$44,818	327 \$45,551	307 \$48,027	246 \$54,890	1,161 \$53,287	641 \$58,910	419 \$60,772	58 \$55,663	1 \$45,220	0 \$0	0 \$0	3,740 \$52,676
45-49	227 \$43,184	311 \$41,789	271 \$46,846	233 \$45,177	219 \$51,713	1,146 \$53,804	697 \$57,290	537 \$61,176	482 \$68,176	132 \$61,265	0 \$0	0 \$0	4,255 \$54,697
50-54	197 \$45,818	249 \$47,289	263 \$45,262	206 \$48,704	209 \$54,874	1,172 \$52,162	617 \$56,338	452 \$60,007	558 \$65,767	692 \$67,194	88 \$64,687	2 \$58,536	4,705 \$56,584
55-59	166 \$43,816	212 \$49,542	225 \$51,599	208 \$48,051	167 \$53,715	982 \$51,339	593 \$54,068	490 \$58,783	536 \$62,852	730 \$68,991	386 \$73,596	72 \$64,638	4,767 \$58,055
60-64	90 \$49,072	138 \$52,887	147 \$50,261	153 \$49,388	151 \$57,171	817 \$54,238	545 \$56,595	429 \$55,216	385 \$61,516	507 \$67,380	292 \$76,378	224 \$80,134	3,878 \$59,885
65 & Over	30 \$60,886	50 \$52,448	61 \$58,731	87 \$57,284	63 \$63,883	474 \$55,302	328 \$57,334	243 \$64,679	154 \$64,369	190 \$68,861	106 \$77,912	175 \$84,850	1,961 \$63,172
Total	2,444 \$42,836	3,017 \$43,767	2,700 \$46,074	2,256 \$48,084	1,866 \$54,089	8,314 \$53,284	4,004 \$56,894	2,635 \$59,675	2,173 \$64,460	2,252 \$67,602	872 \$74,153	473 \$79,429	33,006 \$54,328

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, Teachers
As of 06/30/2016**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	165 \$41,791	70 \$44,219	0 \$0	1 \$49,516	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	236 \$42,544
25-29	311 \$46,175	294 \$46,118	259 \$47,110	197 \$49,475	108 \$53,597	91 \$54,816	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,260 \$48,130
30-34	212 \$48,845	187 \$50,153	188 \$49,991	188 \$51,891	216 \$54,469	828 \$56,572	41 \$62,901	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,860 \$53,803
35-39	148 \$51,035	133 \$49,826	144 \$57,679	136 \$54,397	124 \$57,706	721 \$58,431	456 \$63,489	42 \$69,154	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,904 \$58,311
40-44	104 \$49,914	88 \$50,270	105 \$59,379	93 \$59,131	97 \$60,740	472 \$63,358	369 \$66,029	384 \$69,806	45 \$74,717	0 \$0	0 \$0	0 \$0	0 \$0	1,757 \$63,562
45-49	65 \$47,464	69 \$55,163	80 \$57,213	74 \$58,586	88 \$67,319	331 \$64,352	227 \$69,946	271 \$72,881	476 \$74,857	34 \$73,446	0 \$0	0 \$0	0 \$0	1,715 \$68,097
50-54	50 \$55,106	47 \$48,388	58 \$54,433	43 \$59,500	45 \$58,937	294 \$65,095	174 \$69,621	140 \$74,052	260 \$74,913	382 \$80,588	14 \$88,288	0 \$0	0 \$0	1,507 \$70,680
55-59	40 \$53,408	32 \$57,792	36 \$63,670	39 \$59,486	34 \$66,586	207 \$68,307	168 \$76,851	151 \$74,643	149 \$78,704	270 \$80,903	174 \$87,158	14 \$87,697	14 \$100,781	1,314 \$75,455
60-64	24 \$51,268	18 \$56,622	21 \$53,087	29 \$49,388	29 \$66,760	164 \$67,969	123 \$71,706	124 \$81,458	142 \$82,452	171 \$87,828	126 \$95,308	78 \$100,781	78 \$100,781	1,049 \$79,501
65 & Over	26 \$53,090	7 \$40,665	11 \$50,359	21 \$81,492	13 \$56,402	102 \$68,222	74 \$77,729	72 \$73,268	77 \$92,953	90 \$89,977	47 \$99,657	97 \$119,703	97 \$119,703	637 \$85,086
Total	1,145 \$47,985	945 \$49,013	902 \$53,033	821 \$54,575	754 \$58,502	3,210 \$61,230	1,632 \$68,241	1,184 \$73,036	1,149 \$77,514	947 \$82,621	361 \$91,674	189 \$109,523	189 \$109,523	13,239 \$64,469

Summary of Pensions in Force by Type of Retirement

Employee Group	Contributory		Noncontributory		Hybrid	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
All Employees	20,520	\$ 2,730	14,180	\$ 1,637	6,954	\$ 2,139
	<u>Service</u>		<u>Service</u>		<u>Service</u>	
Total	20,057	\$ 2,761	13,324	\$ 1,684	6,676	\$ 2,173
General Employees - male	4,243	2,432	4,272	1,637	1,947	2,235
General Employees - female	6,452	1,787	5,154	1,264	2,793	1,855
Teachers - male	1,676	3,385	1,313	2,406	584	2,901
Teachers - female	4,355	3,081	2,585	2,234	1,352	2,428
Police and Firefighters	3,331	4,337	-	-	-	-
	<u>Ordinary Disability</u>		<u>Ordinary Disability</u>		<u>Ordinary Disability</u>	
Total	186	\$ 972	696	\$ 921	243	\$ 1,314
General Employees - male	58	992	326	914	113	1,245
General Employees - female	64	753	285	819	91	1,299
Teachers - male	8	1,402	32	1,395	8	1,326
Teachers - female	26	1,212	53	1,221	31	1,609
Police and Firefighters	30	1,078	-	-	-	-
	<u>Accidental Disability</u>		<u>Accidental Disability</u>		<u>Accidental Disability</u>	
Total	277	\$ 1,641	160	\$ 799	35	\$ 1,300
General Employees - male	105	1,498	90	803	20	1,292
General Employees - female	62	1,363	59	744	13	1,259
Teachers - male	1	1,911	4	749	-	-
Teachers - female	4	2,695	7	1,222	2	1,640
Police and Firefighters	105	1,906	-	-	-	-

Summary of Pensions in Force by Age and Type**General Employees**

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	26,147	24,861	937	349
	Contributory			
Total	10,984	10,695	122	167
30-39	-	-	-	-
40-44	1	1	-	-
45-49	3	2	-	1
50-54	21	14	1	6
55-59	224	209	8	7
60-64	717	685	16	16
65-69	1,174	1,128	24	22
70-74	1,521	1,482	14	25
75-79	1,679	1,640	17	22
80-84	2,117	2,075	21	21
85-89	1,984	1,946	13	25
90-94	1,174	1,149	7	18
95-99	337	332	1	4
100 & over	32	32	-	-
	Noncontributory			
Total	10,186	9,426	611	149
30-39	1	-	1	-
40-44	4	-	3	1
45-49	7	-	4	3
50-54	40	-	32	8
55-59	291	181	88	22
60-64	1,131	950	152	29
65-69	2,777	2,582	166	29
70-74	2,974	2,830	117	27
75-79	1,746	1,686	39	21
80-84	823	812	9	2
85-89	336	330	-	6
90-94	52	51	-	1
95-99	4	4	-	-
100 & over	-	-	-	-
	Hybrid			
Total	4,977	4,740	204	33
30-39	1	-	-	1
40-44	-	-	-	-
45-49	4	-	3	1
50-54	30	-	29	1
55-59	286	243	38	5
60-64	1,427	1,355	61	11
65-69	2,152	2,090	55	7
70-74	872	851	14	7
75-79	162	159	3	-
80-84	36	35	1	-
85-89	5	5	-	-
90-94	2	2	-	-
95-99	-	-	-	-
100 & over	-	-	-	-

Summary of Pensions in Force by Age and Type

Teachers

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	12,041	11,865	158	18
	Contributory			
Total	6,070	6,031	34	5
30-39	-	-	-	-
40-44	1	1	-	-
45-49	3	3	-	-
50-54	8	8	-	-
55-59	65	65	-	-
60-64	272	270	2	-
65-69	835	827	7	1
70-74	1,221	1,212	8	1
75-79	1,170	1,165	5	-
80-84	1,249	1,247	2	-
85-89	817	811	3	3
90-94	323	319	4	-
95-99	94	91	3	-
100 & over	12	12	-	-
	Noncontributory			
Total	3,994	3,898	85	11
30-39	-	-	-	-
40-44	1	1	-	-
45-49	2	1	1	-
50-54	12	3	8	1
55-59	48	38	10	-
60-64	292	268	19	5
65-69	1,188	1,165	22	1
70-74	1,370	1,348	19	3
75-79	729	723	6	-
80-84	251	251	-	-
85-89	86	85	-	1
90-94	14	14	-	-
95-99	1	1	-	-
100 & over	-	-	-	-
	Hybrid			
Total	1,977	1,936	39	2
30-39	-	-	-	-
40-44	-	-	-	-
45-49	5	1	4	-
50-54	7	2	5	-
55-59	92	88	3	1
60-64	505	489	16	-
65-69	913	901	11	1
70-74	357	357	-	-
75-79	74	74	-	-
80-84	18	18	-	-
85-89	5	5	-	-
90-94	-	-	-	-
95-99	1	1	-	-
100 & over	-	-	-	-

Summary of Pensions in Force by Age and Type**Police and Firefighters**

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	3,466	3,331	30	105
30-39	-	-	-	-
40-44	1	-	-	1
45-49	39	32	3	4
50-54	201	189	6	6
55-59	488	475	1	12
60-64	666	645	7	14
65-69	806	779	4	23
70-74	608	578	4	26
75-79	371	359	3	9
80-84	172	166	1	5
85-89	78	75	-	3
90-94	31	30	1	-
95-99	4	3	-	1
100 & over	1	-	-	1

Noncontributory Service Pensions in Force
by Years of Service

Years of Service	Total		General Employees		Teachers	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	13,324	\$ 1,683	9,426	\$ 1,432	3,898	\$ 2,291
Less than 5	4	1,492	2	1,617	2	1,367
5-9	12	536	10	505	2	692
10-14	2,687	558	2,212	526	475	709
15-19	1,944	911	1,526	860	418	1,099
20-24	2,068	1,193	1,589	1,103	479	1,490
25-29	1,520	1,730	1,072	1,553	448	2,153
30-34	3,035	2,486	1,750	2,266	1,285	2,785
35 and over	2,054	3,174	1,265	2,880	789	3,645

Noncontributory Service Pensions in Force
by Years Since Retirement

Years Since Retirement	Total		General Employees		Teachers	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	13,324	\$ 1,684	9,426	\$ 1,433	3,898	\$ 2,292
Less than 5	3,495	1,427	2,635	1,280	860	1,878
5-9	3,504	1,709	2,598	1,474	906	2,384
10-14	3,612	1,800	2,401	1,502	1,211	2,390
15-19	1,682	1,727	1,158	1,393	524	2,467
20-24	938	2,036	574	1,761	364	2,470
25 and over	93	1,614	60	1,295	33	2,194

**Contributory Service Pensions in Force
by Years of Service**

Years of Service	Total		General Employees		Teachers		Police and Firefighters	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	20,057	\$ 2,761	10,695	\$ 2,042	6,031	\$ 3,166	3,331	\$ 4,337
Less than 5	8	1,136	5	976	2	713	1	2,784
5-9	644	400	489	375	149	479	6	529
10-14	1,232	751	951	642	234	1,114	47	1,139
15-19	1,649	1,239	1,265	1,058	317	1,789	67	2,058
20-24	2,273	1,727	1,629	1,476	500	2,186	144	2,977
25-29	6,106	2,947	2,566	2,166	1,579	2,847	1,961	4,050
30-34	5,814	3,583	2,397	2,901	2,417	3,554	1,000	5,290
35 and over	2,331	4,029	1,393	3,440	833	4,817	105	5,594

Hybrid Service Pensions in Force

by Years of Service

Years of Service	Total		General Employees		Teachers	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	6,676	\$ 2,173	4,740	\$ 2,011	1,936	\$ 2,571
Less than 5	1	326	-	-	1	326
5-9	714	615	589	606	125	661
10-14	757	877	580	843	177	989
15-19	786	1,286	547	1,210	239	1,459
20-24	1,142	1,643	775	1,498	367	1,949
25-29	841	2,264	569	2,089	272	2,630
30-34	1,346	3,117	938	3,033	408	3,311
35 and over	1,089	4,059	742	3,816	347	4,578

**Contributory Service Pensions in Force
by Years Since Retirement**

Years Since Retirement	Total		General Employees		Teachers		Police and Firefighters	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	20,057	\$ 2,761	10,695	\$ 2,042	6,031	\$ 3,166	3,331	\$ 4,337
Less than 5	1,470	4,246	600	2,930	254	4,550	616	5,401
5-9	2,415	3,825	1,180	2,856	588	4,212	647	5,240
10-14	3,136	3,302	1,478	2,523	1,054	3,817	604	4,311
15-19	2,767	2,697	1,421	2,007	822	3,209	524	3,767
20-24	4,447	2,701	2,387	2,117	1,515	3,224	545	3,806
25-29	3,194	1,923	1,872	1,529	1,081	2,387	241	2,910
30-34	1,857	1,628	1,230	1,368	530	2,038	97	2,672
35 and over	771	1,176	527	1,019	187	1,362	57	2,024

Hybrid Service Pensions in Force

by Years Since Retirement

Years Since Retirement	Total		General Employees		Teachers	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	6,676	\$ 2,173	4,740	\$ 2,011	1,936	\$ 2,571
Less than 5	4,084	2,044	2,925	1,892	1,159	2,428
5-9	2,592	2,377	1,815	2,203	777	2,783

Pensions in Force by Payment Option

General Employees

Type of Option	Total		Service		Ordinary Disability		Accidental Disability		Other	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	26,147	\$ 1,766	24,861	\$ 1,805	937	\$ 956	349	\$ 1,147	-	\$ -
	Contributory									
Total	10,984	\$ 2,020	10,695	\$ 2,042	122	\$ 866	167	\$ 1,448	-	\$ -
Maximum	1,419	2,107	1,384	2,130	18	1,275	17	1,140	-	-
Option 1	681	1,449	645	1,475	20	893	16	1,091	-	-
Option 2	610	2,284	583	2,319	10	1,346	17	1,633	-	-
Option 3	337	2,914	328	2,948	5	1,025	4	2,461	-	-
Option 4	4,694	2,280	4,585	2,303	39	786	70	1,560	-	-
Option 5	3,243	1,584	3,170	1,598	30	522	43	1,352	-	-
	Noncontributory									
Total	10,186	\$ 1,390	9,426	\$ 1,433	611	\$ 870	149	\$ 780	-	\$ -
Maximum	5,467	1,397	5,154	1,430	235	862	78	833	-	-
Option A	2,032	1,472	1,910	1,505	96	1,008	26	746	-	-
Option B	2,110	1,286	1,828	1,360	243	815	39	735	-	-
Option C	577	1,409	534	1,453	37	916	6	535	-	-
	Hybrid									
Total	4,977	\$ 1,976	4,740	\$ 2,011	204	\$ 1,269	33	\$ 1,279	-	\$ -
Maximum	1,884	1,890	1,825	1,908	47	1,326	12	1,352	-	-
Option 1	368	1,799	351	1,824	15	1,270	2	1,264	-	-
Option 2	1,112	1,940	1,024	2,005	76	1,181	12	1,182	-	-
Option 3	720	2,434	697	2,472	17	1,375	6	1,057	-	-
Option 4	557	2,093	527	2,132	29	1,361	1	2,918	-	-
Option 5	336	1,598	316	1,620	20	1,244	-	-	-	-

Pensions in Force by Payment Option

Teachers

Type of Option	Total		Service		Ordinary Disability		Accidental Disability		Other	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	12,041	\$ 2,761	11,865	\$ 2,782	158	\$ 1,345	18	\$ 1,529	-	\$ -
Contributory										
Total	6,070	\$ 3,154	6,031	\$ 3,166	34	\$ 1,257	5	\$ 2,538	-	\$ -
Maximum	902	3,491	895	3,505	7	1,662	-	-	-	-
Option 1	273	2,543	269	2,568	3	1,007	1	413	-	-
Option 2	278	3,538	277	3,544	-	-	1	1,911	-	-
Option 3	175	4,245	173	4,265	2	2,471	-	-	-	-
Option 4	2,372	3,483	2,358	3,495	12	1,292	2	2,842	-	-
Option 5	2,070	2,568	2,059	2,576	10	762	1	4,682	-	-
Noncontributory										
Total	3,994	\$ 2,267	3,898	\$ 2,292	85	\$ 1,286	11	\$ 1,050	-	\$ -
Maximum	2,553	2,328	2,493	2,353	53	1,314	7	1,093	-	-
Option A	666	2,360	658	2,373	7	1,307	1	1,144	-	-
Option B	560	1,937	534	1,971	23	1,263	3	918	-	-
Option C	215	2,111	213	2,123	2	735	-	-	-	-
Hybrid										
Total	1,977	\$ 2,550	1,936	\$ 2,571	39	\$ 1,551	2	\$ 1,640	-	\$ -
Maximum	842	2,508	828	2,522	14	1,683	-	-	-	-
Option 1	110	2,349	107	2,368	3	1,671	-	-	-	-
Option 2	410	2,395	400	2,417	8	1,498	2	1,640	-	-
Option 3	286	2,990	281	3,017	5	1,484	-	-	-	-
Option 4	168	2,776	162	2,830	6	1,331	-	-	-	-
Option 5	161	2,281	158	2,296	3	1,511	-	-	-	-

Pensions in Force by Payment Option

Police and Firefighters

Type of Option	Total		Service		Ordinary Disability		Accidental Disability		Other	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	3,466	\$ 4,235	3,331	\$ 4,337	30	\$ 1,078	105	\$ 1,906	-	\$ -
Maximum	118	4,304	102	4,645	-	-	16	2,132	-	-
Option 1	37	4,284	30	4,599	1	2,474	6	3,011	-	-
Option 2	160	4,334	145	4,581	7	1,553	8	2,275	-	-
Option 3	60	4,930	56	5,149	2	1,275	2	2,441	-	-
Option 4	2,059	4,648	2,021	4,704	12	1,015	26	1,991	-	-
Option 5	1,032	3,345	977	3,454	8	531	47	1,554	-	-

Pensions in Force by Payment Option

General Employees - New Retirees

Type of Option	Total		Service		Ordinary Disability		Accidental Disability		Other	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	1,508	\$ 1,585	1,461	\$ 1,595	46	\$ 1,285	1	\$ 751	-	\$ -
Contributory										
Total	112	\$ 2,832	112	\$ 2,832	-	\$ -	-	\$ -	-	\$ -
Maximum	19	3,254	19	3,254	-	-	-	-	-	-
Option 1	3	2,162	3	2,162	-	-	-	-	-	-
Option 2	12	3,067	12	3,067	-	-	-	-	-	-
Option 3	9	2,997	9	2,997	-	-	-	-	-	-
Option 4	62	2,756	62	2,756	-	-	-	-	-	-
Option 5	7	2,032	7	2,032	-	-	-	-	-	-
Noncontributory										
Total	618	\$ 1,204	594	\$ 1,211	23	\$ 1,027	1	\$ 751	-	\$ -
Maximum	272	1,183	262	1,191	10	958	-	-	-	-
Option A	144	1,237	139	1,261	4	519	1	751	-	-
Option B	153	1,219	145	1,224	8	1,138	-	-	-	-
Option C	49	1,174	48	1,139	1	2,874	-	-	-	-
Hybrid										
Total	778	\$ 1,708	755	\$ 1,713	23	\$ 1,542	-	\$ -	-	\$ -
Maximum	279	1,633	276	1,637	3	1,306	-	-	-	-
Option 1	68	1,301	65	1,282	3	1,700	-	-	-	-
Option 2	181	1,795	173	1,822	8	1,217	-	-	-	-
Option 3	87	2,202	85	2,190	2	2,696	-	-	-	-
Option 4	100	1,887	95	1,895	5	1,740	-	-	-	-
Option 5	63	1,262	61	1,260	2	1,312	-	-	-	-

Pensions in Force by Payment Option

Teachers - New Retirees

Type of Option	Total		Service		Ordinary Disability		Accidental Disability		Other	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	554	\$ 2,376	542	\$ 2,401	12	\$ 1,259	-	\$ -	-	\$ -
Contributory										
Total	48	\$ 4,776	48	\$ 4,776	-	\$ -	-	\$ -	-	\$ -
Maximum	7	6,008	7	6,008	-	-	-	-	-	-
Option 1	1	10,655	1	10,655	-	-	-	-	-	-
Option 2	7	4,699	7	4,699	-	-	-	-	-	-
Option 3	4	4,882	4	4,882	-	-	-	-	-	-
Option 4	25	4,379	25	4,379	-	-	-	-	-	-
Option 5	4	3,662	4	3,662	-	-	-	-	-	-
Noncontributory										
Total	201	\$ 1,776	196	\$ 1,789	5	\$ 1,287	-	\$ -	-	\$ -
Maximum	113	1,770	110	1,785	3	1,195	-	-	-	-
Option A	34	1,823	34	1,823	-	-	-	-	-	-
Option B	46	1,827	44	1,845	2	1,425	-	-	-	-
Option C	8	1,382	8	1,382	-	-	-	-	-	-
Hybrid										
Total	305	\$ 2,393	298	\$ 2,421	7	\$ 1,238	-	\$ -	-	\$ -
Maximum	132	2,528	127	2,560	5	1,734	-	-	-	-
Option 1	15	2,529	15	2,529	-	-	-	-	-	-
Option 2	66	2,235	66	2,235	-	-	-	-	-	-
Option 3	33	2,685	33	2,685	-	-	-	-	-	-
Option 4	28	2,528	27	2,567	1	1,492	-	-	-	-
Option 5	31	1,735	30	1,764	1	872	-	-	-	-

Pensions in Force by Payment Option

Police and Firefighters - New Retirees

Type of Option	Total		Service		Ordinary Disability		Accidental Disability		Other	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
Total	126	\$ 5,048	125	\$ 5,064	1	\$ 3,053	-	\$ -	-	\$ -
Maximum	14	5,440	13	5,623	1	3,053	-	-	-	-
Option 1	4	-	4	5,352	-	-	-	-	-	-
Option 2	21	4,894	21	4,894	-	-	-	-	-	-
Option 3	12	4,956	12	4,956	-	-	-	-	-	-
Option 4	61	5,350	61	5,350	-	-	-	-	-	-
Option 5	14	3,559	14	3,559	-	-	-	-	-	-

SECTION N

DEFINITION OF ACTUARIAL TERMS

Definition of Actuarial Terms

1. *Actuarial Accrued Liability* – for benefits payable in the future to present members, it will equal the present value of benefits payable in the future to them less the present value of future normal costs.
2. *Actuarial Assumptions* – assumptions as to future experience under the ERS. Current actuarial assumptions are detailed in Table 21 of the current annual valuation report. Assumptions include future fund earnings rate, rates of future salary increases, and rates of death (both before and after retirement), disability, retirement, and withdrawal.
3. *Actuarial Gain or Actuarial Loss* - a measure of the difference between actual experience and assumed experience of the ERS. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, actuarial liabilities emerge which may be the same as forecasted, or they may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the ERS's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
4. *Actuarial Liabilities* - the actuarially determined present value of future benefits to be provided by the ERS. There are separate actuarially determined present values for retired members and non-retired members (either active or inactive). When applied to active members, it takes into account benefits which will be earned through future service and future salary increases.
5. *Actuarial Value of Present Assets* - the value of present ERS assets for valuation purposes. This value is calculated under a four-year phase-in of the excess (shortfall) between expected and actual income return.
6. *Actuarially Determined* - values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
7. *Decrements* - those types of activities by members of the ERS which cause them no longer to be members, i.e., death, retirement, disability, and withdrawal. It is a general term referring to any or all of these membership-terminating events.

8. *Defined Benefits* - in a retirement plan, benefits which are defined by a specific formula applied to specific member compensation and/or specific years of service. The amount of the benefit is not a function of contributions or actual earnings on those contributions.
9. *Defined Contributions* - in a retirement plan, periodic contributions to the plan which are defined as a specific percent of compensation.
10. *Experience Study* - a periodic review and analysis of the actual experience of the ERS which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
11. *Funding Period* - the number of years in the future that will be required to fund (i.e., pay off or eliminate) the unfunded actuarial accrued liability, based on the actuarial assumptions and assuming no future actuarial gains or losses.
12. *Future Benefits* - benefits specified in the law which will become payable at some time in the future when the member satisfies the requirement to receive such benefits.
13. *Future Contributions* - contributions to be made by the member or the employers in the future.
14. *Normal Cost* - the actuarial cost to fund the benefits provided by the ERS were the funding to begin at date of hire.
15. *Present Value* - the actuarially determined lump sum value as of the valuation date of a series of payments to be made in the future, where the lump sum value is equal to the sum of the discounted value of each future payment. The discounted value of each payment is the product of (a) the amount of the payment, (b) the probability that the payment will be made (based on the current actuarial assumptions as to future experience), and (c) the time value of money (based on the current assumed interest rate).
16. *Unfunded Actuarial Accrued Liability* - that portion of the actuarial accrued liability (including the present value of benefits presently being paid to retired members) that exceeds the value of current assets.
17. *Covered Payroll* - the total annualized payroll of active members as of the valuation date. Used to project individual members pay and benefits.
18. *Projected Payroll for Contributions Purposes* - The aggregate projected payroll for the fiscal year following the valuation date is calculated by increasing the actual payroll paid during the previous fiscal year by the payroll growth rate and multiplying by the ratio of current active members to the average number of active members during the previous fiscal year.