

EMPLOYEES' RETIREMENT SYSTEM OF THE STATE OF HAWAII

REPORT TO BOARD OF TRUSTEES ON THE 92nd ANNUAL
ACTUARIAL VALUATION
FOR THE YEAR ENDING JUNE 30, 2017



January 8, 2018

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, 2017

We certify that the information contained in the 2017 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, 2017. 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 26 years. Because this period is less than 30 years, the objectives set in State statute are currently 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 54.9% and this is slightly larger than the funded ratio from the previous valuation and consistent with the expectations from the funding plan.

The 2017 Legislature made significant changes to the future employer contribution rates. The employer contribution rate for Police and Fire employees are scheduled to increase to 28.00% in FY2018, 31.00% in FY2019, 36% in FY2020, and 41% for FY2021, and the employer contribution rate for All Other Employees are scheduled to increase to 18.00% in FY2018, 19.00% in FY2019, 22% in FY2020, and 24% for FY2021. Under current law, the contribution rates are expected to stay at these levels until the System is fully funded.

The 2011 Legislature 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 had a liability experience loss which was caused by individual salary increases being larger than expected by the assumptions. The System also experienced negative interest amortization as the higher scheduled contribution increases needed to produce the 26 year funding period are being phased into and will not be in full effect for four more years. As a result, the UAAL grew based on this actuarial valuation as of June 30, 2017, ERS's underfunded status as measured by the UAAL is now \$12.928 billion.

Because of the favorable investment performance in FY2017, the System is now deferring only \$22 million in investment losses, compared with \$900 million in deferred losses last year. If there are no significant investment losses or other actuarial losses, the funded status of the System would be expected to increase in the near future and over the long term.

Thus, given the plan's current and future 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 2023, and then begin to decrease,
5. The unfunded actuarial accrued liability will be fully amortized after 26 years, and
6. In the absence of benefit improvements and in consistent financial markets, the funded ratio should increase steadily until it reaches 100%.

However, it is important to note that these statements are based on the current assumptions which could change in the future. Also, these statements depend upon the employers meeting the contribution requirements established by the 2017 Legislature. Future changes to the actuarial assumptions or future changes to reduce the contribution requirements could significantly change the outlook of the System and the expectation on when the System will reach a 100% funded level.

BENEFIT PROVISIONS AND LEGISLATIVE CHANGES

This is the fifth 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. However, the Legislature passed Act 017 which contains significant increases to the employer contribution rates over a 4-year period. These increases have improved the outlook of ERS. As long as the contributions are made the System's funded status should improve and the System should be able to absorb moderate adverse experience without a need to further increase the contribution rates.

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.

There have been no changes to the assumptions or methods since the prior valuation.

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 and funded status of the System.

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, 2017, 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.

SIGNIFICANT EVENTS AFTER THE CENSUS DATE

A significant number of the covered active employees, employed by the Maui Hawaii Health System Corporation, were terminated from active coverage in the System as a result of privatization of their employer. We were provided the list of employees of this employer who were active on the census date (March 31, 2017). We treated these employees as terminated as of the valuation date and we removed their payroll from the actuarial valuation. If the employees were vested, then they were included in our terminated vested membership counts and liabilities. It is expected that some of the employees actually retired and began receiving their ERS benefits as of July 1, 2017. While the liabilities for these members reflected that possibility, they will not show up in the retiree counts until the next valuation.

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.

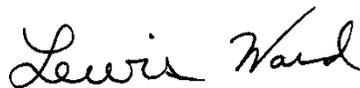
The undersigned are independent actuaries and consultants. Mr. Newton is an Enrolled Actuary, a Member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public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

Sincerely,



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

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Lewis Ward
Consultant



Linna Ye, ASA, MAAA
Actuary

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SECTION A – EXECUTIVE SUMMARY

The following table summarizes the key results of the June 30, 2017 actuarial valuation of the Employees' Retirement System of the State of Hawaii (ERS).

Item	2017	2016
Membership <ul style="list-style-type: none"> • Number of <ul style="list-style-type: none"> - Active members - Retirees and beneficiaries - Inactive, vested - Total • Covered payroll for active members • Actual benefit payments and refunds 	65,911 46,927 9,241 <hr style="width: 100%;"/> 122,079 \$4,134.2 million \$1,323.1 million	67,377 45,506 7,741 <hr style="width: 100%;"/> 120,624 \$4,118.4 million \$1,245.5 million
Assets <ul style="list-style-type: none"> • Actuarial (smoothed) value • Market value • Return on actuarial value • Return on market value • Employer contributions during fiscal year • External cash flow % 	\$15,720.6 million \$15,698.3 million 6.9% 13.9% \$781,244,218 (2.0%)	\$14,998.7 million \$14,070.0 million 5.6% (1.2%) \$756,558,222 (1.9%)
Actuarial Information <ul style="list-style-type: none"> • Total normal cost % (employee + employer) • Unfunded actuarial accrued liability (UAAL) • Funded ratio (based on smoothed assets) • Funded ratio (based on market assets) • Funding period (years)* • Employer contribution rate % of projected payroll** For FY beginning July 1 	13.96% \$12,928.0 million 54.9% 54.8% 26.0 19.16%	13.98% \$12,440.5 million 54.7% 51.3% 66.0 17.91%

* 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 28.0% Contribution Rate for Police and Firefighters and 18.0% Contribution Rate for for All Other Employees for fiscal year beginning July 1, 2017.
 Weighted average of 25.0% Contribution Rate for Police and Firefighters and 17.0% Contribution Rate for for All Other Employees for fiscal year beginning July 1, 2016.

SECTION B – INTRODUCTION

The results of the June 30, 2017 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

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 \$33.6 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 25.56% of pay for Police and Fire employees and 12.39% for All Other employees. It includes all of the employees' contribution (if any) and the employers' normal cost rate.
- The impact of the new tier of benefits can be seen in comparing the normal cost for the employee groups from the prior year to the current year. The change in the Total Normal Cost rate shows the impact of the change in benefits between the old tier and the new tier. The change in the employer normal cost rate shows both the impact on the change in benefits and the larger contribution rates paid by employees in the new tier. In the absence of changes to the actuarial assumptions, we expect the year-to-year decrease in the normal cost to continue for at least the next decade.
- A part of the normal cost is paid by the employee contributions of 12.43% of pay for Police and Firefighters, leaving 13.13% of pay to be funded by the employers. Thus the current year's employer normal cost for Police and Firefighters is deemed to be 13.13% of the valuation payroll. As for the All Other Employees group, the average weighted effective employee contribution rate is 5.06% of pay, leaving 7.33% of pay to be funded by the employers. This is shown in Line 3 of Table 1.
- The UAAL is \$12.928 billion for 2017, an increase from \$12.441 billion in 2016. 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.

SECTION C – FUNDED STATUS (CONTINUED)

- As shown in Item 10 of Table 1 and on Table 9c, the period to fund the UAAL is 26 years for the Police and Fire and 26 years for the All Other Employees group (i.e. the UAAL is expected to be paid off in fiscal year 2043). Of course, this implies that the aggregate funding period for ERS is 26 years. Since the aggregate funding period based on the contribution rates is less than 30 years, the employer contribution rates are adequate to meet the requirements of Hawaii Revised Statutes §88-122(e)(1). Please note that this statement includes the increases in the employer contribution rates enacted by the 2017 Legislature.

As of the valuation date, ERS has a funded ratio of 54.9%, 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 2043 which is 26 years from now. Therefore, the funding period is equal to 26 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

Section C has noted that the unfunded actuarial accrued liability (UAAL) is \$12.928 billion as of June 30, 2017 compared to the \$12.441 billion UAAL for 2016.

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 7.00%.

As shown in Item 5 of Table 9b, the expected value of actuarial assets as of June 30, 2017 is \$15.732 billion. As developed in Table 6, the actual value of actuarial assets as of the valuation date is \$15.721 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 \$11.2 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 6.92% (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.

After a poor investment year in FY 2016, the financial markets rebounded in FY 2017 resulting in a return of 13.90% on the market value of assets. The rate of return for the actuarial value was 6.92%, which is less 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 \$22 million, so there are \$22 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 \$929 million in deferred losses, and almost all of the deferred investment losses were recognized or offset by investment gains in this valuation.

Table 9a shows the total unanticipated change in the unfunded actuarial accrued liability was \$72 million (item 7), this means there was a total actuarial experience loss from all sources for the 2016/2017 plan year of \$72 million. As noted above, the actuarial investment loss was equal to \$11 million. The privatization of the Maui HHSC employees resulted in an actuarial gain of \$34 million. This means that there was a liability loss during the year equal to \$80 million. The liability experience loss is primarily 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 grow until 2023 before beginning to decline and finally begin eliminated in 2046.

The June 30, 2046 valuation is 26 years from this valuation. Therefore, for the purpose of satisfying Hawaii Revised Statutes §88-122(e)(1) the funding period is considered to be 26 years.

SECTION E – ERS ASSETS

Table 4 presents a summary of the market value of assets held by the ERS. About 61% of the total assets available for benefits are held in equities (including alternative investments) and real estate compared to about 75% 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 13.90%, the return on the actuarial value was 6.92%. 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 7.00%.

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

SECTION F – BENEFIT AND CONTRIBUTION 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. However, there have been significant changes to the statutory employer contribution rates. The 2017 Legislature enacted ACT 017 which increases the employer contribution rates over a four year period.

The employer contribution rates for Police and Fire employees are 28.00% in FY 2018, 31.00% of pay in FY 2019, 36.00% of pay in FY 2020, and 41.00% of pay in FY 2021 and beyond while the employer contribution rates for All Other Employees will increase according to the following schedule 18.00% in FY 2018, 19.00% of pay in FY 2019, 22.00% of pay in FY 2020, and 24.00% of pay in FY 2021 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

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

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.

The ERS's Board adopted new actuarial assumptions in December 2016 to be used effective with the June 30, 2016 actuarial valuation. There have been no changes to the actuarial assumptions and methods since the prior valuation.

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

SECTION I – 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 2017, 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 decreased by 1,466 members from 67,377 to 65,911. These 65,911 active members are distributed as follows:

<u>Category</u>	<u>Number</u>	<u>% of Total</u>
(1)	(2)	(3)
Police & Fire	5,009	7.5%
Contributory	850	1.3%
Noncontributory	13,743	20.9%
Hybrid	<u>46,309</u>	<u>70.3%</u>
Total	65,911	100.00%

Covered payroll (which is the annualized pay for all active members on the census date) increased by only 0.4% since last year (as a result of the privatization of the Maui HHSC group). ERS also provided the actual aggregate payroll for fiscal year 2017 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 to produce the *projected FY 2017 payroll for contribution purposes*, as shown in Item 1 of Table 1. This number was also adjusted for the lost payroll of the Maui HHSC employees.

Average age of the active members is 47.9 years as of June 30, 2016, compared to 48.0 years as of June 30, 2017, while average service increased from 13.2 years to 13.3 years.

SECTION J – SUMMARY AND CLOSING COMMENTS

To summarize the results of the actuarial valuation of the Employees' Retirement System as of June 30, 2017, 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.

Last year the ERS was expected to eliminate the unfunded liability of the System (be fully funded) in 2082 which was 66 years from the valuation date. This year's valuation shows that the ERS is expected to be fully funded in 2043, which is 40 years earlier than last year (26 years from this year's valuation date). This dramatic change is a direct result of the legislated increases in the employer contribution rates over the next several years.

Thus, the current contribution rates are sufficient to eliminate the UAAL over a period of 30 years or less as specified by Hawaii Revised Statute 88-122(e)(1).

We believe that the results of this valuation are extremely optimistic when compared with the prior year's valuation. The System is once again on track to be fully funded in a reasonable period of time. In addition, our modeling has shown that the new contribution levels should be able to absorb material adverse experience without resulting in a need for further contribution rate increases. Moderate adverse experience may result in the date the System obtaining a fully funded status in a year later than 2043, but it is not expected to result in a requirement for further contribution rate increases.

SECTION K – ACTUARIAL CERTIFICATION STATEMENT

	Police and Firefighters June 30, 2017 (1)	All Other Employees June 30, 2017 (2)	All Employees June 30, 2017 (3)
1. Gross normal cost as a percentage of pay	25.56%	12.39%	13.96%
2. Present value of future benefits			
a. Active employees	\$ 3,754,120,848	\$ 13,911,516,934	\$ 17,665,637,782
b. Inactive members	71,452,445	849,783,699	921,236,144
c. Pensioners and beneficiaries	2,672,319,502	12,348,284,110	15,020,603,612
d. Total	<u>\$ 6,497,892,795</u>	<u>\$ 27,109,584,743</u>	<u>\$ 33,607,477,538</u>
3. Present value of future employee and employer contributions			
a. Present value of future normal costs	\$ 1,161,189,615	\$ 3,797,657,390	\$ 4,958,847,005
b. Present value of future employee contribution	<u>589,938,887</u>	<u>1,693,178,991</u>	<u>2,283,117,878</u>
c. Present value of future employer normal costs (Item 3a - Item 3b)	\$ 571,250,728	\$ 2,104,478,399	\$ 2,675,729,127
4. Actuarial accrued liability (Item 2d - Item 3a)	\$ 5,336,703,180	\$ 23,311,927,353	\$ 28,648,630,533
5. Actuarial value of assets			
a. Annuity Savings Fund	\$ 1,001,209,147	\$ 1,634,314,400	\$ 2,635,523,547
b. Pension Accumulation Fund	<u>2,105,424,331</u>	<u>10,979,679,242</u>	<u>13,085,103,573</u>
c. Total	\$ 3,106,633,478	\$ 12,613,993,642	\$ 15,720,627,120
6. Unfunded actuarial accrued liability	\$ 2,230,069,702	\$ 10,697,933,711	\$ 12,928,003,413
7. Adequacy of contribution rates			
a. Statutory Contribution Rate for Fiscal Year			
Fiscal Year 2018	28.00%	18.00%	19.16%
b. Funding Period in years as of June 30, 2017*	26	26	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.

SECTION K – ACTUARIAL CERTIFICATION STATEMENT (CONTINUED)

The actuarial valuation as of June 30, 2017 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

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TABLE 1

Development of Employer Cost

	Police and Firefighters June 30, 2017 (1)	All Other Employees June 30, 2017 (2)	All Employees June 30, 2017 (3)
1. Projected FY 2018 payroll for contribution purposes	\$ 495,136,855	\$ 3,769,901,933	\$ 4,265,038,788
2. Gross normal cost (Table 3)	25.56%	12.39%	13.96%
3. Employer normal cost rate (Table 3)	13.13%	7.33%	8.02%
4. Present value future benefits (Table 2)	\$ 6,497,892,795	\$ 27,109,584,743	\$ 33,607,477,538
5. Present value future employer normal cost	\$ 571,250,728	\$ 2,104,478,399	\$ 2,675,729,127
6. Present value future employee contributions	\$ 589,938,887	\$ 1,693,178,991	\$ 2,283,117,878
7. Actuarial accrued liability (Item 4 - Item 5 - Item 6)	\$ 5,336,703,180	\$ 23,311,927,353	\$ 28,648,630,533
8. Actuarial value of assets	\$ 3,106,633,478	\$ 12,613,993,642	\$ 15,720,627,120
9. Unfunded actuarial accrued liability (UAAL) (Item 7 - Item 8)	\$ 2,230,069,702	\$ 10,697,933,711	\$ 12,928,003,413
10. Funding Period*	26	26	26

	Police and Firefighters June 30, 2016 (1)	All Other Employees June 30, 2016 (2)	All Employees June 30, 2016 (3)
1. Projected FY 2016 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

* 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.

TABLE 2**Actuarial Present Value of Future Benefits**

	Police and Firefighters June 30, 2017 (1)	All Other Employees June 30, 2017 (2)	All Employees June 30, 2017 (3)
1. Active members			
a. Service retirement benefits	\$ 3,605,472,878	\$ 12,733,560,754	\$ 16,339,033,632
b. Termination Benefits	105,091,726	797,543,978	902,635,704
c. Survivor benefits	19,810,420	141,612,493	161,422,913
d. Disability retirement benefits	23,745,824	238,799,709	262,545,533
e. Total	\$ 3,754,120,848	\$ 13,911,516,934	\$ 17,665,637,782
2. Retired members			
a. Service retirement	\$ 2,502,019,362	\$ 11,448,616,086	\$ 13,950,635,448
b. Disability retirement	29,297,997	234,759,723	264,057,720
c. Beneficiaries	141,002,143	664,908,301	805,910,444
d. Total	\$ 2,672,319,502	\$ 12,348,284,110	\$ 15,020,603,612
3. Inactive members			
a. Vested terminations	\$ 67,233,586	\$ 763,256,731	\$ 830,490,317
b. Nonvested terminations	4,218,859	86,526,968	90,745,827
c. Total	\$ 71,452,445	\$ 849,783,699	\$ 921,236,144
4. Total actuarial present value of future benefit	\$ 6,497,892,795	\$ 27,109,584,743	\$ 33,607,477,538

	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 benefit	\$ 6,148,967,061	\$ 26,268,837,557	\$ 32,417,804,618

TABLE 3**Analysis of Normal Cost**

	Police and Firefighters June 30, 2017	All Other Employees June 30, 2017	All Employees June 30, 2017
	(1)	(2)	(3)
1. Normal cost as a percent of pay			
a. Service retirement benefits	22.66%	9.27%	10.87%
b. Deferred termination benefits	1.15%	0.91%	0.94%
c. Refunds	0.89%	1.33%	1.28%
d. Disability retirement benefits	0.32%	0.38%	0.37%
e. Survivor benefits	0.19%	0.15%	0.15%
f. Administrative Expenses	0.35%	0.35%	0.35%
g. Total	25.56%	12.39%	13.96%
2. Employee contribution rate	12.43%	5.06%	5.94%
3. Effective employer normal cost rate (Item 1g - Item 2)	13.13%	7.33%	8.02%

	Police and Firefighters June 30, 2016	All Other Employees June 30, 2016	All Employees June 30, 2016
	(1)	(2)	(3)
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	25.72%	12.46%	13.98%
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%

TABLE 4**Plan Net Assets
(Assets at Market or Fair Value)**

Item	Valuation as of	
	June 30, 2017	June 30, 2016
1. Cash and cash equivalents	\$ 2,390,108,075	\$ 524,140,752
2. Receivables:		
a. Accounts receivable and others	\$ 5,686,729	\$ 5,546,300
b. Investment sale proceeds	190,816,066	197,451,653
c. Accrued income	43,320,022	49,758,195
d. Employer contributions	47,967,178	78,921,403
e. Member contributions	-	-
f. Subtotal	\$ 287,789,995	\$ 331,677,551
3. Investments		
a. Equity securities	\$ 7,190,541,977	\$ 8,541,857,929
b. Fixed income securities	3,930,555,468	3,117,134,649
c. Real estate investments	1,112,391,820	967,131,489
d. Real estate mortgages	-	-
e. Alternative investments	1,259,025,683	1,010,360,689
f. Subtotal	\$ 13,492,514,948	\$ 13,636,484,756
4. Other		
a. Invested securities lending collateral	\$ 1,039,906,540	\$ 1,268,719,491
b. Equipment at cost, net of depreciation	5,215,413	6,287,484
c. Other assets	-	-
d. Subtotal	\$ 1,045,121,953	\$ 1,275,006,975
5. Total assets	\$ 17,215,534,971	\$ 15,767,310,034
6. Liabilities		
a. Bank overdraft	\$ -	\$ -
b. Accounts payable	52,194,547	46,683,310
c. Investment commitments payable	250,612,562	211,762,793
d. Due to employers	-	-
e. Securities lending collateral	1,039,906,540	1,268,719,491
f. Notes payable	174,497,016	170,165,523
g. Total liabilities	\$ 1,517,210,665	\$ 1,697,331,117
7. Total market value of assets available for benefits (Item 5 - Item 6g)	\$ 15,698,324,306	\$ 14,069,978,917

TABLE 5**Reconciliation of Plan Net Assets**

	Year Ending	
	June 30, 2017	June 30, 2016
1. a. Value of assets at beginning of year	\$ 14,069,978,917	\$ 14,505,464,556
b. Adjustment due to post valuation changes in CAFR asset	-	-
c. Adjusted value of assets at beginning of year	\$ 14,069,978,917	\$ 14,505,464,556
2. Revenue for the year		
a. Contributions		
i. Member contributions	\$ 250,704,067	\$ 236,801,861
ii. Employer contributions	781,244,218	756,558,222
iii. Total	\$ 1,031,948,285	\$ 993,360,083
b. Income		
i. Interest, dividends, and other income	\$ 382,099,708	\$ 395,497,731
ii. Investment expenses	(37,949,651)	(38,084,467)
iii. Net	\$ 344,150,057	\$ 357,413,264
c. Net realized and unrealized gains (loss)	\$ 1,590,362,450	\$ (526,781,374)
d. Net income (loss)	\$ 1,934,512,507	\$ (169,368,110)
e. Total revenue	\$ 2,966,460,792	\$ 823,991,973
3. Expenditures for the year		
a. Refunds	\$ 16,340,290	\$ 12,927,672
b. Benefit payments	1,306,788,954	1,232,589,353
c. Administrative and miscellaneous expenses	14,986,159	13,960,587
d. Total expenditures	\$ 1,338,115,403	\$ 1,259,477,612
4. Increase (decrease) in net assets (Item 2e - Item 3d)	\$ 1,628,345,389	\$ (435,485,639)
5. Value of assets at end of year (Item 1c + Item 4)	\$ 15,698,324,306	\$ 14,069,978,917

TABLE 6

Development of Actuarial Value of Assets

	<u>Year Ending June 30, 2017</u>
1. Actuarial value of assets, beginning of year	\$ 14,998,749,060
2. Net new investments	
a. Contributions	\$ 1,031,948,285
b. Benefits paid and Refunds	(1,323,129,244)
c. Administrative expenses	<u>(14,986,159)</u>
d. Subtotal	(306,167,118)
3. Market value of assets at end of year	\$ 15,698,324,306
4. Expected return on actuarial value of assets	\$ 1,039,196,585
5. Expected actuarial value of assets, end of year	\$ 15,731,778,527
6. Excess/(shortfall) return (Item 3-Item 5)	\$ (33,454,221)
7. Development of amounts to be recognized as of June 30, 2017:	
	Remaining
	Deferrals of Excess
	(Shortfall) of
	Offsetting of
	Net Deferrals
	Years
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	Remaining after
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TABLE 7

Estimation of Yields

	June 30, 2017	June 30, 2016
	(1)	(2)
A. Market value yield		
1. Beginning of year market assets	\$ 14,069,978,917	\$ 14,505,464,556
2. Investment income		
a. Change in assets (Item 3 - Item 1)	\$ 1,628,345,389	\$ (435,485,639)
b. Cash Flow*	(306,167,118)	(266,117,529)
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 1,934,512,507	\$ (169,368,110)
3. End of year market assets	\$ 15,698,324,306	\$ 14,069,978,917
4. Estimated dollar weighted market value yield (net of investment and administrative expenses)	13.90%	(1.18%)
B. Actuarial value yield		
1. Beginning of year actuarial assets	\$ 14,998,749,060	\$ 14,463,670,277
2. Investment income (based on asset valuation method)		
a. Change in assets (Item 3 - Item 1)	\$ 721,878,060	\$ 535,078,783
b. Cash Flow*	(306,167,118)	(266,117,529)
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 1,028,045,178	\$ 801,196,312
3. End of year actuarial assets	\$ 15,720,627,120	\$ 14,998,749,060
4. Estimated actuarial value yield (net of investment and administrative expenses)	6.92%	5.59%

*Prior to 2016 the cash flow excluded administrative expenses.

TABLE 8

Allocation of Cash and Investments

	<u>June 30, 2017</u> (1)	<u>June 30, 2016</u> (2)
1. Cash and short-term equivalents	15.0%	3.7%
2. Fixed income securities	24.7%	22.0%
3. Equity securities	45.4%	60.4%
4. Real estate	7.0%	6.8%
5. Other	<u>7.9%</u>	<u>7.1%</u>
6. Total investments	100.0%	100.0%

TABLE 9A**Total Experience Gain or Loss**

Item (1)	Police and Firefighters (2)	All Other Employees (3)	All Employees (4)
A. Calculation of total actuarial gain or loss			
1. Unfunded actuarial accrued liability (UAAL), as of June 30, 2016	\$ 2,093,207,014	\$ 10,347,277,555	\$ 12,440,484,569
2. Normal cost for the year (include admin expense)	\$ 126,929,424	\$ 464,781,303	\$ 591,710,728
3. Less: contributions and assessments for the year	\$ (191,804,894)	\$ (840,143,391)	\$ (1,031,948,285)
4. Interest at 7.00%			
a. On UAAL	\$ 146,524,491	\$ 724,309,429	\$ 870,833,920
b. On normal cost	4,442,530	16,267,346	20,709,876
c. On contributions	(6,713,171)	(29,405,019)	(36,118,190)
d. Total	\$ 144,253,850	\$ 711,171,756	\$ 855,425,606
5. Expected UAAL as of June 30, 2017 (Sum of Items 1 - 4)	\$ 2,172,585,394	\$ 10,683,087,223	\$ 12,855,672,618
6. Actual UAAL as of June 30, 2017	\$ 2,230,069,702	\$ 10,697,933,711	\$ 12,928,003,413
7. Total gain (loss) for the year (Item 5 - Item 6)	\$ (57,484,308)	\$ (14,846,488)	\$ (72,330,795)
B. Source of gains and losses			
8. Asset gain (loss) for the year (Table 9b)	\$ (2,203,687)	\$ (8,947,720)	\$ (11,151,407)
9. Gain (loss) due to privatization	-	33,679,419	33,679,419
10. Other liability gain (loss)	(55,280,621)	(39,578,187)	(94,858,808)
11. Change in benefit provisions	-	-	-
12. Total gain (loss) for the year	\$ (57,484,308)	\$ (14,846,488)	\$ (72,330,796)

TABLE 9B**Investment Experience Gain or Loss**

Item (1)	June 30, 2017 (2)	June 30, 2016 (3)
1. Actuarial assets, beginning of year	\$ 14,998,749,060	\$ 14,463,670,277
2. Total contributions during year	\$ 1,031,948,285	\$ 993,360,083
3. Benefits and refunds paid	\$ (1,323,129,244)	\$ (1,245,517,025)
4. Administrative expenses paid	\$ (14,986,159)	N/A
5. Assumed net investment income at 7.00%		
a. Beginning of year assets	\$ 1,049,912,435	\$ 1,106,596,855
b. Contributions	36,118,190	38,492,703
c. Benefits and refunds paid	(46,309,524)	(48,263,785)
d. Administrative expenses paid	<u>(524,516)</u>	<u>N/A</u>
e. Total	\$ 1,039,196,585	\$ 1,096,825,773
6. Expected actuarial assets, end of year (Sum of items 1 through 5)	\$ 15,731,778,527	\$ 15,308,339,108
7. Actual actuarial assets, end of year	\$ 15,720,627,120	\$ 14,998,749,060
8. Asset gain (loss) for year (Item 7 - Item 6)	\$ (11,151,407)	\$ (309,590,048)
9. Asset gain (loss) as a percent of actuarial value of assets, end of year (Item 8 / Item 7)	(0.07%)	(2.06%)

TABLE 9C

Projection Results Based on June 30, 2017 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)
2017	19.16%	\$ 4,265	\$ 817	\$ 28,649	\$ 15,721	\$ 12,928	54.9%
2018	20.39%	4,375	892	29,710	16,370	13,341	55.1%
2019	23.61%	4,497	1,062	30,864	17,161	13,703	55.6%
2020	25.95%	4,625	1,200	32,022	18,108	13,914	56.5%
2021	25.95%	4,759	1,235	33,181	19,185	13,996	57.8%
2022	25.94%	4,897	1,270	34,342	20,293	14,049	59.1%
2023	25.93%	5,042	1,308	35,504	21,435	14,069	60.4%
2024	25.92%	5,193	1,346	36,666	22,614	14,052	61.7%
2025	25.91%	5,350	1,386	37,826	23,831	13,995	63.0%
2026	25.90%	5,515	1,429	38,985	25,092	13,893	64.4%
2027	25.89%	5,688	1,473	40,141	26,400	13,741	65.8%
2028	25.88%	5,868	1,519	41,297	27,763	13,534	67.2%
2029	25.88%	6,056	1,567	42,455	29,188	13,267	68.8%
2030	25.87%	6,253	1,617	43,615	30,683	12,932	70.3%
2031	25.86%	6,457	1,670	44,780	32,255	12,525	72.0%
2032	25.85%	6,670	1,724	45,951	33,913	12,038	73.8%
2033	25.85%	6,891	1,781	47,128	35,666	11,462	75.7%
2034	25.84%	7,121	1,840	48,314	37,523	10,791	77.7%
2035	25.84%	7,361	1,902	49,513	39,498	10,015	79.8%
2036	25.84%	7,610	1,966	50,726	41,601	9,125	82.0%
2037	25.84%	7,869	2,033	51,958	43,847	8,110	84.4%
2038	25.84%	8,139	2,103	53,212	46,252	6,960	86.9%
2039	25.84%	8,421	2,176	54,496	48,833	5,663	89.6%
2040	25.85%	8,714	2,252	55,813	51,608	4,205	92.5%
2041	25.85%	9,019	2,332	57,171	54,597	2,574	95.5%
2042	25.86%	9,336	2,414	58,577	57,823	754	98.7%
2043	4.30%	9,665	415	60,037	61,307	(1,270)	102.1%
2044	4.25%	10,007	425	61,558	62,916	(1,357)	102.2%
2045	4.21%	10,361	436	63,148	64,599	(1,451)	102.3%
2046	4.18%	10,728	448	64,811	66,362	(1,551)	102.4%

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

TABLE 10**Employer Covered Payroll**

	Police and Firefighters		All Other Employees		All Employees	
	March 31, 2017	March 31, 2016	March 31, 2017	March 31, 2016	March 31, 2017	March 31, 2016
	(1)	(2)	(3)	(4)	(5)	(6)
State of Hawaii	\$ 18,760,658	\$ 17,908,897	\$3,034,764,556	\$ 3,061,089,645	\$ 3,053,525,214	\$3,078,998,542
City & County of Honolulu	295,625,263	281,944,051	332,643,575	323,490,569	628,268,838	605,434,620
Board of Water Supply	-	-	35,446,382	34,433,281	35,446,382	34,433,281
County of Hawaii	73,870,202	72,227,466	94,710,441	92,713,105	168,580,643	164,940,571
County of Maui	62,340,672	59,694,442	104,447,012	97,111,961	166,787,684	156,806,403
County of Kauai	27,796,301	26,318,063	53,751,719	51,420,172	81,548,020	77,738,235
Total All Employers	\$ 478,393,096	\$ 458,092,919	\$3,655,763,685	\$ 3,660,258,733	\$ 4,134,156,781	\$4,118,351,652

TABLE 11**Schedule of Funding Progress**

Valuation Date	Unfunded Actuarial			Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Accrued Liability (UAAL) (3) - (2)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
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%
June 30, 2017	15,720.6	28,648.6	12,928.0	54.9%	4,265.0	303.1%

Note : Dollar amounts in millions.

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

** New assumption effective on valuation date.

TABLE 12A

Membership Data

	Police and Firefighters		All Other Employees		All Employees	
	June 30, 2017	June 30, 2016	June 30, 2017	June 30, 2016	June 30, 2017	June 30, 2016
	(1)	(2)	(3)	(4)	(5)	(6)
1. Active members						
a. Number	5,009	5,087	60,902	62,290	65,911	67,377
b. Total salary	\$ 478,393,096	\$ 458,092,919	\$ 3,655,763,685	\$ 3,660,258,732	\$ 4,134,156,781	\$ 4,118,351,651
c. Average salary	\$ 95,507	\$ 90,052	\$ 60,027	\$ 58,762	\$ 62,723	\$ 61,124
d. Average age	42.8	42.5	48.4	48.3	48.0	47.9
e. Average service	14.6	14.3	13.2	13.2	13.3	13.3
2. Inactive members						
a. Number	378	366	8,863	7,375	9,241	7,741
b. Total annual deferred benefits	\$ 6,372,538	\$ 6,084,027	\$ 75,657,983	\$ 69,037,725	\$ 82,030,521	\$ 75,121,752
c. Average annual deferred benefit	\$ 16,859	\$ 16,623	\$ 8,536	\$ 9,361	\$ 8,877	\$ 9,704
3. Service retirees						
a. Number	3,439	3,331	37,809	36,726	41,248	40,057
b. Total annual benefits	\$ 186,219,761	\$ 173,883,842	\$ 989,160,649	\$ 940,185,518	\$ 1,175,380,410	\$ 1,114,069,360
c. Average annual benefit	\$ 54,149	\$ 52,202	\$ 26,162	\$ 25,600	\$ 28,495	\$ 27,812
4. Disabled retirees						
a. Number	124	135	1,485	1,462	1,609	1,597
b. Total annual benefits	\$ 2,722,839	\$ 2,852,210	\$ 19,580,231	\$ 18,585,276	\$ 22,303,070	\$ 21,437,486
c. Average annual benefit	\$ 21,958	\$ 21,127	\$ 13,185	\$ 12,712	\$ 13,861	\$ 13,424
5. Beneficiaries						
a. Number	304	285	3,766	3,567	4,070	3,852
b. Total annual benefits	\$ 11,184,933	\$ 10,053,859	\$ 60,704,184	\$ 55,514,373	\$ 71,889,117	\$ 65,568,232
c. Average annual benefit	\$ 36,793	\$ 35,277	\$ 16,119	\$ 15,563	\$ 17,663	\$ 17,022

TABLE 12B**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)
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
2017	65,911	-2.2%	4,134.2	0.4%	62,723	2.6%	48.0	13.3

TABLE 13**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)
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%)
2017	250.7	781.2	1,031.9	(1,306.8)	(16.3)	(15.0)	(1,338.1)	(306.2)	15,698.3	(2.0%)

Amounts in \$ millions

¹ Excludes investment expenses

² Column (9) = Column (4) + Column (8)

TABLE 14

Solvency Test

	<u>June 30, 2017</u>	<u>June 30, 2016</u>
	(1)	(2)
1. Actuarial accrued liability (AAL)		
a. Active member contributions	\$ 2,183,210,846	\$ 2,150,455,931
b. Retirees and beneficiaries	15,020,603,612	14,228,204,532
c. Active and inactive members	<u>11,444,816,075</u>	<u>11,060,573,166</u>
d. Total	\$ 28,648,630,533	\$ 27,439,233,629
2. Actuarial value of assets	\$ 15,720,627,120	\$ 14,998,749,060
3. Cumulative portion of AAL covered		
a. Active member contributions	100%	100%
b. Retirees and beneficiaries	90%	90%
c. Active and inactive members	0%	0%

TABLE 15**Highlights of Last Five Annual Actuarial Valuations
2013 through 2017**

Item	Valuation Date: June 30				
	2013	2014	2015	2016	2017
Number of active members	66,226	67,206	67,310	67,377	65,911
Number of inactive members	7,312	8,105	7,413	7,741	9,241
Number of pensioners	38,741	39,680	40,657	41,654	42,857
Number of beneficiaries	3,071	3,407	3,626	3,852	4,070
Average monthly contributory member pension amount	\$ 2,414	\$ 2,508	\$ 2,621	\$ 2,730	\$ 2,854
Average monthly noncontributory member pension amount	\$ 1,562	\$ 1,585	\$ 1,611	\$ 1,637	\$ 1,669
Average monthly hybrid member pension amount	\$ 2,092	\$ 2,088	\$ 2,114	\$ 2,139	\$ 2,178
Average monthly beneficiary amount	\$ 1,247	\$ 1,304	\$ 1,361	\$ 1,419	\$ 1,472
Total actuarial value of assets (\$millions)	\$ 12,749	\$ 13,642	\$ 14,464	\$ 14,999	\$ 15,721
Unfunded actuarial accrued liability (\$millions)	\$ 8,494.9	\$ 8,578.3	\$ 8,774.7	\$ 12,440.5	\$ 12,928.0
Funding Period (in years) ⁽¹⁾	28.0	26.0	26.0	66.0	26.0
Item (Dollar amounts in millions)	Fiscal Year				
	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Employer contributions ⁽²⁾	\$ 581.4	\$ 653.1	\$ 717.8	\$ 756.6	\$ 781.2

⁽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. Beginning July 1, 2017, the percentages increased to 28.0% for Police and Fire, 18.0% for All Others.

TABLE 16

**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.)

TABLE 16 (CONTINUED)

	<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.

TABLE 16 (CONTINUED)

	Noncontributory	Contributory	Hybrid
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.

TABLE 16 (CONTINUED)

	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>

TABLE 16 (CONTINUED)

	<u>Noncontributory</u>	<u>Contributory</u>	<u>Hybrid</u>
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>

TABLE 16 (CONTINUED)

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.

TABLE 16 (CONTINUED)
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.)

TABLE 16 (CONTINUED)

	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%

TABLE 16 (CONTINUED)

	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.

TABLE 16 (CONTINUED)

	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	<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 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>	<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 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>	<p>Return of member’s Hybrid contributions and 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>

TABLE 16 (CONTINUED)

	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	Same for all members.		
	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);		
	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.		
	If there is no spouse/reciprocal beneficiary or dependent children/parents, the ordinary death benefit shall be payable to the designated beneficiary.		

TABLE 16 (CONTINUED)

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.

TABLE 16 (CONTINUED)

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.

TABLE 16 (CONTINUED)

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.

TABLE 17

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.

TABLE 17 (CONTINUED)

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 pre-deceases 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.

TABLE 17 (CONTINUED)

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 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.

Act 153, 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.

TABLE 17 (CONTINUED)

Act 017, effective July 1, 2017

Legislation was enacted that increased the future employer contribution rates to ERS. Employers of Police and Fire employees will contribute 28% of pay in FY 2018, 31% in FY 2019, 36% in FY 2020, and 41% in FY 2021 and beyond. Employers of All Other Employees will contribute 18% of pay in FY 2018, 19% in FY 2019, 22% in FY 2020, and 24% in FY 2021 and beyond.

TABLE 18

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.

TABLE 18 (CONTINUED)

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.

TABLE 18 (CONTINUED)

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.

TABLE 18 (CONTINUED)

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%

TABLE 18 (CONTINUED)

3. Salary increase rates (continued):

Police & Firefighters		
Years of Service	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%.

TABLE 18 (CONTINUED)

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

TABLE 18 (CONTINUED)

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>				
Gender	Year of Retirement			
	2020	2025	2030	2035
<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.

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

TABLE 18 (CONTINUED)

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	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

TABLE 18 (CONTINUED)

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			

TABLE 18 (CONTINUED)

Noncontributory Members

<u>Age</u>	<u>Expected Retirements per 100 Lives</u>							
	<u>General Employees</u>				<u>Teachers</u>			
	<u>Unreduced</u>		<u>Reduced</u>		<u>Unreduced</u>		<u>Reduced</u>	
<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	
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.

TABLE 18 (CONTINUED)

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.

TABLE 18 (CONTINUED)

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.
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%

TABLE 18 (CONTINUED)

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 uniformly throughout the year (effectively middle of 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 Payment Timing: Benefits are assumed to be paid uniformly throughout the year (effectively middle of year).
20. 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.
21. 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.

TABLE 18 (CONTINUED)

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

There have been no changes in the actuarial assumptions and methods since the prior valuation.

SECTION M – STATISTICAL TABLES

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38,41	88/91	PENSIONS IN FORCE BY PAYMENT OPTION – GENERAL EMPLOYEES/NEW
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TABLE 19

**Distribution of Active Members by Age and by Years of Service - All Employees
As of 06/30/2017**

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.	
Under 25	333 \$40,936	216 \$40,361	66 \$40,371	33 \$42,823	7 \$48,631	1 \$57,780	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	656 \$40,893
25-29	847 \$45,116	930 \$43,073	748 \$47,330	519 \$47,892	362 \$52,576	305 \$58,326	1 \$33,264	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,712 \$47,248
30-34	797 \$49,012	783 \$46,362	712 \$49,781	645 \$50,477	634 \$53,138	2,036 \$60,492	327 \$62,424	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5,934 \$54,032
35-39	485 \$48,244	601 \$45,464	538 \$49,010	557 \$51,843	515 \$55,791	2,160 \$60,038	2,140 \$65,352	285 \$64,789	1 \$73,820	0 \$0	0 \$0	0 \$0	7,282 \$58,057
40-44	397 \$46,575	403 \$45,501	406 \$48,902	434 \$52,103	414 \$53,556	1,724 \$61,149	2,128 \$65,454	1,849 \$72,865	176 \$75,687	2 \$64,683	0 \$0	0 \$0	7,933 \$62,316
45-49	326 \$47,385	349 \$46,232	382 \$46,643	319 \$53,886	316 \$51,043	1,401 \$59,311	1,819 \$63,457	2,034 \$71,669	1,820 \$79,682	428 \$80,157	2 \$65,359	0 \$0	9,196 \$65,950
50-54	249 \$48,266	309 \$47,922	262 \$48,976	293 \$50,243	221 \$52,445	1,219 \$57,626	1,517 \$60,450	1,482 \$65,529	1,562 \$74,861	2,114 \$79,604	275 \$82,921	5 \$93,936	9,508 \$66,630
55-59	194 \$48,621	241 \$46,189	239 \$51,172	268 \$55,419	238 \$52,120	1,120 \$57,085	1,304 \$58,995	1,385 \$59,439	1,266 \$70,738	1,912 \$75,212	1,081 \$81,287	181 \$73,122	9,429 \$65,511
60-64	154 \$53,271	150 \$48,996	142 \$53,353	169 \$49,832	183 \$55,630	878 \$58,424	1,097 \$59,076	1,089 \$59,610	972 \$68,741	1,286 \$72,472	791 \$81,796	646 \$82,478	7,557 \$66,262
65 & Over	62 \$69,592	65 \$56,703	77 \$56,642	79 \$62,703	108 \$60,249	547 \$59,699	747 \$62,437	726 \$61,469	509 \$69,694	658 \$76,558	421 \$85,195	705 \$94,018	4,704 \$71,374
Total	3,844 \$47,402	4,047 \$45,428	3,572 \$48,866	3,316 \$51,404	2,998 \$53,629	11,391 \$59,463	11,080 \$62,734	8,850 \$66,435	6,306 \$74,087	6,400 \$76,578	2,570 \$82,246	1,537 \$86,707	65,911 \$62,723

TABLE 20

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, All
As of 06/30/2017**

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	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	2 \$54,007	57 \$53,678	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	59 \$53,690
35-39	0 \$0	0 \$0	0 \$0	0 \$0	1 \$56,769	14 \$47,598	644 \$60,132	107 \$51,575	1 \$73,820	0 \$0	0 \$0	0 \$0	767 \$58,723
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5 \$34,662	695 \$61,063	641 \$63,380	58 \$58,984	1 \$66,540	0 \$0	0 \$0	1,400 \$61,947
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3 \$42,654	574 \$57,707	792 \$62,644	600 \$68,318	147 \$61,783	1 \$57,653	0 \$0	2,117 \$62,823
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3 \$96,410	504 \$57,465	684 \$58,914	628 \$67,224	738 \$69,655	93 \$67,856	2 \$59,901	2,652 \$63,952
55-59	0 \$0	0 \$0	0 \$0	1 \$38,275	2 \$30,661	1 \$44,550	401 \$54,777	671 \$54,771	572 \$64,917	778 \$68,525	338 \$74,141	47 \$75,120	2,811 \$63,286
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$19,970	315 \$53,621	468 \$56,144	460 \$63,355	530 \$66,207	282 \$74,749	191 \$75,647	2,248 \$63,597
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$71,167	242 \$58,471	351 \$54,279	274 \$65,580	350 \$72,333	205 \$77,777	265 \$89,169	1,689 \$68,800
Total	0 \$0	0 \$0	0 \$0	1 \$38,275	3 \$39,364	32 \$49,741	3,432 \$58,076	3,714 \$58,733	2,593 \$65,926	2,544 \$68,503	919 \$74,485	505 \$82,631	13,743 \$63,639

TABLE 21

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, General Employees
As of 06/30/2017**

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	2 \$54,007	43 \$51,482	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	45 \$51,594
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	13 \$46,922	319 \$56,438	85 \$48,569	1 \$73,820	0 \$0	0 \$0	0 \$0	418 \$54,583
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5 \$34,662	421 \$58,391	342 \$59,957	40 \$55,321	1 \$66,540	0 \$0	0 \$0	809 \$58,765
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3 \$42,654	436 \$54,298	535 \$59,020	310 \$63,145	131 \$60,498	1 \$57,653	0 \$0	1,416 \$58,570
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$96,747	389 \$53,053	547 \$55,237	440 \$63,306	499 \$65,657	84 \$67,082	2 \$59,901	1,963 \$59,815
55-59	0 \$0	0 \$0	0 \$0	1 \$38,275	2 \$30,661	1 \$44,550	319 \$51,796	562 \$50,867	448 \$60,634	607 \$64,386	250 \$71,718	46 \$74,896	2,236 \$59,425
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$24,993	253 \$50,914	382 \$51,632	355 \$57,535	446 \$61,886	221 \$70,786	161 \$71,705	1,819 \$59,288
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$38,171	194 \$53,615	295 \$50,701	211 \$58,365	263 \$64,478	138 \$67,705	182 \$80,329	1,284 \$61,240
Total	0 \$0	0 \$0	0 \$0	1 \$38,275	2 \$30,661	28 \$47,160	2,374 \$54,304	2,748 \$54,473	1,805 \$60,732	1,947 \$63,891	694 \$70,042	391 \$76,034	9,990 \$59,298

TABLE 22

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, Teachers
As of 06/30/2017**

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	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	14 \$60,425	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	14 \$60,425
35-39	0 \$0	0 \$0	0 \$0	0 \$0	1 \$56,769	1 \$56,379	325 \$63,759	22 \$63,185	0 \$0	0 \$0	0 \$0	0 \$0	349 \$63,681
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	274 \$65,169	299 \$67,295	18 \$67,125	0 \$0	0 \$0	0 \$0	591 \$66,304
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	138 \$68,479	257 \$70,188	290 \$73,847	16 \$72,306	0 \$0	0 \$0	701 \$71,413
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$95,737	115 \$72,387	137 \$73,595	188 \$76,394	239 \$78,000	9 \$75,078	0 \$0	689 \$75,737
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	82 \$66,373	109 \$74,900	124 \$80,390	171 \$83,218	88 \$81,026	1 \$85,452	575 \$78,297
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$14,947	62 \$64,666	86 \$76,185	105 \$83,029	84 \$89,154	61 \$89,106	30 \$96,805	429 \$81,871
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$104,162	48 \$78,097	56 \$73,125	63 \$89,744	87 \$96,078	67 \$98,521	83 \$108,551	405 \$92,768
Total	0 \$0	0 \$0	0 \$0	0 \$0	1 \$56,769	4 \$67,806	1,058 \$66,540	966 \$70,852	788 \$77,825	597 \$83,546	225 \$88,189	114 \$105,258	3,753 \$75,197

TABLE 23

**Distribution of Active Members by Age and by Years of Service
Contributory Members, All
As of 06/30/2017**

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.	
Under 25	12 \$64,492	12 \$65,529	5 \$66,502	6 \$58,725	2 \$63,881	0 \$0	37 \$64,132						
25-29	47 \$59,937	67 \$65,452	68 \$64,455	53 \$64,421	60 \$67,377	56 \$84,545	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	351 \$67,740
30-34	36 \$60,285	45 \$62,953	87 \$63,973	37 \$64,820	77 \$67,481	306 \$83,057	69 \$88,767	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	657 \$75,652
35-39	18 \$60,948	14 \$63,198	35 \$63,203	21 \$67,826	53 \$66,946	256 \$80,685	343 \$88,099	61 \$95,892	0 \$0	0 \$0	0 \$0	0 \$0	801 \$82,259
40-44	7 \$83,811	6 \$66,811	14 \$61,574	15 \$67,182	33 \$66,878	159 \$80,492	272 \$91,134	386 \$101,345	44 \$113,137	0 \$0	0 \$0	0 \$0	936 \$92,679
45-49	3 \$69,092	7 \$58,453	6 \$84,532	5 \$69,960	14 \$64,591	76 \$85,905	188 \$89,399	401 \$99,029	348 \$115,406	113 \$125,041	0 \$0	0 \$0	1,161 \$103,114
50-54	1 \$69,092	2 \$127,611	1 \$57,324	2 \$134,690	1 \$61,034	24 \$95,067	59 \$88,424	137 \$101,134	206 \$113,782	294 \$126,184	69 \$130,230	3 \$116,625	799 \$115,068
55-59	3 \$62,204	0 \$0	2 \$61,035	3 \$150,608	4 \$72,660	14 \$91,680	19 \$89,273	36 \$96,735	83 \$110,345	140 \$123,139	145 \$106,002	52 \$76,595	501 \$106,317
60-64	3 \$34,889	1 \$186,543	1 \$197,945	0 \$0	3 \$145,546	9 \$83,474	15 \$127,150	21 \$120,407	32 \$128,451	44 \$130,653	101 \$98,114	139 \$81,870	369 \$100,979
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	2 \$69,137	10 \$88,573	11 \$90,088	12 \$105,027	8 \$87,804	20 \$128,910	38 \$100,456	146 \$87,403	247 \$93,660
Total	130 \$61,636	154 \$65,852	219 \$65,022	142 \$68,085	249 \$68,083	910 \$82,785	976 \$89,908	1,054 \$100,385	721 \$114,494	611 \$125,686	353 \$107,884	340 \$83,746	5,859 \$94,522

TABLE 24

**Distribution of Active Members by Age and by Years of Service
Contributory Members, General Employees
As of 06/30/2017**

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	1 \$12,211	0 \$0	0 \$0	0 \$0	1 \$61,034	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$36,623
30-34	4 \$60,833	0 \$0	0 \$0	2 \$60,874	2 \$58,831	5 \$60,794	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	13 \$60,516
35-39	0 \$0	0 \$0	1 \$57,349	0 \$0	1 \$21,664	4 \$63,400	6 \$62,439	2 \$66,564	0 \$0	0 \$0	0 \$0	0 \$0	14 \$60,027
40-44	1 \$187,618	1 \$61,034	1 \$61,034	0 \$0	1 \$61,034	5 \$54,698	9 \$86,068	9 \$59,773	0 \$0	0 \$0	0 \$0	0 \$0	27 \$72,473
45-49	0 \$0	1 \$17,025	2 \$123,789	0 \$0	1 \$61,034	6 \$133,812	17 \$100,802	17 \$79,258	8 \$108,782	1 \$76,743	0 \$0	0 \$0	53 \$96,916
50-54	0 \$0	1 \$187,618	0 \$0	1 \$187,543	1 \$61,034	5 \$122,452	9 \$81,644	11 \$90,652	15 \$89,993	11 \$83,649	10 \$73,408	2 \$110,217	66 \$90,984
55-59	3 \$62,204	0 \$0	2 \$61,035	2 \$186,543	3 \$76,687	4 \$113,020	7 \$94,806	11 \$88,864	12 \$82,339	18 \$113,304	49 \$71,423	41 \$63,258	152 \$79,776
60-64	2 \$46,593	1 \$186,543	1 \$197,945	0 \$0	3 \$145,546	5 \$108,089	12 \$133,413	8 \$150,585	6 \$191,983	13 \$160,720	60 \$87,585	93 \$70,670	204 \$94,750
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	2 \$69,137	9 \$90,851	11 \$90,088	7 \$104,549	7 \$90,074	9 \$131,953	23 \$95,254	95 \$79,942	163 \$87,621
Total	11 \$65,723	4 \$113,055	7 \$97,996	5 \$136,475	15 \$79,229	43 \$94,334	71 \$96,524	65 \$91,226	48 \$103,971	52 \$121,409	142 \$82,252	231 \$73,510	694 \$87,227

TABLE 25

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Teachers
As of 06/30/2017**

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	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
35-39	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
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$54,075	0 \$0	0 \$0	1 \$73,185	0 \$0	0 \$0	0 \$0	2 \$63,630
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$98,593	0 \$0	0 \$0	0 \$0	0 \$0	1 \$98,593
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$83,511	1 \$61,990	0 \$0	0 \$0	2 \$72,750
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$31,208	0 \$0	3 \$73,785	3 \$131,027	19 \$84,465	4 \$97,277	30 \$87,986
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$11,173	0 \$0	2 \$129,088	1 \$167,130	4 \$107,560	17 \$89,408	35 \$95,225	60 \$95,325
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$75,692	0 \$0	3 \$137,429	11 \$106,940	46 \$97,428	61 \$100,754
Total	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$32,624	1 \$31,208	4 \$108,115	6 \$90,863	11 \$117,964	47 \$91,513	85 \$96,514	156 \$95,362

TABLE 26

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Police and Firefighters
As of 06/30/2017**

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	12 \$64,492	12 \$65,529	5 \$66,502	6 \$58,725	2 \$63,881	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	37 \$64,132
25-29	46 \$60,975	67 \$65,452	68 \$64,455	53 \$64,421	59 \$67,485	56 \$84,545	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	349 \$67,918
30-34	32 \$60,216	45 \$62,953	87 \$63,973	35 \$65,046	75 \$67,712	301 \$83,427	69 \$88,767	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	644 \$75,958
35-39	18 \$60,948	14 \$63,198	34 \$63,375	21 \$67,826	52 \$67,817	252 \$80,959	337 \$88,556	59 \$96,886	0 \$0	0 \$0	0 \$0	0 \$0	787 \$82,654
40-44	6 \$66,510	5 \$67,966	13 \$61,616	15 \$67,182	32 \$67,061	153 \$81,508	263 \$91,307	377 \$102,337	43 \$114,066	0 \$0	0 \$0	0 \$0	907 \$93,345
45-49	3 \$69,092	6 \$65,358	4 \$64,903	5 \$69,960	13 \$64,865	70 \$81,799	171 \$88,265	383 \$99,908	340 \$115,562	112 \$125,472	0 \$0	0 \$0	1,107 \$103,415
50-54	1 \$69,092	1 \$67,604	1 \$57,324	1 \$81,836	0 \$0	19 \$87,860	50 \$89,644	126 \$102,049	190 \$115,819	282 \$128,071	59 \$139,861	1 \$129,442	731 \$117,358
55-59	0 \$0	0 \$0	0 \$0	1 \$78,737	1 \$60,580	10 \$83,144	11 \$91,031	25 \$100,199	68 \$116,900	119 \$124,428	77 \$133,322	7 \$142,894	319 \$120,687
60-64	1 \$11,483	0 \$0	0 \$0	0 \$0	0 \$0	3 \$66,551	3 \$102,099	11 \$96,881	25 \$111,656	27 \$119,597	24 \$130,604	11 \$134,065	105 \$116,313
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$68,066	0 \$0	4 \$113,197	1 \$71,914	8 \$122,291	4 \$112,532	5 \$136,942	23 \$117,649
Total	119 \$61,258	150 \$64,593	212 \$63,933	137 \$65,589	234 \$67,368	865 \$82,327	904 \$89,453	985 \$100,958	667 \$115,464	548 \$126,247	164 \$134,770	24 \$137,047	5,009 \$95,507

TABLE 27

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, All
As of 06/30/2017**

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	321 \$40,055	204 \$38,881	61 \$38,230	27 \$39,290	5 \$42,531	1 \$57,780	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	619 \$39,504
25-29	800 \$44,246	863 \$41,336	680 \$45,618	466 \$46,012	302 \$49,635	249 \$52,430	1 \$33,264	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,361 \$45,108
30-34	761 \$48,478	738 \$45,350	625 \$47,805	608 \$49,604	557 \$51,155	1,728 \$56,504	201 \$55,862	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5,218 \$51,314
35-39	467 \$47,754	587 \$45,041	503 \$48,022	536 \$51,217	461 \$54,506	1,890 \$57,334	1,153 \$61,500	117 \$60,659	0 \$0	0 \$0	0 \$0	0 \$0	5,714 \$54,575
40-44	390 \$45,906	397 \$45,179	392 \$48,450	419 \$51,563	381 \$52,402	1,560 \$59,262	1,161 \$62,067	822 \$66,889	74 \$66,510	1 \$62,825	0 \$0	0 \$0	5,597 \$57,330
45-49	323 \$47,183	342 \$45,981	376 \$46,038	314 \$53,630	302 \$50,415	1,322 \$57,820	1,057 \$61,965	841 \$67,123	872 \$73,245	168 \$66,043	1 \$73,065	0 \$0	5,918 \$59,778
50-54	248 \$48,182	307 \$47,403	261 \$48,944	291 \$49,662	220 \$52,405	1,192 \$56,775	954 \$60,296	661 \$64,995	728 \$70,437	1,082 \$73,734	113 \$66,431	0 \$0	6,057 \$61,414
55-59	191 \$48,408	241 \$46,189	237 \$51,089	264 \$54,403	232 \$51,951	1,105 \$56,658	884 \$60,258	678 \$62,079	611 \$70,808	994 \$73,696	598 \$79,333	82 \$69,774	6,117 \$63,192
60-64	151 \$53,637	149 \$48,073	141 \$52,327	169 \$49,832	180 \$54,131	867 \$58,252	767 \$59,984	600 \$60,186	480 \$69,923	712 \$73,540	408 \$82,627	316 \$86,874	4,940 \$64,882
65 & Over	62 \$69,592	65 \$56,703	77 \$56,642	79 \$62,703	106 \$60,081	535 \$59,116	494 \$63,765	363 \$66,981	227 \$74,021	288 \$78,057	178 \$90,481	294 \$101,675	2,768 \$70,956
Total	3,714 \$46,904	3,893 \$44,620	3,353 \$47,811	3,173 \$50,661	2,746 \$52,333	10,449 \$57,461	6,672 \$61,155	4,082 \$64,676	2,992 \$71,423	3,245 \$73,662	1,298 \$80,769	692 \$91,136	46,309 \$58,428

TABLE 28

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, General Employees
As of 06/30/2017**

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.	
Under 25	169 \$36,549	123 \$36,088	57 \$37,628	27 \$39,290	5 \$42,531	1 \$57,780	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	382 \$36,889
25-29	480 \$42,169	553 \$39,274	412 \$43,800	290 \$43,482	161 \$47,573	155 \$50,652	1 \$33,264	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2,052 \$42,962
30-34	507 \$46,217	554 \$44,163	468 \$46,224	430 \$48,699	374 \$49,191	920 \$56,236	118 \$51,995	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,371 \$49,463
35-39	321 \$45,483	434 \$43,593	378 \$46,117	391 \$48,333	336 \$52,508	1,221 \$56,060	644 \$60,099	69 \$55,100	0 \$0	0 \$0	0 \$0	0 \$0	3,794 \$52,306
40-44	283 \$44,600	305 \$43,360	304 \$47,066	306 \$47,564	286 \$49,696	1,096 \$57,038	737 \$59,760	409 \$63,198	40 \$59,550	1 \$62,825	0 \$0	0 \$0	3,767 \$54,094
45-49	234 \$44,476	265 \$45,332	308 \$43,089	233 \$51,068	227 \$45,918	979 \$54,567	788 \$59,448	558 \$63,860	403 \$69,611	130 \$62,741	1 \$73,065	0 \$0	4,126 \$55,792
50-54	192 \$47,083	253 \$46,011	223 \$47,233	236 \$47,857	175 \$49,499	952 \$54,283	740 \$57,383	494 \$61,594	485 \$68,394	693 \$69,855	101 \$64,175	0 \$0	4,544 \$58,055
55-59	161 \$46,821	206 \$44,765	205 \$49,414	222 \$53,048	197 \$49,889	891 \$53,445	696 \$56,811	532 \$58,075	442 \$65,804	744 \$71,385	382 \$75,370	75 \$67,900	4,753 \$59,464
60-64	112 \$54,013	122 \$48,074	122 \$51,552	145 \$48,401	154 \$53,870	721 \$55,688	621 \$57,241	476 \$54,830	356 \$64,901	532 \$69,172	299 \$77,911	224 \$81,486	3,884 \$60,960
65 & Over	46 \$73,864	50 \$55,725	64 \$58,200	70 \$62,088	89 \$56,713	444 \$57,147	407 \$60,949	283 \$62,841	153 \$64,765	184 \$71,058	119 \$83,043	192 \$90,395	2,101 \$65,439
Total	2,505 \$45,311	2,865 \$43,384	2,541 \$46,246	2,350 \$48,680	2,004 \$50,091	7,380 \$55,400	4,752 \$58,526	2,821 \$60,436	1,879 \$66,900	2,284 \$69,883	902 \$75,968	491 \$82,895	32,774 \$55,596

TABLE 29

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, Teachers
As of 06/30/2017**

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.	
Under 25	152 \$43,953	81 \$43,122	4 \$46,806	0 \$0	237 \$43,717								
25-29	320 \$47,361	310 \$45,013	268 \$48,413	176 \$50,180	141 \$51,989	94 \$55,361	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,309 \$48,472
30-34	254 \$52,991	184 \$48,924	157 \$52,518	178 \$51,790	183 \$55,168	808 \$56,810	83 \$61,359	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,847 \$54,692
35-39	146 \$52,749	153 \$49,146	125 \$53,782	145 \$58,991	125 \$59,877	669 \$59,659	509 \$63,273	48 \$68,649	0 \$0	0 \$0	0 \$0	0 \$0	1,920 \$59,060
40-44	107 \$49,362	92 \$51,209	88 \$53,228	113 \$62,392	95 \$60,551	464 \$64,515	424 \$66,076	413 \$70,543	34 \$74,698	0 \$0	0 \$0	0 \$0	1,830 \$63,992
45-49	89 \$54,301	77 \$48,216	68 \$59,397	81 \$60,998	75 \$64,026	343 \$67,106	269 \$69,339	283 \$73,558	469 \$76,368	38 \$77,340	0 \$0	0 \$0	1,792 \$68,956
50-54	56 \$51,949	54 \$53,928	38 \$58,985	55 \$57,411	45 \$63,708	240 \$66,660	214 \$70,370	167 \$75,058	243 \$74,515	389 \$80,643	12 \$85,422	0 \$0	1,513 \$71,502
55-59	30 \$56,925	35 \$54,566	32 \$61,817	42 \$61,563	35 \$63,554	214 \$70,035	188 \$73,019	146 \$76,666	169 \$83,893	250 \$80,572	216 \$86,343	7 \$89,853	1,364 \$76,183
60-64	39 \$52,557	27 \$48,071	19 \$57,307	24 \$58,478	26 \$55,675	146 \$70,914	146 \$71,655	124 \$80,745	124 \$84,340	180 \$86,449	109 \$95,563	92 \$99,993	1,056 \$79,308
65 & Over	16 \$57,311	15 \$59,965	13 \$48,971	9 \$67,489	17 \$77,716	91 \$68,721	87 \$76,936	80 \$81,626	74 \$93,157	104 \$90,440	59 \$105,483	102 \$122,907	667 \$88,333
Total	1,209 \$50,203	1,028 \$48,066	812 \$52,707	823 \$56,318	742 \$58,390	3,069 \$62,419	1,920 \$67,661	1,261 \$74,161	1,113 \$79,059	961 \$82,642	396 \$91,705	201 \$111,268	13,535 \$65,287

TABLE 30

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	20,016	\$ 2,854	14,796	\$ 1,669	8,045	\$ 2,178
	<u>Service</u>		<u>Service</u>		<u>Service</u>	
Total	19,586	\$ 2,885	13,927	\$ 1,715	7,735	\$ 2,210
General Employees - male	4,021	2,532	4,440	1,669	2,275	2,267
General Employees - female	6,246	1,858	5,426	1,295	3,271	1,890
Teachers - male	1,624	3,523	1,366	2,458	659	2,959
Teachers - female	4,256	3,179	2,695	2,260	1,530	2,489
Police and Firefighters	3,439	4,500	-	-	-	-
	<u>Ordinary Disability</u>		<u>Ordinary Disability</u>		<u>Ordinary Disability</u>	
Total	172	\$ 1,009	703	\$ 949	268	\$ 1,366
General Employees - male	55	1,039	325	939	111	1,282
General Employees - female	55	752	293	848	105	1,309
Teachers - male	8	1,424	32	1,431	13	1,737
Teachers - female	26	1,231	53	1,282	39	1,631
Police and Firefighters	28	1,130	-	-	-	-
	<u>Accidental Disability</u>		<u>Accidental Disability</u>		<u>Accidental Disability</u>	
Total	258	\$ 1,702	166	\$ 838	42	\$ 1,380
General Employees - male	97	1,554	90	852	23	1,334
General Employees - female	60	1,406	65	778	16	1,401
Teachers - male	1	1,941	4	763	-	-
Teachers - female	4	2,735	7	1,249	3	1,619
Police and Firefighters	96	1,991	-	-	-	-

TABLE 31**Summary of Pensions in Force by Age and Type****General Employees**

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	26,974	25,679	944	351
	Contributory			
Total	10,534	10,267	110	157
30-39	-	-	-	-
40-44	1	1	-	-
45-49	2	1	-	1
50-54	10	9	-	1
55-59	201	182	8	11
60-64	611	583	14	14
65-69	1,097	1,058	18	21
70-74	1,499	1,462	18	19
75-79	1,568	1,526	16	26
80-84	1,977	1,943	14	20
85-89	1,924	1,892	11	21
90-94	1,244	1,217	10	17
95-99	352	346	1	5
100 & over	48	47	-	1
	Noncontributory			
Total	10,639	9,866	618	155
30-39	2	-	2	-
40-44	1	-	1	-
45-49	11	-	8	3
50-54	34	-	26	8
55-59	280	170	90	20
60-64	1,150	969	145	36
65-69	2,685	2,491	166	28
70-74	3,102	2,957	119	26
75-79	1,972	1,899	49	24
80-84	951	936	11	4
85-89	382	375	1	6
90-94	64	64	-	-
95-99	5	5	-	-
100 & over	-	-	-	-
	Hybrid			
Total	5,801	5,546	216	39
30-39	-	-	-	-
40-44	1	-	-	1
45-49	6	-	3	3
50-54	26	-	24	2
55-59	318	271	42	5
60-64	1,463	1,387	65	11
65-69	2,468	2,400	60	8
70-74	1,220	1,193	19	8
75-79	240	236	3	1
80-84	49	49	-	-
85-89	9	9	-	-
90-94	1	1	-	-
95-99	-	-	-	-
100 & over	-	-	-	-

TABLE 32**Summary of Pensions in Force by Age and Type****Teachers**

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	12,319	12,130	170	19
	Contributory			
Total	5,919	5,880	34	5
30-39	-	-	-	-
40-44	1	1	-	-
45-49	3	3	-	-
50-54	6	6	-	-
55-59	52	52	-	-
60-64	235	233	2	-
65-69	672	665	6	1
70-74	1,223	1,216	7	-
75-79	1,163	1,155	7	1
80-84	1,207	1,206	1	-
85-89	907	900	4	3
90-94	342	338	4	-
95-99	88	85	3	-
100 & over	20	20	-	-
	Noncontributory			
Total	4,157	4,061	85	11
30-39	-	-	-	-
40-44	-	-	-	-
45-49	2	1	1	-
50-54	12	5	7	-
55-59	67	54	12	1
60-64	264	243	17	4
65-69	1,041	1,015	24	2
70-74	1,480	1,461	17	2
75-79	862	854	7	1
80-84	299	299	-	-
85-89	107	106	-	1
90-94	22	22	-	-
95-99	1	1	-	-
100 & over	-	-	-	-
	Hybrid			
Total	2,243	2,189	51	3
30-39	-	-	-	-
40-44	-	-	-	-
45-49	9	2	7	-
50-54	10	4	6	-
55-59	112	101	10	1
60-64	459	446	13	-
65-69	1,009	994	13	2
70-74	504	502	2	-
75-79	103	103	-	-
80-84	28	28	-	-
85-89	8	8	-	-
90-94	-	-	-	-
95-99	1	1	-	-
100 & over	-	-	-	-

TABLE 33**Summary of Pensions in Force by Age and Type****Police and Firefighters**

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	3,563	3,439	28	96
30-39	-	-	-	-
40-44	1	-	-	1
45-49	44	38	3	3
50-54	215	207	4	4
55-59	501	488	3	10
60-64	634	614	6	14
65-69	786	762	5	19
70-74	659	626	4	29
75-79	404	395	2	7
80-84	200	193	1	6
85-89	81	79	-	2
90-94	34	34	-	-
95-99	4	3	-	1
100 & over	-	-	-	-

TABLE 34

**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	13,927	\$ 1,714	9,866	\$ 1,462	4,061	\$ 2,326
Less than 5	6	928	4	694	2	1,397
5-9	14	621	12	607	2	705
10-14	2,781	568	2,278	536	503	715
15-19	2,031	934	1,591	879	440	1,133
20-24	2,194	1,222	1,677	1,128	517	1,527
25-29	1,645	1,768	1,165	1,584	480	2,213
30-34	3,148	2,528	1,838	2,305	1,310	2,839
35 and over	2,108	3,247	1,301	2,945	807	3,736

TABLE 35

**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	13,927	\$ 1,715	9,866	\$ 1,463	4,061	\$ 2,327
Less than 5	3,604	1,466	2,732	1,322	872	1,916
5-9	3,463	1,723	2,572	1,490	891	2,394
10-14	3,707	1,818	2,506	1,528	1,201	2,422
15-19	1,993	1,804	1,327	1,452	666	2,505
20-24	1,022	2,021	645	1,731	377	2,517
25 and over	138	1,711	84	1,394	54	2,204

TABLE 36-1

**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	19,586	\$ 2,885	10,267	\$ 2,122	5,880	\$ 3,274	3,439	\$ 4,500
Less than 5	8	1,156	5	992	2	727	1	2,830
5-9	590	412	438	386	146	483	6	525
10-14	1,156	779	891	662	219	1,174	46	1,160
15-19	1,561	1,300	1,182	1,085	309	1,922	70	2,174
20-24	2,185	1,805	1,556	1,513	475	2,333	154	3,118
25-29	6,032	3,068	2,470	2,218	1,526	2,920	2,036	4,208
30-34	5,718	3,702	2,329	2,981	2,371	3,641	1,018	5,492
35 and over	2,336	4,158	1,396	3,553	832	4,961	108	5,794

TABLE 36-2**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	7,735	\$ 2,210	5,546	\$ 2,044	2,189	\$ 2,630
Less than 5	6	1,218	2	-	4	1,827
5-9	826	636	683	628	143	671
10-14	917	904	712	864	205	1,041
15-19	923	1,334	653	1,263	270	1,504
20-24	1,250	1,694	852	1,549	398	2,004
25-29	1,011	2,330	695	2,167	316	2,688
30-34	1,591	3,154	1,114	3,053	477	3,390
35 and over	1,211	4,140	835	3,883	376	4,711

TABLE 37-1**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	19,586	\$ 2,885	10,267	\$ 2,122	5,880	\$ 3,274	3,439	\$ 4,500
Less than 5	1,453	4,504	571	3,134	243	4,959	639	5,556
5-9	2,212	4,043	1,060	2,949	508	4,476	644	5,503
10-14	3,036	3,462	1,420	2,645	980	3,936	636	4,553
15-19	2,855	2,885	1,401	2,164	910	3,382	544	3,913
20-24	4,084	2,772	2,170	2,170	1,356	3,277	558	3,885
25-29	2,982	2,070	1,702	1,610	1,045	2,599	235	3,052
30-34	2,061	1,764	1,301	1,467	632	2,162	128	2,812
35 and over	903	1,271	642	1,129	206	1,505	55	2,049

TABLE 37-2**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	7,735	\$ 2,210	5,546	\$ 2,045	2,189	\$ 2,630
Less than 5	4,436	2,081	3,243	1,914	1,193	2,534
5-9	2,999	2,412	2,104	2,256	895	2,781
10-14	300	2,109	199	1,938	101	2,445

TABLE 38

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	26,974	\$ 1,813	25,679	\$ 1,852	944	\$ 987	351	\$ 1,184	-	\$ -
Contributory										
Total	10,534	\$ 2,100	10,267	\$ 2,122	110	\$ 896	157	\$ 1,497	-	\$ -
Maximum	1,370	2,218	1,338	2,240	17	1,298	15	1,273	-	-
Option 1	649	1,495	615	1,522	18	931	16	1,111	-	-
Option 2	588	2,394	561	2,434	10	1,372	17	1,665	-	-
Option 3	340	3,036	332	3,068	5	1,043	3	2,718	-	-
Option 4	4,536	2,358	4,433	2,381	35	812	68	1,599	-	-
Option 5	3,051	1,631	2,988	1,643	25	493	38	1,395	-	-
Noncontributory										
Total	10,639	\$ 1,421	9,866	\$ 1,463	618	\$ 896	155	\$ 821	-	\$ -
Maximum	5,658	1,426	5,342	1,459	236	874	80	860	-	-
Option A	2,168	1,502	2,040	1,535	100	1,043	28	789	-	-
Option B	2,226	1,318	1,936	1,390	248	845	42	818	-	-
Option C	587	1,456	548	1,495	34	989	5	419	-	-
Hybrid										
Total	5,801	\$ 2,012	5,546	\$ 2,045	216	\$ 1,295	39	\$ 1,361	-	\$ -
Maximum	2,196	1,938	2,136	1,954	47	1,378	13	1,399	-	-
Option 1	416	1,830	399	1,853	15	1,296	2	1,292	-	-
Option 2	1,294	1,977	1,198	2,037	80	1,222	16	1,325	-	-
Option 3	830	2,471	806	2,507	18	1,292	6	1,082	-	-
Option 4	664	2,106	628	2,144	34	1,382	2	2,317	-	-
Option 5	401	1,615	379	1,636	22	1,255	-	-	-	-

TABLE 39**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	12,319	\$ 2,819	12,130	\$ 2,841	171	\$ 1,423	18	\$ 1,557	-	\$ -
Contributory										
Total	5,919	\$ 3,262	5,880	\$ 3,274	34	\$ 1,277	5	\$ 2,576	-	\$ -
Maximum	895	3,601	888	3,616	7	1,692	-	-	-	-
Option 1	265	2,655	261	2,682	3	1,023	1	417	-	-
Option 2	280	3,717	279	3,724	-	-	1	1,941	-	-
Option 3	175	4,403	173	4,424	2	2,514	-	-	-	-
Option 4	2,329	3,590	2,315	3,603	12	1,312	2	2,885	-	-
Option 5	1,975	2,635	1,964	2,644	10	772	1	4,753	-	-
Noncontributory										
Total	4,157	\$ 2,303	4,061	\$ 2,327	85	\$ 1,338	11	\$ 1,072	-	\$ -
Maximum	2,643	2,359	2,583	2,382	53	1,407	7	1,115	-	-
Option A	692	2,411	684	2,423	7	1,331	1	1,168	-	-
Option B	600	1,991	574	2,027	23	1,231	3	939	-	-
Option C	222	2,146	220	2,159	2	751	-	-	-	-
Hybrid										
Total	2,243	\$ 2,607	2,189	\$ 2,630	52	\$ 1,658	2	\$ 1,675	-	\$ -
Maximum	954	2,578	935	2,595	19	1,771	-	-	-	-
Option 1	118	2,380	115	2,397	3	1,710	-	-	-	-
Option 2	468	2,443	453	2,463	13	1,837	2	1,675	-	-
Option 3	319	3,036	312	3,073	7	1,382	-	-	-	-
Option 4	195	2,842	188	2,899	7	1,319	-	-	-	-
Option 5	189	2,336	186	2,349	3	1,544	-	-	-	-

TABLE 40
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	3,563	\$ 4,406	3,439	\$ 4,500	28	\$ 1,130	96	\$ 1,991	-	\$ -
Maximum	132	4,687	117	4,995	-	-	15	2,285	-	-
Option 1	35	4,494	29	4,808	1	2,528	5	3,068	-	-
Option 2	188	4,676	173	4,908	7	1,584	8	2,364	-	-
Option 3	67	5,405	64	5,582	2	1,298	1	2,290	-	-
Option 4	2,123	4,797	2,088	4,848	11	1,028	24	2,082	-	-
Option 5	1,018	3,436	968	3,537	7	587	43	1,636	-	-

TABLE 41
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	1,630	\$ 1,733	1,570	\$ 1,757	53	\$ 1,126	7	\$ 966	-	\$ -
Contributory										
Total	99	\$ 3,470	99	\$ 3,470	-	\$ -	-	\$ -	-	\$ -
Maximum	16	4,013	16	4,013	-	-	-	-	-	-
Option 1	-	-	-	-	-	-	-	-	-	-
Option 2	9	3,912	9	3,912	-	-	-	-	-	-
Option 3	11	4,020	11	4,020	-	-	-	-	-	-
Option 4	57	3,275	57	3,275	-	-	-	-	-	-
Option 5	6	2,210	6	2,210	-	-	-	-	-	-
Noncontributory										
Total	679	\$ 1,325	645	\$ 1,338	29	\$ 1,039	5	\$ 1,353	-	\$ -
Maximum	297	1,297	291	1,300	5	1,064	1	1,438	-	-
Option A	174	1,387	167	1,397	5	1,275	2	878	-	-
Option B	178	1,290	159	1,320	17	951	2	1,785	-	-
Option C	30	1,448	28	1,470	2	1,131	-	-	-	-
Hybrid										
Total	852	\$ 1,857	826	\$ 1,879	24	\$ 1,231	2	\$ -	-	\$ -
Maximum	321	1,877	320	1,876	1	2,390	-	-	-	-
Option 1	50	1,624	49	1,639	1	886	-	-	-	-
Option 2	193	1,833	180	1,862	12	1,300	1	2,945	-	-
Option 3	113	2,282	111	2,313	2	606	-	-	-	-
Option 4	107	1,792	101	1,820	5	1,255	1	1,646	-	-
Option 5	68	1,462	65	1,481	3	1,063	-	-	-	-

TABLE 42**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	546	\$ 2,618	527	\$ 2,650	19	\$ 1,732	-	\$ -	-	\$ -
Contributory										
Total	56	\$ 5,732	56	\$ 5,732	-	\$ -	-	\$ -	-	\$ -
Maximum	12	6,801	12	6,801	-	-	-	-	-	-
Option 1	1	5,120	1	5,120	-	-	-	-	-	-
Option 2	9	6,616	9	6,616	-	-	-	-	-	-
Option 3	3	7,601	3	7,601	-	-	-	-	-	-
Option 4	27	5,083	27	5,083	-	-	-	-	-	-
Option 5	4	3,669	4	3,669	-	-	-	-	-	-
Noncontributory										
Total	213	\$ 1,998	207	\$ 2,010	6	\$ 1,608	-	\$ -	-	\$ -
Maximum	119	1,962	115	1,965	4	1,865	-	-	-	-
Option A	34	2,267	34	2,267	-	-	-	-	-	-
Option B	51	1,935	49	1,970	2	1,092	-	-	-	-
Option C	9	1,823	9	1,823	-	-	-	-	-	-
Hybrid										
Total	277	\$ 2,465	264	\$ 2,498	13	\$ 1,789	-	\$ -	-	\$ -
Maximum	118	2,485	113	2,512	5	1,883	-	-	-	-
Option 1	11	1,760	11	1,760	-	-	-	-	-	-
Option 2	60	2,400	55	2,405	5	2,350	-	-	-	-
Option 3	33	2,770	31	2,881	2	1,043	-	-	-	-
Option 4	27	2,727	26	2,794	1	996	-	-	-	-
Option 5	28	2,219	28	2,219	-	-	-	-	-	-

TABLE 43**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	167	\$ 5,433	167	\$ 5,433	-	\$ -	-	\$ -	-	\$ -
Maximum	16	6,017	16	6,017	-	-	-	-	-	-
Option 1	-	-	-	-	-	-	-	-	-	-
Option 2	30	5,803	30	5,803	-	-	-	-	-	-
Option 3	9	7,231	9	7,231	-	-	-	-	-	-
Option 4	99	5,233	99	5,233	-	-	-	-	-	-
Option 5	13	4,128	13	4,128	-	-	-	-	-	-

Section N – 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. *Decrement* - 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.