

EMPLOYEES' RETIREMENT SYSTEM OF THE STATE OF HAWAII

REPORT TO BOARD OF TRUSTEES ON THE 93rd ANNUAL
ACTUARIAL VALUATION
FOR THE YEAR ENDING JUNE 30, 2018



January 14, 2019

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, 2018

We certify that the information contained in the 2018 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, 2018. 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 25 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 2017 Legislature passed legislation in 2017 that made significant changes to the future employer contribution rates. This is the 2nd year of four scheduled increases. The employer contribution rate for Police and Fire employees are scheduled to increase to 31% in FY2019, 36% in FY2020, and 41% for FY2021, and the employer contribution rate for All Other Employees are scheduled to increase to 19% 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 25 year funding period assumes all of the currently scheduled contribution increases occur and remain in effect throughout the period. It is imperative that the increases occur as scheduled to meet the current projected obligations of the System.

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 55.2% and this is slightly larger than the funded ratio from the previous valuation and consistent with the expectations from the funding plan.

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 three more years. As a result, the UAAL grew based on this actuarial valuation as of June 30, 2018 and ERS's underfunded status as measured by the UAAL is now \$13.405 billion.

Because of the favorable investment performance in FY2017 and FY2018, the System is now deferring \$86 million in investment gains, compared with \$22 million in deferred losses last year and \$900 million in deferred losses two years ago. 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 25 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 again note that these statements are based on the actual experience meeting the current assumptions. 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 sixth 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, 2018, by ERS's staff. We have not subjected this data to any auditing procedures, but have examined the data for reasonableness and consistency with the prior year's data. Asset information was supplied by ERS's staff.

RESPONSIBILITY FOR TABLES AND SCHEDULES

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

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

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

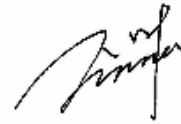
Sincerely,



Joseph P. Newton, FSA, EA
Pension Market Leader & Actuary



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, 2018 actuarial valuation of the Employees' Retirement System of the State of Hawaii (ERS).

Item	2018	2017
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 	<div>66,271</div> <div>48,569</div> <div>9,249</div> <div style="border-top: 1px solid black;">124,089</div> <div>\$4,257 million</div> <div>\$1,417 million</div>	<div>65,911</div> <div>46,927</div> <div>9,241</div> <div style="border-top: 1px solid black;">122,079</div> <div>\$4,134 million</div> <div>\$1,323 million</div>
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 % 	<div>\$16,513 million</div> <div>\$16,598 million</div> <div>7.2%</div> <div>7.9%</div> <div>\$847,595,466</div> <div>(2.0%)</div>	<div>\$15,721 million</div> <div>\$15,698 million</div> <div>6.9%</div> <div>13.9%</div> <div>\$781,244,218</div> <div>(2.0%)</div>
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 	<div>13.90%</div> <div>\$13,405 million</div> <div>55.2%</div> <div>55.5%</div> <div>25.0</div> <div>20.36%</div>	<div>13.96%</div> <div>\$12,928 million</div> <div>54.9%</div> <div>54.8%</div> <div>26.0</div> <div>19.16%</div>

* 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 31.0% Contribution Rate for Police and Firefighters and 19.0% Contribution Rate for for All Other Employees for fiscal year beginning July 1, 2018.
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.

SECTION B – INTRODUCTION

The results of the June 30, 2018 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 \$35.0 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 25.46% of pay for Police and Fire employees and 12.38% 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 12.49% of pay for Police and Firefighters, leaving 12.97% of pay to be funded by the employers. Thus the current year's employer normal cost for Police and Firefighters is deemed to be 12.97% of the valuation payroll. As for the All Other Employees group, the average weighted effective employee contribution rate is 5.24% of pay, leaving 7.14% of pay to be funded by the employers. This is shown in Line 3 of Table 1.
- The UAAL is \$13.405 billion for 2018, an increase from \$12.928 billion in 2017. 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 25 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 25 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 55.2%, 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 25 years from now. Therefore, the funding period is equal to 25 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 \$13.405 billion as of June 30, 2018 compared to the \$12.928 billion UAAL for 2017.

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 6 of Table 9b, the expected value of actuarial assets as of June 30, 2018 is \$16.484 billion. As developed in Table 6, the actual value of actuarial assets as of the valuation date is \$16.513 billion (as repeated in Item 7 of Table 9b). Thus the gain loss for the year is the difference between the actual value and the expected value, or \$28.6 million (as shown in Item 8). This asset gain for the year is a direct reflection of the estimated yield for the year based on the value of actuarial assets, namely 7.18% (as shown in Item B4 of Table 7) being greater than the assumed rate of return.

The markets returned a positive result in FY 2018 with a return of 7.89% on the market value of assets. The rate of return for the actuarial value was 7.18%, which is less than the market return due to the smoothing methodology used in the determination of the actuarial value of assets. The market value of assets exceeds the actuarial value of assets by \$86 million, so there are \$86 million in deferred investment gains still to be recognized in the actuarial value of assets.

Table 9a shows the total unanticipated change in the unfunded actuarial accrued liability was \$96 million (item 7), this means there was a total actuarial experience loss from all sources for the 2017/2018 plan year of \$96 million. As noted above, the actuarial investment gain was equal to \$29 million. This means that there was a liability loss during the year equal to \$125 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 as a dollar amount until 2023 before beginning to decline and finally being eliminated in 2043.

The June 30, 2043 valuation is 25 years from this valuation. Therefore, for the purpose of satisfying Hawaii Revised Statutes §88-122(e)(1) the funding period is considered to be 25 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 invested assets available for benefits are held in equities (including alternative investments) and real estate compared to about 61% 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 expected actuarial value of assets is calculated and compared to the actual market value of assets. This difference is then compared with the remaining deferrals from the prior years to determine this year's excess/shortfall. The current year's excess/shortfall is offset directly against any prior years' deferrals of the opposite sign (oldest bases first). Any remaining bases are then recognized over four year period from the date the base was established. Any remaining deferrals, after the current year's recognition, are then subtracted from the market 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.

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 7.89%, the return on the actuarial value was 7.18%. 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 actuarial value of assets 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 benefit 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 31% of pay in FY 2019, 36% of pay in FY 2020, and 41% of pay in FY 2021 and beyond while the employer contribution rates for All Other Employees will increase according to the following schedule 19% of pay in FY 2019, 22% of pay in FY 2020, and 24% 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 transfer. The Hybrid class membership has since grown to more than 47,700 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 2018, employer entity and accumulated employee contributions. Data for inactive, nonretired members was similar, but also includes the members' unreduced benefit. For retired members, data includes status (service retiree, disabled retiree or beneficiary), sex, birthdate, pension amount, pension COLA amount, form of payment, beneficiary sex and birthdate if applicable, and date of retirement.

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

Since last year, the number of active members increased by 360 members from 65,911 to 66,271. These 66,271 active members are distributed as follows:

Category	Number	% of Total
(1)	(2)	(3)
Police & Fire	4,890	7.4%
Contributory	757	1.1%
Noncontributory	12,841	19.4%
Hybrid	<u>47,783</u>	<u>72.1%</u>
Total	66,271	100.00%

Covered payroll (which is the annualized pay for all active members on the census date) increased by 3.0% since last year. ERS also provided the actual aggregate payroll for fiscal year 2018 on which contributions were received (this includes payroll for members who terminated and retired during the year). The lesser of the covered payroll and the aggregate payroll is adjusted by the payroll growth rate to produce the *projected FY 2019 payroll for contribution purposes*, as shown in Item 1 of Table 1.

Average age of the active members was 48.0 years as of June 30, 2017, compared to 47.9 years as of June 30, 2018, while average service decreased from 13.3 years to 13.2 years.

SECTION J – SUMMARY AND CLOSING COMMENTS

To summarize the results of the actuarial valuation of the Employees' Retirement System as of June 30, 2018, 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.

This year's valuation shows that the ERS is expected to be fully funded in 2043, which is the same projected year as in last year's valuation (25 years from this year's valuation date).

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).

This year's valuation came in very close to where we expected to be at this time last year. Although there were some actuarial liability losses they were not of sufficient magnitude to impact the funding period and in aggregate ERS is expected to be fully funded in the same time frame as last year.

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.

The only negative in the valuation was that the payroll for Police and Fire employees did not grow as expected. As a result the Police and Fire funding period is the same 26 years as it was last valuation. There was a significant drop in the number of Police and Fire employees. It is possible that these employees will be replaced in future years which may put the funding period back on the same path as the All Other Employees group.

SECTION K – ACTUARIAL CERTIFICATION STATEMENT

	Police and Firefighters June 30, 2018 (1)	All Other Employees June 30, 2018 (2)	All Employees June 30, 2018 (3)
1. Gross normal cost as a percentage of pay	25.46%	12.38%	13.90%
2. Present value of future benefits			
a. Active employees	\$ 3,750,123,235	\$ 14,346,308,740	\$ 18,096,431,975
b. Inactive members	72,307,171	829,683,339	901,990,510
c. Pensioners and beneficiaries	2,979,119,168	13,029,728,632	16,008,847,800
d. Total	<u>\$ 6,801,549,574</u>	<u>\$ 28,205,720,711</u>	<u>\$ 35,007,270,285</u>
3. Present value of future employee and employer contributions			
a. Present value of future normal costs	\$ 1,163,653,981	\$ 3,926,214,921	\$ 5,089,868,902
b. Present value of future employee contributions	600,305,287	1,824,873,397	2,425,178,684
c. Present value of future employer normal costs (Item 3a - Item 3b)	\$ 563,348,694	\$ 2,101,341,524	\$ 2,664,690,218
4. Actuarial accrued liability (Item 2d - Item 3a)	\$ 5,637,895,593	\$ 24,279,505,790	\$ 29,917,401,383
5. Actuarial value of assets			
a. Annuity Savings Fund	\$ 1,056,634,488	\$ 1,728,794,900	\$ 2,785,429,388
b. Pension Accumulation Fund	2,268,733,411	11,458,581,675	13,727,315,086
c. Total	<u>\$ 3,325,367,899</u>	<u>\$ 13,187,376,575</u>	<u>\$ 16,512,744,474</u>
6. Unfunded actuarial accrued liability	\$ 2,312,527,694	\$ 11,092,129,215	\$ 13,404,656,909
7. Adequacy of contribution rates			
a. Statutory Contribution Rate for Fiscal Year Fiscal Year 2019	31.00%	19.00%	20.36%
b. Funding Period in years as of June 30, 2018*	26	25	25

* 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, 2018 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
Pension Market Leader & Actuary

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TABLE 1**Development of Employer Cost**

	Police and Firefighters June 30, 2018 (1)	All Other Employees June 30, 2018 (2)	All Employees June 30, 2018 (3)
1. Projected FY 2019 payroll for contribution purposes	\$ 497,115,143	\$ 3,886,572,864	\$ 4,383,688,007
2. Gross normal cost (Table 3)	25.46%	12.38%	13.90%
3. Employer normal cost rate (Table 3)	12.97%	7.14%	7.82%
4. Present value future benefits (Table 2)	\$ 6,801,549,574	\$ 28,205,720,711	\$ 35,007,270,285
5. Present value future employer normal cost	\$ 563,348,694	\$ 2,101,341,524	\$ 2,664,690,218
6. Present value future employee contributions	\$ 600,305,287	\$ 1,824,873,397	\$ 2,425,178,684
7. Actuarial accrued liability (Item 4 - Item 5 - Item 6)	\$ 5,637,895,593	\$ 24,279,505,790	\$ 29,917,401,383
8. Actuarial value of assets	\$ 3,325,367,899	\$ 13,187,376,575	\$ 16,512,744,474
9. Unfunded actuarial accrued liability (UAAL) (Item 7 - Item 8)	\$ 2,312,527,694	\$ 11,092,129,215	\$ 13,404,656,909
10. Funding Period*	26	25	25

	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

* 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, 2018 (1)	All Other Employees June 30, 2018 (2)	All Employees June 30, 2018 (3)
1. Active members			
a. Service retirement benefits	\$ 3,599,756,675	\$ 13,124,340,425	\$ 16,724,097,100
b. Temination Benefits	106,097,780	827,255,506	933,353,286
c. Survivor benefits	19,768,611	145,139,966	164,908,577
d. Disability retirement benefits	24,500,169	249,572,843	274,073,012
e. Total	\$ 3,750,123,235	\$ 14,346,308,740	\$ 18,096,431,975
2. Retired members			
a. Service retirement	\$ 2,800,532,024	\$ 12,064,140,944	\$ 14,864,672,968
b. Disability retirement	30,563,426	251,324,987	281,888,413
c. Beneficiaries	148,023,718	714,262,701	862,286,419
d. Total	\$ 2,979,119,168	\$ 13,029,728,632	\$ 16,008,847,800
3. Inactive members			
a. Vested terminations	\$ 67,739,133	\$ 732,682,607	\$ 800,421,740
b. Nonvested terminations	4,568,038	97,000,732	101,568,770
c. Total	\$ 72,307,171	\$ 829,683,339	\$ 901,990,510
4. Total actuarial present value of future benefits	\$ 6,801,549,574	\$ 28,205,720,711	\$ 35,007,270,285

	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. Temination 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 benefits	\$ 6,497,892,795	\$ 27,109,584,743	\$ 33,607,477,538

TABLE 3**Analysis of Normal Cost**

	Police and Firefighters June 30, 2018 (1)	All Other Employees June 30, 2018 (2)	All Employees June 30, 2018 (3)
1. Normal cost as a percent of pay			
a. Service retirement benefits	22.55%	9.23%	10.77%
b. Deferred termination benefits	1.15%	0.90%	0.93%
c. Refunds	0.90%	1.37%	1.32%
d. Disability retirement benefits	0.32%	0.38%	0.38%
e. Survivor benefits	0.19%	0.15%	0.15%
f. Administrative Expenses	0.35%	0.35%	0.35%
g. Total	25.46%	12.38%	13.90%
2. Employee contribution rate	12.49%	5.24%	6.08%
3. Effective employer normal cost rate (Item 1g - Item 2)	12.97%	7.14%	7.82%

	Police and Firefighters June 30, 2017 (1)	All Other Employees June 30, 2017 (2)	All Employees June 30, 2017 (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%

TABLE 4

Statement of Net Position
(Assets at Market or Fair Value)

Item	Valuation as of	
	June 30, 2018	June 30, 2017
1. Cash and cash equivalents	\$ 2,389,282,306	\$ 2,390,108,075
2. Receivables:		
a. Accounts receivable and others	\$ 4,660,591	\$ 5,686,729
b. Investment sale proceeds	106,100,490	190,816,066
c. Accrued income	54,932,158	43,320,022
d. Member and employer contributions	48,713,407	47,967,178
e. Subtotal	\$ 214,406,646	\$ 287,789,995
3. Investments		
a. Equity securities	\$ 7,608,789,085	\$ 7,190,541,977
b. Fixed income securities	4,096,606,113	3,930,555,468
c. Real estate investments	1,060,893,051	1,112,391,820
d. Alternative investments	1,512,559,223	1,259,025,683
e. Subtotal	\$ 14,278,847,472	\$ 13,492,514,948
4. Other		
a. Invested securities lending collateral	\$ 1,097,510,629	\$ 1,039,906,540
b. Equipment at cost, net of depreciation	5,510,268	5,215,413
c. Other assets	-	-
d. Subtotal	\$ 1,103,020,897	\$ 1,045,121,953
5. Total assets	\$ 17,985,557,321	\$ 17,215,534,971
6. Liabilities		
a. Accounts payable	\$ 42,903,869	\$ 52,194,547
b. Investment commitments payable	135,189,850	250,612,562
c. Securities lending collateral	1,097,510,629	1,039,906,540
d. Notes payable	111,545,000	174,497,016
e. Total liabilities	\$ 1,387,149,348	\$ 1,517,210,665
7. Total market value of assets available for benefits (Item 5 - Item 6e)	\$ 16,598,407,973	\$ 15,698,324,306
 % in equities	 10,182,241,359 61%	 9,561,959,480 61%

TABLE 5**Statement of Changes in Net Position**

		Year Ending	
		June 30, 2018	June 30, 2017
1.	a. Value of assets at beginning of year	\$ 15,698,324,306	\$ 14,069,978,917
	b. Adjustment due to post valuation changes in CAFR assets	-	-
	c. Adjusted value of assets at beginning of year	\$ 15,698,324,306	\$ 14,069,978,917
2.	Revenue for the year		
	a. Contributions		
	i. Member contributions	\$ 259,427,934	\$ 250,704,067
	ii. Employer contributions	847,595,466	781,244,218
	iii. Total	\$ 1,107,023,400	\$ 1,031,948,285
	b. Income		
	i. Interest, dividends, and other income	\$ 443,350,111	\$ 382,099,708
	ii. Investment expenses	(57,189,048)	(37,949,651)
	iii. Net	\$ 386,161,063	\$ 344,150,057
	c. Net realized and unrealized gains/(loss)	\$ 839,411,536	\$ 1,590,362,450
	d. Net income/(loss)	\$ 1,225,572,599	\$ 1,934,512,507
	e. Total revenue	\$ 2,332,595,999	\$ 2,966,460,792
3.	Expenditures for the year		
	a. Refunds	\$ 20,846,500	\$ 16,340,290
	b. Benefit payments	1,395,881,342	1,306,788,954
	c. Administrative and miscellaneous expenses	15,784,490	14,986,159
	d. Total expenditures	\$ 1,432,512,332	\$ 1,338,115,403
4.	Increase/(decrease) in net assets (Item 2e - Item 3d)	\$ 900,083,667	\$ 1,628,345,389
5.	Value of assets at end of year (Item 1c + Item 4)	\$ 16,598,407,973	\$ 15,698,324,306

TABLE 6

Development of Actuarial Value of Assets

	Year Ending June 30, 2018					
1. Actuarial value of assets, beginning of year	\$ 15,720,627,120					
2. Net new investments						
a. Contributions	\$ 1,107,023,400					
b. Benefits paid and Refunds	(1,416,727,842)					
c. Administrative expenses	(15,784,490)					
d. Subtotal	(325,488,932)					
3. Market value of assets at end of year	\$ 16,598,407,973					
4. Expected return on actuarial value of assets	\$ 1,089,051,786					
5. Expected actuarial value of assets, end of year	\$ 16,484,189,974					
6. Excess/(shortfall) return (Item 3-Item 5)	\$ 114,217,999					
7. Development of amounts to be recognized as of June 30, 2018:						
	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
Fiscal Year End	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2015	\$ 0	\$ 0	\$ 0	1	\$ 0	\$ 0
2016	(22,302,814)	22,302,814	0	2	0	0
2017	0	0	0	3	0	0
2018	136,520,813	(22,302,814)	114,217,999	4	28,554,500	85,663,499
Total	\$ 114,217,999	\$ 0	\$ 114,217,999		\$ 28,554,500	\$ 85,663,499
8. Actuarial value of assets as of June 30, 2018 (Item 3 - Item 7)	\$ 16,512,744,474					
9. Ratio of actuarial value to market value	99.5%					
10. Asset gain/(loss) for year (Item 8 - Item 5)	\$ 28,554,500					

TABLE 7**Estimation of Yields**

	June 30, 2018 (1)	June 30, 2017 (2)
A. Market value yield		
1. Beginning of year market assets	\$ 15,698,324,306	\$ 14,069,978,917
2. Investment income		
a. Change in assets (Item 3 - Item 1)	\$ 900,083,667	\$ 1,628,345,389
b. Cash Flow	<u>(325,488,932)</u>	<u>(306,167,118)</u>
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 1,225,572,599	\$ 1,934,512,507
3. End of year market assets	\$ 16,598,407,973	\$ 15,698,324,306
4. Estimated dollar weighted market value yield (net of investment and administrative expenses)	7.89%	13.90%
B. Actuarial value yield		
1. Beginning of year actuarial assets	\$ 15,720,627,120	\$ 14,998,749,060
2. Investment income (based on asset valuation method)		
a. Change in assets (Item 3 - Item 1)	\$ 792,117,354	\$ 721,878,060
b. Cash Flow	<u>(325,488,932)</u>	<u>(306,167,118)</u>
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 1,117,606,286	\$ 1,028,045,178
3. End of year actuarial assets	\$ 16,512,744,474	\$ 15,720,627,120
4. Estimated actuarial value yield (net of investment and administrative expenses)	7.18%	6.92%

TABLE 8**Allocation of Cash and Investments**

	<u>June 30, 2018</u>	<u>June 30, 2017</u>
	(1)	(2)
1. Cash and short-term equivalents	14.3%	15.0%
2. Fixed income securities	24.6%	24.7%
3. Equity securities	45.6%	45.4%
4. Real estate	6.4%	7.0%
5. Other	<u>9.1%</u>	<u>7.9%</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, 2017	\$ 2,230,069,702	\$ 10,697,933,711	\$ 12,928,003,413
2. Normal cost for the year (include admin expense)	\$ 129,662,827	\$ 470,591,856	\$ 600,254,683
3. Less: contributions and assessments for the year	\$ (218,239,356)	\$ (888,784,044)	\$ (1,107,023,400)
4. Interest at 7.00%			
a. On UAAL	\$ 156,104,879	\$ 748,855,360	\$ 904,960,239
b. On normal cost	4,538,199	16,470,715	21,008,914
c. On contributions	(7,638,377)	(31,107,442)	(38,745,819)
d. Total	\$ 153,004,701	\$ 734,218,633	\$ 887,223,334
5. Expected UAAL as of June 30, 2018 (Sum of Items 1 - 4)	\$ 2,294,497,874	\$ 11,013,960,156	\$ 13,308,458,030
6. Actual UAAL as of June 30, 2018	\$ 2,312,527,694	\$ 11,092,129,215	\$ 13,404,656,909
7. Total gain/(loss) for the year (Item 5 - Item 6)	\$ (18,029,820)	\$ (78,169,059)	\$ (96,198,879)
B. Source of gains and losses			
8. Asset gain/(loss) for the year (Table 9b)	\$ 5,750,360	\$ 22,804,140	\$ 28,554,500
9. Gain/(loss) due to change in payment timing	-	-	-
10. Other liability gain/(loss)	(23,780,180)	(100,973,199)	(124,753,379)
11. Change in benefit provisions	-	-	-
12. Total gain/(loss) for the year	\$ (18,029,820)	\$ (78,169,059)	\$ (96,198,879)

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

Item (1)	June 30, 2018 (2)	June 30, 2017 (3)
1. Actuarial assets, beginning of year	\$ 15,720,627,120	\$ 14,998,749,060
2. Total contributions during year	\$ 1,107,023,400	\$ 1,031,948,285
3. Benefits and refunds paid	\$ (1,416,727,842)	\$ (1,323,129,244)
4. Administrative expenses paid	\$ (15,784,490)	\$ (14,986,159)
5. Assumed net investment income at 7.00%		
a. Beginning of year assets	\$ 1,100,443,898	\$ 1,049,912,435
b. Contributions	38,745,819	36,118,190
c. Benefits and refunds paid	(49,585,474)	(46,309,524)
d. Administrative expenses paid	<u>(552,457)</u>	<u>(524,516)</u>
e. Total	\$ 1,089,051,786	\$ 1,039,196,585
6. Expected actuarial assets, end of year (Sum of items 1 through 5)	\$ 16,484,189,974	\$ 15,731,778,527
7. Actual actuarial assets, end of year	\$ 16,512,744,474	\$ 15,720,627,120
8. Asset gain/(loss) for year (Item 7 - Item 6)	\$ 28,554,500	\$ (11,151,407)
9. Asset gain/(loss) as a percent of actuarial value of assets, end of year (Item 8 / Item 7)	0.17%	(0.07%)

TABLE 9C

Projection Results Based on June 30, 2018 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)
2018	20.36%	\$ 4,384	\$ 893	\$ 29,917	\$ 16,513	\$ 13,405	55.2%
2019	23.58%	4,495	1,060	30,983	17,208	13,774	55.5%
2020	25.92%	4,619	1,197	32,152	18,157	13,995	56.5%
2021	25.91%	4,750	1,231	33,325	19,238	14,088	57.7%
2022	25.91%	4,885	1,266	34,502	20,349	14,153	59.0%
2023	25.90%	5,026	1,302	35,681	21,494	14,187	60.2%
2024	25.90%	5,172	1,339	36,861	22,675	14,185	61.5%
2025	25.89%	5,325	1,379	38,040	23,894	14,146	62.8%
2026	25.89%	5,485	1,420	39,216	25,153	14,063	64.1%
2027	25.89%	5,652	1,463	40,391	26,458	13,933	65.5%
2028	25.89%	5,827	1,509	41,566	27,816	13,749	66.9%
2029	25.89%	6,011	1,556	42,740	29,233	13,508	68.4%
2030	25.89%	6,202	1,606	43,918	30,716	13,202	69.9%
2031	25.89%	6,401	1,657	45,098	32,273	12,825	71.6%
2032	25.89%	6,608	1,711	46,283	33,912	12,371	73.3%
2033	25.89%	6,824	1,767	47,473	35,641	11,833	75.1%
2034	25.89%	7,048	1,825	48,670	37,468	11,201	77.0%
2035	25.89%	7,281	1,885	49,876	39,407	10,469	79.0%
2036	25.89%	7,524	1,948	51,093	41,467	9,626	81.2%
2037	25.89%	7,777	2,013	52,325	43,662	8,664	83.4%
2038	25.89%	8,040	2,082	53,577	46,006	7,571	85.9%
2039	25.89%	8,316	2,153	54,853	48,517	6,336	88.4%
2040	25.89%	8,602	2,227	56,159	51,212	4,947	91.2%
2041	25.89%	8,901	2,304	57,501	54,111	3,390	94.1%
2042	25.89%	9,211	2,385	58,886	57,233	1,653	97.2%
2043	4.32%	9,533	412	60,321	60,602	(281)	100.5%
2044	4.28%	9,868	422	61,813	62,114	(301)	100.5%
2045	4.24%	10,215	433	63,369	63,691	(322)	100.5%
2046	4.20%	10,575	444	64,993	65,338	(344)	100.5%
2047	4.18%	10,949	458	66,694	67,062	(368)	100.6%

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, 2018	March 31, 2017	March 31, 2018	March 31, 2017	March 31, 2018	March 31, 2017
	(1)	(2)	(3)	(4)	(5)	(6)
State of Hawaii	\$ 19,179,233	\$ 18,760,658	\$3,134,152,168	\$ 3,034,764,556	\$ 3,153,331,401	\$3,053,525,214
City & County of Honolulu	296,786,547	295,625,263	345,081,101	332,643,575	641,867,648	628,268,838
Board of Water Supply	-	-	36,260,420	35,446,382	36,260,420	35,446,382
County of Hawaii	74,840,058	73,870,202	98,632,901	94,710,441	173,472,959	168,580,643
County of Maui	61,769,872	62,340,672	107,133,093	104,447,012	168,902,965	166,787,684
County of Kauai	27,728,776	27,796,301	55,677,801	53,751,719	83,406,577	81,548,020
Total All Employers	\$ 480,304,486	\$ 478,393,096	\$3,776,937,484	\$ 3,655,763,685	\$ 4,257,241,970	\$4,134,156,781

TABLE 11**Schedule of Funding Progress**

Valuation Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial		Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
			Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
June 30, 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%
June 30, 2018	16,512.7	29,917.4	13,404.7	55.2%	4,383.7	305.8%

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, 2018	June 30, 2017	June 30, 2018	June 30, 2017	June 30, 2018	June 30, 2017
	(1)	(2)	(3)	(4)	(5)	(6)
1. Active members						
a. Number	4,890	5,009	61,381	60,902	66,271	65,911
b. Total salary	\$ 480,304,486	\$ 478,393,096	\$ 3,776,937,484	\$ 3,655,763,685	\$ 4,257,241,970	\$ 4,134,156,781
c. Average salary	\$ 98,222	\$ 95,507	\$ 61,533	\$ 60,027	\$ 64,240	\$ 62,723
d. Average age	42.7	42.8	48.3	48.4	47.9	48.0
e. Average service	14.4	14.6	13.1	13.2	13.2	13.3
2. Inactive members						
a. Number	382	378	8,867	8,863	9,249	9,241
b. Total annual deferred benefits	\$ 6,427,960	\$ 6,372,538	\$ 92,406,838	\$ 75,657,983	\$ 98,834,798	\$ 82,030,521
c. Average annual deferred benefit	\$ 16,827	\$ 16,859	\$ 10,421	\$ 8,536	\$ 10,686	\$ 8,877
3. Service retirees						
a. Number	3,633	3,439	39,029	37,809	42,662	41,248
b. Total annual benefits	\$ 206,589,158	\$ 186,219,761	\$ 1,043,197,275	\$ 989,160,649	\$ 1,249,786,433	\$ 1,175,380,410
c. Average annual benefit	\$ 56,865	\$ 54,149	\$ 26,729	\$ 26,162	\$ 29,295	\$ 28,495
4. Disabled retirees						
a. Number	125	124	1,518	1,485	1,643	1,609
b. Total annual benefits	\$ 2,825,661	\$ 2,722,839	\$ 20,913,676	\$ 19,580,231	\$ 23,739,337	\$ 22,303,070
c. Average annual benefit	\$ 22,605	\$ 21,958	\$ 13,777	\$ 13,185	\$ 14,449	\$ 13,861
5. Beneficiaries						
a. Number	312	304	3,952	3,766	4,264	4,070
b. Total annual benefits	\$ 11,934,021	\$ 11,184,933	\$ 65,573,518	\$ 60,704,184	\$ 77,507,539	\$ 71,889,117
c. Average annual benefit	\$ 38,250	\$ 36,793	\$ 16,592	\$ 16,119	\$ 18,177	\$ 17,663

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)
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
2018	66,271	0.5%	4,257.2	3.0%	64,240	2.4%	47.9	13.2

TABLE 13**History of Cash Flow**

Year Ending June 30, (1)	Contributions			Expenditures				External		External Cash
	Employee (2)	Employer (3)	Total (4)	Benefit	Refunds (6)	Administrative	Total (8)	Cash Flow	Market Value	Flow as Percent
				Payments (5)		Expenses ¹ (7)		for the Year ² (9)	of Assets (10)	of Market Value (11)
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%)
2018	259.4	847.6	1,107.0	(1,395.9)	(20.8)	(15.8)	(1,432.5)	(325.5)	16,598.4	(2.0%)

Amounts in \$ millions

¹ Excludes investment expenses

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

TABLE 14**Solvency Test**

	<u>June 30, 2018</u> (1)	<u>June 30, 2017</u> (2)
1. Actuarial accrued liability (AAL)		
a. Active member contributions	\$ 2,181,288,334	\$ 2,183,210,846
b. Retirees and beneficiaries	16,008,847,800	15,020,603,612
c. Active and inactive members	<u>11,727,265,249</u>	<u>11,444,816,075</u>
d. Total	\$ 29,917,401,383	\$ 28,648,630,533
2. Actuarial value of assets	\$ 16,512,744,474	\$ 15,720,627,120
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
2014 through 2018

Item	Valuation Date: June 30				
	2014	2015	2016	2017	2018
Number of active members	67,206	67,310	67,377	65,911	66,271
Number of inactive members	8,105	7,413	7,741	9,241	9,249
Number of pensioners	39,680	40,657	41,654	42,857	44,305
Number of beneficiaries	3,407	3,626	3,852	4,070	4,264
Average monthly contributory member pension amount	\$ 2,508	\$ 2,621	\$ 2,730	\$ 2,854	\$ 2,994
Average monthly noncontributory member pension amount	\$ 1,585	\$ 1,611	\$ 1,637	\$ 1,669	\$ 1,702
Average monthly hybrid member pension amount	\$ 2,088	\$ 2,114	\$ 2,139	\$ 2,178	\$ 2,238
Average monthly beneficiary amount	\$ 1,304	\$ 1,361	\$ 1,419	\$ 1,472	\$ 1,515
Total actuarial value of assets (\$millions)	\$ 13,642	\$ 14,464	\$ 14,999	\$ 15,721	\$ 16,513
Unfunded actuarial accrued liability (\$millions)	\$ 8,578.3	\$ 8,774.7	\$ 12,440.5	\$ 12,928.0	\$ 13,404.7
Funding Period (in years) ⁽¹⁾	26.0	26.0	66.0	26.0	25.0
Item (Dollar amounts in millions)	Fiscal Year				
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Employer contributions ⁽²⁾	\$ 653.1	\$ 717.8	\$ 756.6	\$ 781.2	\$ 847.6

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

⁽²⁾ Beginning July 1, 2013, the percentages increased to 23.0% for Police and Fire, 16.0% for All Other Employees.
Beginning July 1, 2014, the percentages increased to 24.0% for Police and Fire, 16.5% for All Other Employees.
Beginning July 1, 2015, the percentages increased to 25.0% for Police and Fire, 17.0% for All Other Employees.
Beginning July 1, 2017, the percentages increased to 28.0% for Police and Fire, 18.0% for All Other Employees.

TABLE 16

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

	Noncontributory	Contributory	Hybrid
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)

	Noncontributory	Contributory	Hybrid
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% of AFC)	1 ¾% of AFC times years of credited service, unreduced for age (Minimum is 30% of AFC)	2% of AFC times years of credited service, unreduced for age, split formula for unconverted noncontributory service at 1 ¼% (Minimum is 25% of 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	Surviving spouse/reciprocal beneficiary and dependent children receive a benefit equal to a percentage of member's accrued maximum allowance unreduced for age; or	Lump sum payment of member's contributions and accrued interest plus a percentage of the salary earned in the 12 months preceding death; or	Return of member's Hybrid contributions and accrued interest (both times 150%) plus return of non-Hybrid balance transfers and accrued interest; or
	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	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	Option 3 (50% Joint Survivor) lifetime benefit if credited with at least 10 years of service and one beneficiary designated; or
		Option 2 (100% Joint and Survivor) benefit if member was eligible for retirement at the time of death and one beneficiary designated	Option 2 (100% Joint Survivor) lifetime monthly benefit if member was eligible for service retirement at time of death, and one beneficiary designated

TABLE 16 (CONTINUED)

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

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% of AFC)	3.0% of AFC times years of credited service, unreduced for age (Minimum is 30% of AFC)	1 ¾% of AFC times years of credited service, unreduced for age (Minimum is 25% of 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	<p>Same for all members.</p> <p>Lump sum payment of member's contributions and interest, plus pension of 50% AFC to surviving spouse/reciprocal beneficiary (until remarriage or re-entry into a new reciprocal beneficiary relationship);</p> <p>If there is no surviving spouse or reciprocal beneficiary, surviving dependent children (up to age 18) or dependent parents shall be eligible for a monthly benefit.</p> <p>If there is no spouse/reciprocal beneficiary or dependent children/parents, the ordinary death benefit shall be payable to the designated beneficiary.</p>		

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):

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

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

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:

	General Employees	Teachers	Police and Fire
Type	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)						
	General Employees		Teachers		Police and Fire	
Age	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:

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

Age	Male & Female
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:

Type	General Employees	Teachers	Police and Fire
	Male & Female	Male & Female	Male & Female
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	<u>Expected Terminations per 1000 Lives (Male & Female)</u>		
	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									
	General Employees				Teachers				Police/Fire
	Unreduced Retirement		Reduced Retirement		Unreduced Retirement		Reduced Retirement		Unreduced Retirement
Age	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

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

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

TABLE 18 (CONTINUED)

Hybrid Members

	Expected Retirements per 100 Lives							
	General Employees				Teachers			
	Unreduced		Reduced		Unreduced		Reduced	
Age	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.

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TABLE 19

**Distribution of Active Members by Age and by Years of Service - All Employees
As of 06/30/2018**

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	351 \$42,600	229 \$42,706	67 \$41,413	27 \$41,846	12 \$42,937	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	686 \$42,495
25-29	904 \$45,692	933 \$45,274	785 \$46,645	570 \$50,329	364 \$50,938	353 \$56,490	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,909 \$47,923
30-34	725 \$49,669	781 \$47,208	691 \$48,160	661 \$52,356	610 \$52,759	2,016 \$61,685	376 \$65,041	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5,860 \$54,908
35-39	594 \$48,704	626 \$48,438	525 \$48,512	544 \$52,844	541 \$54,690	2,078 \$62,221	2,209 \$67,380	295 \$65,690	0 \$0	0 \$0	0 \$0	0 \$0	7,412 \$59,440
40-44	448 \$49,920	480 \$48,559	438 \$50,559	403 \$51,815	428 \$54,302	1,665 \$62,909	2,201 \$67,030	1,876 \$75,657	179 \$79,960	4 \$44,048	0 \$0	0 \$0	8,122 \$64,102
45-49	406 \$49,023	384 \$49,187	318 \$49,806	349 \$51,224	323 \$55,373	1,381 \$59,710	1,845 \$65,954	2,112 \$73,619	1,723 \$82,818	399 \$80,142	1 \$143,974	0 \$0	9,241 \$67,616
50-54	271 \$49,685	307 \$49,573	299 \$50,103	258 \$49,990	304 \$53,759	1,060 \$59,917	1,561 \$62,769	1,495 \$69,038	1,481 \$77,980	2,040 \$81,639	317 \$86,377	1 \$140,156	9,394 \$68,891
55-59	210 \$53,738	259 \$50,981	222 \$50,601	248 \$53,130	260 \$55,194	1,008 \$58,233	1,387 \$59,333	1,334 \$62,683	1,187 \$72,540	1,885 \$77,004	1,158 \$83,074	157 \$75,010	9,315 \$67,321
60-64	127 \$51,043	187 \$54,954	166 \$49,904	148 \$57,725	175 \$54,633	815 \$60,325	1,107 \$60,022	1,127 \$61,271	900 \$69,843	1,290 \$73,974	818 \$82,044	570 \$83,806	7,430 \$67,426
65 & Over	74 \$53,874	89 \$64,087	79 \$58,932	86 \$58,393	103 \$57,236	550 \$61,246	811 \$63,798	740 \$63,373	512 \$71,538	674 \$79,612	459 \$87,540	725 \$96,087	4,902 \$72,973
Total	4,110 \$48,342	4,275 \$48,143	3,590 \$48,823	3,294 \$52,085	3,120 \$53,879	10,926 \$60,942	11,497 \$64,450	8,979 \$69,003	5,982 \$76,578	6,292 \$78,343	2,753 \$83,915	1,453 \$89,022	66,271 \$64,240

TABLE 20

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, All
As of 06/30/2018**

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	1 \$60,752	22 \$52,852	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	23 \$53,195
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	4 \$43,063	451 \$63,527	125 \$56,361	0 \$0	0 \$0	0 \$0	0 \$0	580 \$61,841
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	6 \$35,242	543 \$64,081	660 \$65,985	55 \$60,989	4 \$44,048	0 \$0	0 \$0	1,268 \$64,739
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$34,970	417 \$58,776	821 \$64,377	566 \$72,124	134 \$63,722	0 \$0	0 \$0	1,940 \$65,358
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$16,097	380 \$60,916	652 \$61,470	603 \$69,408	725 \$71,196	108 \$69,051	0 \$0	2,470 \$66,472
55-59	0 \$0	0 \$0	0 \$0	0 \$0	1 \$39,317	2 \$47,563	300 \$55,300	650 \$57,059	537 \$66,932	781 \$70,100	379 \$77,691	40 \$70,792	2,690 \$65,718
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$57,611	257 \$56,978	492 \$57,178	405 \$64,125	599 \$67,985	325 \$73,711	162 \$80,554	2,241 \$65,387
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$73,300	180 \$59,441	334 \$56,101	267 \$66,408	355 \$75,078	234 \$80,832	257 \$90,760	1,629 \$71,337
Total	0 \$0	0 \$0	0 \$0	0 \$0	1 \$39,317	20 \$42,296	2,550 \$60,471	3,734 \$60,923	2,433 \$68,094	2,598 \$70,229	1,046 \$76,265	459 \$85,418	12,841 \$66,169

TABLE 21

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, General Employees
As of 06/30/2018**

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	1 \$60,752	21 \$53,069	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	22 \$53,418
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	4 \$43,063	223 \$59,579	94 \$51,989	0 \$0	0 \$0	0 \$0	0 \$0	321 \$57,151
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	6 \$35,242	315 \$61,540	348 \$62,709	36 \$54,782	4 \$44,048	0 \$0	0 \$0	709 \$61,449
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$34,970	306 \$54,496	553 \$60,773	282 \$68,123	117 \$61,106	0 \$0	0 \$0	1,260 \$60,884
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$16,097	285 \$55,824	515 \$57,897	398 \$65,539	493 \$66,755	93 \$67,634	0 \$0	1,786 \$62,175
55-59	0 \$0	0 \$0	0 \$0	0 \$0	1 \$39,317	0 \$0	249 \$52,043	535 \$52,870	420 \$62,246	611 \$66,128	270 \$74,791	38 \$69,839	2,124 \$61,525
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	205 \$54,465	396 \$52,635	320 \$60,476	492 \$62,903	255 \$68,888	136 \$76,397	1,804 \$61,123
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$42,437	143 \$55,120	282 \$52,260	207 \$61,248	276 \$67,105	155 \$70,473	176 \$82,008	1,240 \$63,885
Total	0 \$0	0 \$0	0 \$0	0 \$0	1 \$39,317	16 \$36,814	1,747 \$56,312	2,723 \$56,556	1,663 \$63,404	1,993 \$65,283	773 \$71,117	350 \$78,506	9,266 \$61,624

TABLE 22

Distribution of Active Members by Age and by Years of Service
Noncontributory Members, Teachers
As of 06/30/2018

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	0 \$0	1 \$48,293	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$48,293
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	228 \$67,387	31 \$69,617	0 \$0	0 \$0	0 \$0	0 \$0	259 \$67,654
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	228 \$67,592	312 \$69,640	19 \$72,751	0 \$0	0 \$0	0 \$0	559 \$68,911
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	111 \$70,576	268 \$71,814	284 \$76,096	17 \$81,730	0 \$0	0 \$0	680 \$73,648
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	95 \$76,191	137 \$74,902	205 \$76,921	232 \$80,632	15 \$77,842	0 \$0	684 \$77,694
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$47,563	51 \$71,201	115 \$76,549	117 \$83,755	170 \$84,377	109 \$84,875	2 \$88,898	566 \$81,453
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$57,611	52 \$66,885	96 \$75,917	85 \$77,861	107 \$91,354	70 \$91,280	26 \$102,301	437 \$82,989
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$104,162	37 \$76,142	52 \$76,930	60 \$84,208	79 \$102,935	79 \$101,157	81 \$109,776	389 \$95,088
Total	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	4 \$64,225	803 \$69,517	1,011 \$72,686	770 \$78,224	605 \$86,524	273 \$90,843	109 \$107,610	3,575 \$77,950

TABLE 23

Distribution of Active Members by Age and by Years of Service
Contributory Members, All
As of 06/30/2018

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	10 \$64,072	18 \$66,020	5 \$69,271	1 \$72,327	3 \$57,828	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	37 \$65,439
25-29	49 \$63,750	78 \$64,351	63 \$68,957	61 \$67,243	42 \$67,092	66 \$77,675	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	359 \$68,338
30-34	35 \$57,939	48 \$59,738	49 \$66,744	83 \$66,332	42 \$67,297	318 \$84,045	73 \$93,804	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	648 \$77,272
35-39	15 \$54,523	28 \$61,851	16 \$63,287	46 \$66,322	29 \$66,599	256 \$81,499	337 \$92,522	58 \$97,462	0 \$0	0 \$0	0 \$0	0 \$0	785 \$84,383
40-44	12 \$73,849	8 \$78,000	9 \$64,868	17 \$69,493	14 \$69,369	173 \$81,851	277 \$93,826	363 \$105,416	48 \$116,920	0 \$0	0 \$0	0 \$0	921 \$95,847
45-49	4 \$59,744	2 \$103,582	7 \$70,160	8 \$80,109	9 \$71,611	75 \$84,721	180 \$94,036	399 \$103,826	346 \$119,878	81 \$132,142	1 \$143,974	0 \$0	1,112 \$107,244
50-54	0 \$0	1 \$70,316	2 \$139,550	1 \$60,095	1 \$201,065	22 \$92,043	64 \$95,056	154 \$107,309	219 \$116,793	264 \$130,271	66 \$143,152	1 \$140,156	795 \$119,248
55-59	3 \$71,689	2 \$65,642	0 \$0	2 \$62,252	3 \$156,354	18 \$85,654	22 \$92,838	29 \$112,426	78 \$118,152	130 \$122,389	101 \$120,229	49 \$81,108	437 \$112,193
60-64	1 \$203,071	3 \$112,653	0 \$0	1 \$201,907	1 \$87,387	6 \$112,926	12 \$124,044	17 \$137,124	31 \$123,633	40 \$136,685	60 \$114,638	129 \$80,495	301 \$105,946
65 & Over	0 \$0	1 \$77,240	1 \$190,830	0 \$0	0 \$0	8 \$71,735	10 \$95,672	18 \$101,348	9 \$98,104	17 \$133,895	27 \$116,778	161 \$92,341	252 \$98,420
Total	129 \$63,205	189 \$64,841	152 \$69,201	220 \$67,906	144 \$70,294	942 \$82,855	975 \$93,862	1,038 \$105,286	731 \$118,466	532 \$129,228	255 \$124,574	340 \$86,368	5,647 \$97,631

TABLE 24

**Distribution of Active Members by Age and by Years of Service
Contributory Members, General Employees
As of 06/30/2018**

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	1 \$62,251	0 \$0	0 \$0	0 \$0	1 \$59,901	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$61,076
30-34	0 \$0	1 \$62,251	0 \$0	1 \$67,694	0 \$0	8 \$62,456	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	10 \$62,959
35-39	0 \$0	1 \$62,251	0 \$0	1 \$57,349	2 \$63,001	5 \$87,875	6 \$63,457	2 \$81,094	0 \$0	0 \$0	0 \$0	0 \$0	17 \$72,230
40-44	1 \$191,375	1 \$189,259	1 \$62,251	1 \$62,251	0 \$0	3 \$60,617	5 \$70,603	10 \$63,537	0 \$0	0 \$0	0 \$0	0 \$0	22 \$76,153
45-49	1 \$43,923	2 \$103,582	1 \$54,043	3 \$104,792	0 \$0	5 \$116,739	15 \$107,106	19 \$78,374	8 \$128,467	2 \$83,735	0 \$0	0 \$0	56 \$98,109
50-54	0 \$0	0 \$0	2 \$139,550	0 \$0	1 \$201,065	3 \$125,785	9 \$108,199	14 \$107,451	14 \$89,593	13 \$94,961	6 \$74,857	0 \$0	62 \$101,187
55-59	1 \$73,108	2 \$65,642	0 \$0	2 \$62,252	2 \$194,701	7 \$87,402	5 \$91,306	8 \$119,294	7 \$98,824	19 \$81,163	26 \$86,261	38 \$70,749	117 \$84,668
60-64	1 \$203,071	3 \$112,653	0 \$0	1 \$201,907	0 \$0	5 \$125,176	8 \$142,605	10 \$163,880	6 \$136,938	11 \$177,648	33 \$111,350	95 \$70,229	173 \$99,829
65 & Over	0 \$0	1 \$77,240	1 \$190,830	0 \$0	0 \$0	7 \$72,936	10 \$95,672	11 \$97,354	8 \$97,643	9 \$139,894	18 \$115,856	108 \$83,970	173 \$92,489
Total	4 \$127,869	12 \$94,138	5 \$117,245	9 \$92,009	5 \$143,294	44 \$88,411	58 \$101,176	74 \$100,744	43 \$106,432	54 \$114,023	83 \$101,830	241 \$76,469	632 \$92,721

TABLE 25

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Teachers
As of 06/30/2018**

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	1 \$52,310	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$52,310
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	0 \$0	1 \$56,387	0 \$0	1 \$77,899	0 \$0	0 \$0	0 \$0	2 \$67,143
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$101,331	0 \$0	0 \$0	0 \$0	0 \$0	1 \$101,331
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$88,973	1 \$64,022	0 \$0	0 \$0	2 \$76,497
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$51,234	0 \$0	1 \$56,122	3 \$144,091	10 \$88,099	5 \$84,068	20 \$92,048
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$51,678	0 \$0	1 \$64,478	1 \$177,646	3 \$88,306	9 \$93,913	26 \$96,311	41 \$95,318
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$78,029	0 \$0	5 \$138,780	4 \$94,669	48 \$105,729	58 \$107,338
Total	0 \$0	1 \$52,310	0 \$0	0 \$0	0 \$0	1 \$51,678	2 \$53,811	3 \$81,279	4 \$100,160	12 \$121,259	23 \$91,517	79 \$101,259	125 \$99,324

TABLE 26

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Police and Firefighters
As of 06/30/2018**

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	10 \$64,072	18 \$66,020	5 \$69,271	1 \$72,327	3 \$57,828	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	37 \$65,439
25-29	49 \$63,750	76 \$64,537	63 \$68,957	61 \$67,243	42 \$67,092	65 \$77,948	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	356 \$68,424
30-34	35 \$57,939	47 \$59,685	49 \$66,744	82 \$66,315	42 \$67,297	310 \$84,602	73 \$93,804	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	638 \$77,496
35-39	15 \$54,523	27 \$61,836	16 \$63,287	45 \$66,521	27 \$66,865	251 \$81,372	331 \$93,049	56 \$98,047	0 \$0	0 \$0	0 \$0	0 \$0	768 \$84,652
40-44	11 \$63,165	7 \$62,106	8 \$65,195	16 \$69,946	14 \$69,369	170 \$82,226	271 \$94,393	353 \$106,602	47 \$117,750	0 \$0	0 \$0	0 \$0	897 \$96,394
45-49	3 \$65,017	0 \$0	6 \$72,846	5 \$65,299	9 \$71,611	70 \$82,434	165 \$92,848	379 \$105,109	338 \$119,675	79 \$133,368	1 \$143,974	0 \$0	1,055 \$107,735
50-54	0 \$0	1 \$70,316	0 \$0	1 \$60,095	0 \$0	19 \$86,715	55 \$92,905	140 \$107,295	204 \$118,796	250 \$132,372	60 \$149,982	1 \$140,156	731 \$120,897
55-59	2 \$70,979	0 \$0	0 \$0	0 \$0	1 \$79,660	11 \$84,541	16 \$95,917	21 \$109,810	70 \$120,971	108 \$129,039	65 \$138,759	6 \$144,251	300 \$124,271
60-64	0 \$0	0 \$0	0 \$0	0 \$0	1 \$87,387	0 \$0	4 \$86,924	6 \$104,638	24 \$118,056	26 \$124,936	18 \$131,029	8 \$150,999	87 \$123,116
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$63,327	0 \$0	6 \$112,555	1 \$101,793	3 \$107,756	5 \$137,783	5 \$144,616	21 \$122,653
Total	125 \$61,136	176 \$62,915	147 \$67,567	211 \$66,878	139 \$67,668	897 \$82,617	915 \$93,486	961 \$105,711	684 \$119,330	466 \$131,195	149 \$142,347	20 \$146,836	4,890 \$98,222

TABLE 27

Distribution of Active Members by Age and by Years of Service
Hybrid Members, All
As of 06/30/2018

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	341 \$41,970	211 \$40,717	62 \$39,166	26 \$40,674	9 \$37,974	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	649 \$41,187
25-29	855 \$44,657	855 \$43,533	722 \$44,698	509 \$48,302	322 \$48,831	287 \$51,618	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,550 \$45,859
30-34	690 \$49,249	733 \$46,387	642 \$46,742	578 \$50,349	568 \$51,684	1,697 \$57,496	281 \$58,524	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5,189 \$52,123
35-39	579 \$48,553	598 \$47,810	509 \$48,048	498 \$51,599	512 \$54,015	1,818 \$59,548	1,421 \$62,640	112 \$59,649	0 \$0	0 \$0	0 \$0	0 \$0	6,047 \$55,972
40-44	436 \$49,262	472 \$48,060	429 \$50,258	386 \$51,037	414 \$53,793	1,486 \$60,815	1,381 \$62,815	853 \$70,477	76 \$70,346	0 \$0	0 \$0	0 \$0	5,933 \$59,038
45-49	402 \$48,916	382 \$48,902	311 \$49,348	341 \$50,546	314 \$54,908	1,304 \$58,309	1,248 \$64,302	892 \$68,612	811 \$74,471	184 \$69,208	0 \$0	0 \$0	6,189 \$61,203
50-54	271 \$49,685	306 \$49,505	297 \$49,501	257 \$49,951	303 \$53,272	1,036 \$59,319	1,117 \$61,550	689 \$67,646	659 \$72,925	1,051 \$76,627	143 \$73,257	0 \$0	6,129 \$63,334
55-59	207 \$53,478	257 \$50,867	222 \$50,601	246 \$53,056	256 \$54,071	988 \$57,755	1,065 \$59,777	655 \$66,062	572 \$71,586	974 \$76,483	678 \$80,548	68 \$73,096	6,188 \$64,850
60-64	126 \$49,837	184 \$54,013	166 \$49,904	147 \$56,744	174 \$54,445	808 \$59,938	838 \$60,038	618 \$62,443	464 \$71,241	651 \$75,630	433 \$83,783	279 \$87,224	4,888 \$65,989
65 & Over	74 \$53,874	88 \$63,937	78 \$57,241	86 \$58,393	103 \$57,236	540 \$61,046	621 \$64,548	388 \$67,870	236 \$76,329	302 \$81,886	198 \$91,480	307 \$102,510	3,021 \$71,733
Total	3,981 \$47,860	4,086 \$47,370	3,438 \$47,922	3,074 \$50,953	2,975 \$53,089	9,964 \$58,908	7,972 \$62,125	4,207 \$67,222	2,818 \$73,036	3,162 \$76,448	1,452 \$82,285	654 \$92,931	47,783 \$59,775

TABLE 28

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, General Employees
As of 06/30/2018**

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	176 \$38,915	134 \$37,645	60 \$38,775	25 \$40,722	9 \$37,974	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	404 \$38,564
25-29	527 \$42,579	551 \$41,843	435 \$41,696	309 \$45,717	201 \$45,908	171 \$48,834	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2,194 \$43,453
30-34	448 \$46,832	537 \$45,227	478 \$45,495	430 \$49,232	395 \$50,478	915 \$56,319	184 \$55,485	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,387 \$50,152
35-39	404 \$45,084	448 \$45,946	363 \$46,108	374 \$49,258	370 \$51,177	1,159 \$58,757	796 \$60,902	75 \$55,616	0 \$0	0 \$0	0 \$0	0 \$0	3,989 \$53,558
40-44	291 \$46,100	360 \$45,355	331 \$48,669	298 \$49,399	310 \$49,686	1,034 \$58,755	913 \$60,459	427 \$68,342	41 \$64,201	0 \$0	0 \$0	0 \$0	4,005 \$55,866
45-49	287 \$44,422	293 \$46,168	243 \$47,549	273 \$47,744	243 \$52,319	946 \$54,990	914 \$61,347	594 \$65,000	365 \$70,215	142 \$65,184	0 \$0	0 \$0	4,300 \$57,015
50-54	201 \$46,942	242 \$47,654	245 \$48,064	211 \$46,908	233 \$50,506	816 \$57,016	870 \$58,573	513 \$64,326	418 \$69,482	650 \$73,480	119 \$70,429	0 \$0	4,518 \$59,778
55-59	154 \$51,145	221 \$49,999	189 \$48,628	215 \$51,199	209 \$52,636	789 \$54,242	853 \$56,420	521 \$61,861	422 \$66,708	712 \$73,890	436 \$75,441	63 \$71,947	4,784 \$60,925
60-64	93 \$48,068	150 \$53,467	141 \$48,883	132 \$55,522	149 \$52,325	672 \$58,321	681 \$55,995	486 \$58,107	347 \$66,903	497 \$71,040	305 \$79,716	210 \$82,584	3,863 \$62,193
65 & Over	52 \$56,064	68 \$64,494	60 \$58,363	68 \$59,442	90 \$56,755	452 \$58,895	514 \$61,671	311 \$64,004	165 \$68,839	201 \$73,724	133 \$85,289	201 \$92,290	2,315 \$66,630
Total	2,633 \$45,326	3,004 \$45,876	2,545 \$46,355	2,335 \$49,151	2,209 \$50,807	6,954 \$56,930	5,725 \$59,192	2,927 \$63,320	1,758 \$68,276	2,202 \$72,549	993 \$77,472	474 \$85,286	33,759 \$56,855

TABLE 29

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, Teachers
As of 06/30/2018**

Attained Age	Years of Credited Service												Total Count & Avg. Comp.
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	165 \$45,229	77 \$46,063	2 \$50,896	1 \$39,453	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	245 \$45,514
25-29	328 \$47,997	304 \$46,598	287 \$49,248	200 \$52,295	121 \$53,687	116 \$55,721	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,356 \$49,751
30-34	242 \$53,724	196 \$49,566	164 \$50,376	148 \$53,596	173 \$54,438	782 \$58,873	97 \$64,288	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,802 \$55,828
35-39	175 \$56,563	150 \$53,378	146 \$52,871	124 \$58,663	142 \$61,409	659 \$60,940	625 \$64,855	37 \$67,825	0 \$0	0 \$0	0 \$0	0 \$0	2,058 \$60,652
40-44	145 \$55,607	112 \$56,757	98 \$55,626	88 \$56,582	104 \$66,034	452 \$65,527	468 \$67,412	426 \$72,617	35 \$77,545	0 \$0	0 \$0	0 \$0	1,928 \$65,629
45-49	115 \$60,132	89 \$57,901	68 \$55,777	68 \$61,794	71 \$63,767	358 \$67,079	334 \$72,388	298 \$75,812	446 \$77,955	42 \$82,814	0 \$0	0 \$0	1,889 \$70,736
50-54	70 \$57,564	64 \$56,503	52 \$56,273	46 \$63,907	70 \$62,479	220 \$67,863	247 \$72,035	176 \$77,324	241 \$78,896	401 \$81,727	24 \$87,280	0 \$0	1,611 \$73,307
55-59	53 \$60,254	36 \$56,197	33 \$61,903	31 \$65,935	47 \$60,452	199 \$71,684	212 \$73,283	134 \$82,396	150 \$85,308	262 \$83,528	242 \$89,750	5 \$87,577	1,404 \$78,223
60-64	33 \$54,821	34 \$56,419	25 \$55,660	15 \$67,500	25 \$67,080	136 \$67,928	157 \$77,576	132 \$78,409	117 \$84,110	154 \$90,446	128 \$93,473	69 \$101,347	1,025 \$80,295
65 & Over	22 \$48,699	20 \$62,044	18 \$53,501	18 \$54,428	13 \$60,566	88 \$72,093	107 \$78,366	77 \$83,487	71 \$93,735	101 \$98,128	65 \$104,150	106 \$121,889	706 \$88,465
Total	1,348 \$52,810	1,082 \$51,518	893 \$52,390	739 \$56,647	766 \$59,671	3,010 \$63,479	2,247 \$69,599	1,280 \$76,144	1,060 \$80,932	960 \$85,390	459 \$92,698	180 \$113,061	14,024 \$66,805

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	19,581	\$ 2,994	15,418	\$ 1,702	9,306	\$ 2,238
	Service		Service		Service	
Total	19,165	\$ 3,027	14,534	\$ 1,747	8,963	\$ 2,269
General Employees - male	3,790	2,625	4,621	1,708	2,671	2,337
General Employees - female	6,010	1,927	5,720	1,331	3,802	1,939
Teachers - male	1,560	3,633	1,406	2,491	749	3,055
Teachers - female	4,172	3,270	2,787	2,289	1,741	2,547
Police and Firefighters	3,633	4,728	-	-	-	-
	Ordinary Disability		Ordinary Disability		Ordinary Disability	
Total	163	\$ 1,042	711	\$ 975	287	\$ 1,439
General Employees - male	51	1,072	330	957	118	1,346
General Employees - female	52	771	294	880	112	1,373
Teachers - male	7	1,572	33	1,506	15	1,910
Teachers - female	24	1,266	54	1,281	42	1,707
Police and Firefighters	29	1,160	-	-	-	-
	Accidental Disability		Accidental Disability		Accidental Disability	
Total	253	\$ 1,768	173	\$ 912	56	\$ 1,488
General Employees - male	94	1,610	89	928	28	1,391
General Employees - female	57	1,440	73	831	24	1,582
Teachers - male	1	1,971	3	1,140	1	1,442
Teachers - female	5	2,803	8	1,377	3	1,656
Police and Firefighters	96	2,060	-	-	-	-

TABLE 31

Summary of Pensions in Force by Age and Type

General Employees

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	27,936	26,614	957	365
Contributory				
Total	10,054	9,800	103	151
30-39	-	-	-	-
40-44	1	1	-	-
45-49	2	1	-	1
50-54	4	3	-	1
55-59	157	144	4	9
60-64	542	514	12	16
65-69	1,021	987	19	15
70-74	1,438	1,404	16	18
75-79	1,488	1,439	19	30
80-84	1,822	1,797	10	15
85-89	1,878	1,848	11	19
90-94	1,276	1,245	10	21
95-99	376	369	2	5
100 & over	49	48	-	1
Noncontributory				
Total	11,127	10,341	624	162
30-39	1	-	1	-
40-44	2	-	2	-
45-49	12	-	8	4
50-54	33	-	28	5
55-59	290	192	78	20
60-64	1,109	942	130	37
65-69	2,671	2,463	176	32
70-74	3,176	3,024	124	28
75-79	2,219	2,137	57	25
80-84	1,097	1,073	19	5
85-89	411	405	1	5
90-94	99	98	-	1
95-99	7	7	-	-
100 & over	-	-	-	-
Hybrid				
Total	6,755	6,473	230	52
30-39	1	-	1	-
40-44	1	-	-	1
45-49	7	-	4	3
50-54	19	-	16	3
55-59	355	299	48	8
60-64	1,550	1,471	65	14
65-69	2,783	2,704	68	11
70-74	1,593	1,559	24	10
75-79	358	352	4	2
80-84	68	68	-	-
85-89	19	19	-	-
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	12,611	12,415	175	21
Contributory				
Total	5,769	5,732	31	6
30-39	-	-	-	-
40-44	-	-	-	-
45-49	5	5	-	-
50-54	4	4	-	-
55-59	39	39	-	-
60-64	183	181	2	-
65-69	529	524	5	-
70-74	1,234	1,225	7	2
75-79	1,128	1,123	4	1
80-84	1,178	1,174	4	-
85-89	969	964	3	2
90-94	383	379	3	1
95-99	95	92	3	-
100 & over	22	22	-	-
Noncontributory				
Total	4,291	4,193	87	11
30-39	-	-	-	-
40-44	-	-	-	-
45-49	3	1	2	-
50-54	7	5	2	-
55-59	78	59	17	2
60-64	231	205	21	5
65-69	929	910	17	2
70-74	1,523	1,503	19	1
75-79	996	989	7	-
80-84	361	359	2	-
85-89	137	136	-	1
90-94	22	22	-	-
95-99	4	4	-	-
100 & over	-	-	-	-
Hybrid				
Total	2,551	2,490	57	4
30-39	1	-	1	-
40-44	-	-	-	-
45-49	7	3	4	-
50-54	15	6	9	-
55-59	137	123	13	1
60-64	441	428	12	1
65-69	1,088	1,071	16	1
70-74	657	654	2	1
75-79	156	156	-	-
80-84	39	39	-	-
85-89	8	8	-	-
90-94	1	1	-	-
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	3,758	3,633	29	96
30-39	1	-	1	-
40-44	1	-	-	1
45-49	55	49	2	4
50-54	251	243	3	5
55-59	557	546	5	6
60-64	634	618	2	14
65-69	770	742	8	20
70-74	710	682	3	25
75-79	438	421	4	13
80-84	216	210	1	5
85-89	85	83	-	2
90-94	33	33	-	-
95-99	7	6	-	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	14,534	\$ 1,747	10,341	\$ 1,500	4,193	\$ 2,357
Less than 5	5	924	4	709	1	1,788
5-9	12	615	10	594	2	719
10-14	2,869	578	2,340	546	529	718
15-19	2,125	945	1,658	889	467	1,145
20-24	2,286	1,257	1,752	1,164	534	1,561
25-29	1,781	1,803	1,272	1,622	509	2,256
30-34	3,262	2,566	1,930	2,341	1,332	2,891
35 and over	2,194	3,308	1,375	3,000	819	3,824

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	14,534	\$ 1,747	10,341	\$ 1,500	4,193	\$ 2,357
Less than 5	3,807	1,531	2,923	1,403	884	1,952
5-9	3,392	1,706	2,520	1,479	872	2,361
10-14	3,595	1,812	2,482	1,536	1,113	2,429
15-19	2,434	1,921	1,587	1,562	847	2,593
20-24	1,114	2,007	718	1,701	396	2,563
25-29	180	1,879	104	1,543	76	2,337
30 and over	12	1,043	7	891	5	1,256

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	19,165	\$ 3,027	9,800	\$ 2,197	5,732	\$ 3,368	3,633	\$ 4,728
Less than 5	9	1,578	6	1,640	2	741	1	2,877
5-9	555	424	407	398	141	490	7	546
10-14	1,087	817	826	688	213	1,230	48	1,203
15-19	1,478	1,350	1,118	1,112	289	2,045	71	2,258
20-24	2,096	1,875	1,476	1,554	455	2,418	165	3,254
25-29	5,972	3,225	2,356	2,274	1,472	2,990	2,144	4,431
30-34	5,650	3,845	2,246	3,062	2,324	3,718	1,080	5,746
35 and over	2,318	4,301	1,365	3,676	836	5,074	117	6,073

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	8,963	\$ 2,269	6,473	\$ 2,103	2,490	\$ 2,699
Less than 5	6	1,248	2	-	4	1,872
5-9	947	667	778	662	169	688
10-14	1,120	940	882	898	238	1,097
15-19	1,096	1,388	788	1,324	308	1,552
20-24	1,390	1,747	954	1,599	436	2,071
25-29	1,185	2,408	821	2,249	364	2,766
30-34	1,853	3,249	1,302	3,148	551	3,488
35 and over	1,366	4,260	946	4,009	420	4,827

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	19,165	\$ 3,027	9,800	\$ 2,197	5,732	\$ 3,368	3,633	\$ 4,728
Less than 5	1,498	4,923	501	3,316	227	5,366	770	5,838
5-9	2,076	4,300	976	3,124	427	4,694	673	5,754
10-14	2,667	3,550	1,274	2,660	840	4,082	553	4,790
15-19	3,157	3,120	1,485	2,388	1,034	3,564	638	4,104
20-24	3,661	2,852	1,918	2,216	1,208	3,371	535	3,964
25-29	3,064	2,244	1,713	1,719	1,088	2,797	263	3,377
30-34	2,090	1,818	1,271	1,505	677	2,190	142	2,844
35 and over	952	1,344	662	1,171	231	1,621	59	2,199

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	8,963	\$ 2,269	6,473	\$ 2,103	2,490	\$ 2,699
Less than 5	4,929	2,170	3,639	2,010	1,290	2,621
5-9	3,375	2,430	2,400	2,265	975	2,836
10-14	659	2,184	434	1,991	225	2,556

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	27,936	\$ 1,864	26,614	\$ 1,903	957	\$ 1,026	365	\$ 1,243	-	\$ -
	Contributory									
Total	10,054	\$ 2,174	9,800	\$ 2,197	103	\$ 920	151	\$ 1,546	-	\$ -
Maximum	1,339	2,304	1,307	2,328	17	1,321	15	1,296	-	-
Option 1	611	1,570	581	1,596	16	995	14	1,131	-	-
Option 2	574	2,472	549	2,510	8	1,454	17	1,696	-	-
Option 3	340	3,111	332	3,145	5	1,062	3	2,769	-	-
Option 4	4,368	2,430	4,269	2,455	32	841	67	1,640	-	-
Option 5	2,822	1,673	2,762	1,686	25	501	35	1,462	-	-
	Noncontributory									
Total	11,127	\$ 1,458	10,341	\$ 1,500	624	\$ 920	162	\$ 885	-	\$ -
Maximum	5,859	1,460	5,538	1,492	242	898	79	929	-	-
Option A	2,284	1,544	2,154	1,576	99	1,071	31	866	-	-
Option B	2,372	1,365	2,078	1,435	248	870	46	868	-	-
Option C	612	1,481	571	1,520	35	1,008	6	525	-	-
	Hybrid									
Total	6,755	\$ 2,073	6,473	\$ 2,103	230	\$ 1,359	52	\$ 1,479	-	\$ -
Maximum	2,501	2,011	2,435	2,026	47	1,472	19	1,465	-	-
Option 1	468	1,856	452	1,877	14	1,249	2	1,320	-	-
Option 2	1,512	2,063	1,409	2,117	85	1,297	18	1,465	-	-
Option 3	987	2,525	957	2,562	21	1,329	9	1,328	-	-
Option 4	802	2,111	760	2,147	40	1,430	2	2,374	-	-
Option 5	485	1,650	460	1,667	23	1,327	2	1,674	-	-

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	12,611	\$ 2,871	12,415	\$ 2,893	175	\$ 1,489	21	\$ 1,754	-	\$ -
	Contributory									
Total	5,769	\$ 3,357	5,732	\$ 3,368	31	\$ 1,335	6	\$ 2,664	-	\$ -
Maximum	873	3,704	865	3,721	7	1,722	1	2,911	-	-
Option 1	252	2,735	248	2,764	3	1,039	1	422	-	-
Option 2	274	3,859	273	3,866	-	-	1	1,971	-	-
Option 3	175	4,485	173	4,507	2	2,556	-	-	-	-
Option 4	2,302	3,690	2,289	3,702	11	1,316	2	2,928	-	-
Option 5	1,893	2,698	1,884	2,705	8	829	1	4,824	-	-
	Noncontributory									
Total	4,291	\$ 2,334	4,193	\$ 2,357	87	\$ 1,366	11	\$ 1,313	-	\$ -
Maximum	2,704	2,394	2,648	2,414	49	1,460	7	1,357	-	-
Option A	720	2,435	711	2,450	8	1,273	1	1,192	-	-
Option B	638	2,025	608	2,063	27	1,255	3	1,250	-	-
Option C	229	2,174	226	2,189	3	1,081	-	-	-	-
	Hybrid									
Total	2,551	\$ 2,677	2,490	\$ 2,699	57	\$ 1,760	4	\$ 1,602	-	\$ -
Maximum	1,090	2,636	1,068	2,652	21	1,842	1	1,545	-	-
Option 1	128	2,412	123	2,438	5	1,761	-	-	-	-
Option 2	528	2,570	511	2,591	14	2,003	3	1,622	-	-
Option 3	365	3,114	358	3,147	7	1,416	-	-	-	-
Option 4	227	2,834	220	2,878	7	1,449	-	-	-	-
Option 5	213	2,394	210	2,405	3	1,577	-	-	-	-

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	3,758	\$ 4,632	3,633	\$ 4,728	29	\$ 1,160	96	\$ 2,060	-	\$ -
Maximum	150	5,061	135	5,364	-	-	15	2,330	-	-
Option 1	44	4,813	37	5,128	1	2,582	6	3,242	-	-
Option 2	219	4,985	203	5,215	7	1,615	9	2,427	-	-
Option 3	98	5,901	95	6,035	2	1,322	1	2,332	-	-
Option 4	2,253	4,994	2,217	5,046	12	1,078	24	2,118	-	-
Option 5	994	3,537	946	3,640	7	596	41	1,667	-	-

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	1,817	\$ 1,844	1,763	\$ 1,861	43	\$ 1,326	11	\$ 1,049	-	\$ -
	Contributory									
Total	73	\$ 3,137	73	\$ 3,137	-	\$ -	-	\$ -	-	\$ -
Maximum	19	2,902	19	2,902	-	-	-	-	-	-
Option 1	-	-	-	-	-	-	-	-	-	-
Option 2	7	3,023	7	3,023	-	-	-	-	-	-
Option 3	8	3,413	8	3,413	-	-	-	-	-	-
Option 4	31	3,467	31	3,467	-	-	-	-	-	-
Option 5	8	2,238	8	2,238	-	-	-	-	-	-
	Noncontributory									
Total	739	\$ 1,441	709	\$ 1,453	22	\$ 1,065	8	\$ 1,442	-	\$ -
Maximum	325	1,363	314	1,365	9	1,104	2	2,131	-	-
Option A	174	1,556	166	1,581	5	1,019	3	1,038	-	-
Option B	197	1,509	187	1,528	7	1,073	3	1,387	-	-
Option C	43	1,254	42	1,263	1	876	-	-	-	-
	Hybrid									
Total	1,005	\$ 2,046	981	\$ 2,062	21	\$ 1,600	3	\$ -	-	\$ -
Maximum	320	2,081	315	2,084	4	1,660	1	3,008	-	-
Option 1	63	1,652	63	1,652	-	-	-	-	-	-
Option 2	230	2,197	224	2,208	6	1,820	-	-	-	-
Option 3	162	2,369	157	2,391	3	1,389	2	2,136	-	-
Option 4	143	1,874	138	1,891	5	1,402	-	-	-	-
Option 5	87	1,565	84	1,563	3	1,620	-	-	-	-

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	552	\$ 2,630	538	\$ 2,661	13	\$ 1,444	1	\$ 1,442	-	\$ -
	Contributory									
Total	42	\$ 5,394	42	\$ 5,394	-	\$ -	-	\$ -	-	\$ -
Maximum	4	6,163	4	6,163	-	-	-	-	-	-
Option 1	1	4,980	1	4,980	-	-	-	-	-	-
Option 2	8	6,261	8	6,261	-	-	-	-	-	-
Option 3	1	5,098	1	5,098	-	-	-	-	-	-
Option 4	26	5,130	26	5,130	-	-	-	-	-	-
Option 5	2	4,165	2	4,165	-	-	-	-	-	-
	Noncontributory									
Total	195	\$ 1,908	188	\$ 1,935	7	\$ 1,181	-	\$ -	-	\$ -
Maximum	99	1,920	99	1,920	-	-	-	-	-	-
Option A	36	1,939	35	1,975	1	691	-	-	-	-
Option B	51	1,868	46	1,944	5	1,173	-	-	-	-
Option C	9	1,879	8	1,901	1	1,709	-	-	-	-
	Hybrid									
Total	315	\$ 2,708	308	\$ 2,731	6	\$ 1,752	1	\$ 1,442	-	\$ -
Maximum	135	2,610	134	2,609	1	2,749	-	-	-	-
Option 1	11	1,903	9	1,930	2	1,781	-	-	-	-
Option 2	65	3,060	62	3,117	2	2,101	1	1,442	-	-
Option 3	46	3,243	46	3,243	-	-	-	-	-	-
Option 4	33	2,311	32	2,330	1	1,717	-	-	-	-
Option 5	25	2,282	25	2,282	-	-	-	-	-	-

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	263	\$ 5,837	261	\$ 5,862	1	\$ 1,423	1	\$ 3,838	-	\$ -
Maximum	22	6,197	21	6,309	-	-	1	3,838	-	-
Option 1	8	-	8	5,936	-	-	-	-	-	-
Option 2	31	5,811	31	5,811	-	-	-	-	-	-
Option 3	31	6,554	31	6,554	-	-	-	-	-	-
Option 4	157	5,783	156	5,811	1	1,423	-	-	-	-
Option 5	14	4,299	14	4,299	-	-	-	-	-	-

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 18 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.