

EMPLOYEES' RETIREMENT SYSTEM OF THE STATE OF HAWAII

REPORT TO BOARD OF TRUSTEES ON THE 94th ANNUAL
ACTUARIAL VALUATION
FOR THE YEAR ENDING JUNE 30, 2019



January 13, 2020

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, 2019

We certify that the information contained in the 2019 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, 2019. 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 costs of the System and to amortize the unfunded actuarial accrued liability (UAAL) over a reasonable amount of time, which will ensure benefit security and intergenerational equity.

PROGRESS TOWARD REALIZATION OF FINANCING OBJECTIVES

We have determined that the funding period for paying off the UAAL of the System (in aggregate) is 26 years. This is an increase from the prior year's funding period of 25 years. The increase is due to losses on both the liabilities and investments of the System. However, 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 3rd year of four scheduled increases. The employer contribution rate for Police and Fire employees is scheduled to increase to 36% in FY2020 and 41% for FY2021, and the employer contribution rate for All Other Employees is scheduled to increase to 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 26 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 is the same funded ratio as in the previous valuation. The funded ratio did not improve compared to last year due to actuarial losses on both investments and liabilities.

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. New actuarial assumptions were adopted by the Board effective with this valuation. The new assumptions slightly increased the liabilities of the System. In addition, the System had a liability experience loss which was caused by individual salary increases being larger than expected by the assumptions. The System also experienced negative interest amortization as the higher scheduled contribution increases needed to produce last year's 25 year funding period are being phased into and will not be in full effect for two more years. As a result, the UAAL grew (in dollars) based on this actuarial valuation as of June 30, 2019 and ERS's underfunded status as measured by the UAAL is now \$14.074 billion.

Because of the less than favorable investment performance in FY2019, the System is now deferring \$95 million in investment losses, compared with \$86 million in deferred investment gains last year. If there are no significant investment gains or other actuarial gains, the funded status of the System would be expected to decrease in the near future before increasing 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 2025, and then begin to decrease,
5. The unfunded actuarial accrued liability will be fully amortized after 26 years, and
6. In the absence of benefit improvements and in consistent financial markets, the funded ratio should increase steadily until it reaches 100%.

However, it is important to 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 seventh 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 2017 Legislature passed Act 017 which contained 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 August of 2019 based on the recommendations provided by an Experience Study performed by GRS.

Our Experience Study report dated July 30, 2019 provides details on the changes to the actuarial assumptions. A brief summary of the significant changes are shown below.

- Update the base mortality tables with client-specific mortality tables developing using the actual mortality experience of non-disabled retirees in ERS. Recommend to project the rates on a fully generational basis by Scale BB to account for future mortality improvements.
- Update pre-retirement mortality tables for active employees to the recently published Pub-2010 mortality tables for active employees, by job classification. We also recommend assuming mortality rates will continue to improve in the future using a fully generational approach and Scale BB.
- For Police and Fire Employees, extend the step-rate component of the salary increase assumption to 25 years.
- Minor adjustments to the retirement patterns for members consistent with experience and future expectations for active employees.
- Minor increases to the disability patterns for members consistent with experience and future expectations.

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, 2019, 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.

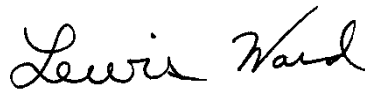
Tables and schedules in the Actuarial Section of the CAFR were generally prepared directly by the Actuary. However, certain of these tables were prepared by ERS utilizing information from this report. When the tables were prepared by ERS from our report, they are so noted.

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.

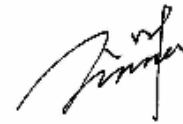
Sincerely,



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



Lewis Ward
Consultant



Linna Ye, ASA, MAAA
Actuary

J:\3046\MasterLinkedFile\MasterLinked_Hawaii Val.docx

Table of Contents

Pages

	Cover Letter	
Section A	Executive Summary.....	1
Section B	Introduction	2
Section C	Funded Status	3
Section D	Analysis of Changes.....	5
Section E	ERS Assets	6
Section F	Benefit and Contribution Provisions.....	7
Section G	GASB Disclosure	8
Section H	Actuarial Assumptions and Methods.....	9
Section I	Membership Data	10
Section J	Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions.....	11
Section K	Summary and Closing Comments	15
Section L	Actuarial Certification Statement	16
Section M	Valuation Tables.....	18
Section N	Statistical Tables.....	69
Section O	Definition of Actuarial Terms.....	97

SECTION A – EXECUTIVE SUMMARY

The following table summarizes the key results of the June 30, 2019 actuarial valuation of the Employees' Retirement System of the State of Hawaii (ERS).

Item	2019	2018
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 	66,383 49,885 9,321 <hr style="width: 100%;"/> 125,589 \$4,393 million \$1,486 million	66,271 48,569 9,249 <hr style="width: 100%;"/> 124,089 \$4,257 million \$1,417 million
Assets <ul style="list-style-type: none"> • Actuarial (smoothed) value • Market value • Return on actuarial value • Return on market value • Employer contributions during fiscal year • External cash flow % 	\$17,322 million \$17,227 million 6.8% 5.7% \$922,635,334 (1.8%)	\$16,513 million \$16,598 million 7.2% 7.9% \$847,595,466 (2.0%)
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 	14.13% \$14,074 million 55.2% 54.9% 26 23.61%	13.90% \$13,405 million 55.2% 55.5% 25 20.36%

* 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 36.0% Contribution Rate for Police and Firefighters and 22.0% Contribution Rate for for All Other Employees for fiscal year beginning July 1, 2019.
 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.

SECTION B – INTRODUCTION

The results of the June 30, 2019 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 J contains a discussion about risk and plan maturity measures and a table showing current and historical risk metrics. Section K contains a final summary and some closing comments about this year's valuation and Section L contains the actuarial certification.

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

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 \$36.7 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 26.55% of pay for Police and Fire employees and 12.46% for All Other Employees. It includes all of the employees' contribution (if any) and the employers' normal cost rate.
- Normally, 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. However, there was a change in assumptions between the prior year's valuation and this year's valuation which caused the normal cost to be higher this year when compared to last year. In the absence of changes to the actuarial assumptions, we expect a year-to-year decrease in the normal cost and for that to continue for at least the next decade.
- A part of the normal cost is paid by the employee contributions of 12.53% of pay for Police and Firefighters, leaving 14.02% of pay to be funded by the employers. Thus the current year's employer normal cost for Police and Firefighters is deemed to be 14.02% of the valuation payroll. As for the All Other Employees group, the average weighted effective employee contribution rate is 5.39% of pay, leaving 7.07% of pay to be funded by the employers. This is shown in Line 3 of Table 1.
- The UAAL is \$14.074 billion for 2019, an increase from \$13.405 billion in 2018. 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 28 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 2044). When combining both groups, the aggregate funding period for ERS is 26 years. Since the aggregate funding period based on the contribution rates is less than 30 years, the employer contribution rates are adequate to meet the requirements of Hawaii Revised Statutes §88-122(e)(1). Please note that this statement includes all of 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 2045 which is 26 years from now. Therefore, the funding period is equal to 26 years. The open group projection assumes that the number of active members will remain constant and that there will be no actuarial gains or losses on liabilities or investments.

SECTION D – ANALYSIS OF CHANGES

Section C has noted that the unfunded actuarial accrued liability (UAAL) is \$14.074 billion as of June 30, 2019 compared to the \$13.405 billion UAAL for 2018.

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, 2019 is \$17.354 billion. As developed in Table 6, the actual value of actuarial assets as of the valuation date is \$17.322 billion (as repeated in Item 7 of Table 9b). Thus the loss for the year is the difference between the actual value and the expected value, or \$31.7 million (as shown in Item 8). This asset loss for the year is a direct reflection of the estimated yield for the year based on the value of actuarial assets, namely 6.81% (as shown in Item B4 of Table 7) being less than the assumed rate of return.

While the markets returned a positive result in FY 2019 with a return of 5.67% on the market value of assets, our benchmark is 7.0% not 0.0%. Therefore, the return for the year was less than our expectation. The rate of return for the actuarial value was 6.81%, which is greater than the market return due to the smoothing methodology used in the determination of the actuarial value of assets. The actuarial value of assets exceeds the market value of assets by \$95 million, so there are \$95 million in deferred investment losses still to be recognized in the actuarial value of assets.

Table 9a shows the total unanticipated change in the unfunded actuarial accrued liability was \$313 million (item 7), this means the UAAL increased \$313 million more than expected from all sources for the 2018/2019 plan year. As discussed previously, new actuarial assumptions were adopted effective with this valuation. The new assumptions increased the UAAL by approximately \$60 million. As noted above, the actuarial investment loss was equal to \$32 million. This means that there was a liability loss during the year equal to almost \$221 million. The liability experience loss is primarily due to larger than expected salary increases for both employee groups. For Tier 1 members, the pensionable earnings includes overtime, and it is possible a source of the higher salaries was higher than average overtime during the fiscal year. If so, some of the loss from this valuation will likely be offset by a gain in the future if the overtime returns to normal levels.

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 2025 before beginning to decline and finally being eliminated in 2045.

The June 30, 2045 valuation is 26 years from this valuation. Therefore, for the purpose of satisfying Hawaii Revised Statutes §88-122(e)(1) the funding period is considered to be 26 years.

SECTION E – ERS ASSETS

Table 4 presents a summary of the market value of assets held by the ERS. About 60% 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 5.67%, the return on the actuarial value was 6.81%. 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 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 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 48,800 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 on August 12, 2019 to be used effective with the June 30, 2019 actuarial valuation. For a complete description of the recommended assumption changes please see our experience study report dated July 30, 2019.

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 2019, 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 112 members from 66,271 to 66,383. These 66,383 active members are distributed as follows:

Category	Number	% of Total
(1)	(2)	(3)
Police & Fire	4,857	7.4%
Contributory	681	1.0%
Noncontributory	11,967	18.0%
Hybrid	<u>48,878</u>	<u>73.6%</u>
Total	66,383	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 2019 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 2020 payroll for contribution purposes*, as shown in Item 1 of Table 1.

Average age of the active members was 47.9 years as of June 30, 2018, compared to 47.9 years as of June 30, 2019, while average service decreased from 13.2 years to 13.1 years.

SECTION J – ASSESSMENT AND DISCLOSURE OF RISK ASSOCIATED WITH MEASURING PENSION OBLIGATIONS AND DETERMINING PENSION PLAN CONTRIBUTIONS

The determination of the accrued liability and an actuarially determined contribution (or funding period) requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and an actuarially determined contribution (or funding period) that result from the differences between actual experience and the actuarial assumptions.

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

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

SECTION J – ASSESSMENT AND DISCLOSURE OF RISK ASSOCIATED WITH MEASURING PENSION OBLIGATIONS AND DETERMINING PENSION PLAN CONTRIBUTIONS (CONTINUED)

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Several generally accepted plan maturity measures are described below and are followed by a table showing a 10-year history of the measurements for ERS.

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher/lower or increasing/decreasing level of this maturity measure generally indicates a higher/lower or increasing/decreasing volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll (5 to 2 ratio), a change in liability 2% other than assumed would equal 5% of payroll. A higher/lower or increasing/decreasing level of this maturity measure generally indicates a higher/lower or increasing/decreasing volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF ACTUARIAL ACCRUED LIABILITY

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

SECTION J – ASSESSMENT AND DISCLOSURE OF RISK ASSOCIATED WITH MEASURING PENSION OBLIGATIONS AND DETERMINING PENSION PLAN CONTRIBUTIONS (CONTINUED)

ADDITIONAL RISK ASSESSMENT

Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. While a robust measurement of additional risk assessment is outside the scope of the annual actuarial valuation. Some scenario tests and sensitivity tests are included in the valuation summary PowerPoint presentation presented to the Board at the Board's January Board Meeting.

In addition an annual stress test as prescribed by state law is conducted each year. Please see the stress test report dated December 24, 2019, which was conducted in conjunction with this valuation.

SECTION J – ASSESSMENT AND DISCLOSURE OF RISK ASSOCIATED WITH MEASURING PENSION OBLIGATIONS AND DETERMINING PENSION PLAN CONTRIBUTIONS (CONTINUED)

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Ratio of the market value of assets to payroll	3.81	3.79	3.68	3.30	3.48	3.56	3.16	2.90	2.97	2.52
Ratio of actuarial accrued liability to payroll	6.95	6.82	6.72	6.44	5.57	5.57	5.44	5.32	5.13	4.74
Ratio of actives to retirees and beneficiaries	1.33	1.36	1.40	1.48	1.52	1.56	1.58	1.61	1.65	1.71
Ratio of net cash flow to market value of assets	-1.8%	-2.0%	-2.0%	-1.9%	-1.8%	-2.0%	-2.5%	-2.7%	-1.9%	-0.2%
Duration of the actuarial accrued liability*	15.11	NA	NA	NA	NA	NA	NA	NA	NA	NA

*Duration measure not available prior to 2019

SECTION K – SUMMARY AND CLOSING COMMENTS

To summarize the results of the actuarial valuation of the Employees' Retirement System as of June 30, 2019, 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 2045 (26 years from this year's valuation date), which is two years later than the projected year in last year's valuation.

Based on this year's valuation results, the statutory 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).

As noted above it is now expected to take two years longer than indicated by last year's valuation to achieve full funding. This is due to the actuarial losses on liability and investments that occurred in FY2019.

Our modeling continues to show 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 2045, but it is not expected to result in a requirement for further contribution rate increases.

The results of this valuation are cautionary. The period over which the System is expected to achieve full funding increased primarily due to significant salary increases especially for Police and Fire employees. While the end date for achieving full funding for All Other Employees did lengthen by one year when compared with last year (2044 versus 2043), the length of time for Police and Fire employees increased by 3 years from 2044 to 2047. Also, the System is now deferring investment losses rather than investment gains. If these deferred investment losses are recognized instead of being offset but investment gains, the end date for achieving full funding could be pushed out additional years.

SECTION L – ACTUARIAL CERTIFICATION STATEMENT

	Police and Firefighters June 30, 2019 (1)	All Other Employees June 30, 2019 (2)	All Employees June 30, 2019 (3)
1. Gross normal cost as a percentage of pay	26.55%	12.46%	14.13%
2. Present value of future benefits			
a. Active employees	\$ 4,020,605,574	\$ 14,872,551,828	\$ 18,893,157,402
b. Inactive members	77,767,297	896,010,093	973,777,390
c. Pensioners and beneficiaries	3,232,000,532	13,639,117,675	16,871,118,207
d. Total	<u>\$ 7,330,373,403</u>	<u>\$ 29,407,679,596</u>	<u>\$ 36,738,052,999</u>
3. Present value of future employee and employer contributions			
a. Present value of future normal costs	\$ 1,277,907,444	\$ 4,063,697,870	\$ 5,341,605,314
b. Present value of future employee contributions	640,268,219	1,944,215,103	2,584,483,322
c. Present value of future employer normal costs (Item 3a - Item 3b)	\$ 637,639,225	\$ 2,119,482,767	\$ 2,757,121,992
4. Actuarial accrued liability (Item 2d - Item 3a)	\$ 6,052,465,959	\$ 25,343,981,726	\$ 31,396,447,685
5. Actuarial value of assets			
a. Annuity Savings Fund	\$ 1,143,799,757	\$ 1,825,287,400	\$ 2,969,087,157
b. Pension Accumulation Fund	2,407,943,654	11,945,163,296	14,353,106,950
c. Total	<u>\$ 3,551,743,411</u>	<u>\$ 13,770,450,696</u>	<u>\$ 17,322,194,107</u>
6. Unfunded actuarial accrued liability	\$ 2,500,722,548	\$ 11,573,531,030	\$ 14,074,253,578
7. Adequacy of contribution rates			
a. Statutory Contribution Rate for Fiscal Year Fiscal Year 2020	36.00%	22.00%	23.61%
b. Funding Period in years as of June 30, 2019*	28	25	26

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

SECTION L – ACTUARIAL CERTIFICATION STATEMENT (CONTINUED)

The actuarial valuation as of June 30, 2019 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 August 12, 2019 based on the actuary's actuarial experience investigation report for the period ending June 30, 2018. 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

SECTION M – VALUATION TABLES

		Pages
Table 1	Development of Employer Cost.....	19
Table 2	Actuarial Present Value of Future Benefits.....	20
Table 3	Analysis of Normal Cost	21
Table 4	Statement of Net Position	22
Table 5	Statement of Changes in Net Position	23
Table 6	Development of Actuarial Value of Assets	24
Table 7	Estimation of Yields.....	25
Table 8	Allocation of Cash and Investments.....	26
Table 9A	Total Experience Gain or Loss	27
Table 9B	Investment Experience Gain or Loss	28
Table 9C	Projection Results	29
Table 10	Employer Covered Payroll.....	30
Table 11	Schedule of Funding Progress.....	31
Table 12A	Membership Data	32
Table 12B	Historical Summary of Active Member Data	33
Table 13	History of Cash Flow	34
Table 14	Solvency Test.....	35
Table 15	Highlights of Last Five Annual Actuarial Valuations.....	36
Table 16	Summary of Benefit Provisions.....	37
Table 17	Summary of Plan Changes	50
Table 18	Summary of Actuarial Methods and Assumptions	54

TABLE 1

Development of Employer Cost

	Police and Firefighters June 30, 2019 (1)	All Other Employees June 30, 2019 (2)	All Employees June 30, 2019 (3)
1. Projected FY 2020 payroll for contribution purposes	\$ 519,202,297	\$ 4,000,491,950	\$ 4,519,694,247
2. Gross normal cost (Table 3)	26.55%	12.46%	14.13%
3. Employer normal cost rate (Table 3)	14.02%	7.07%	7.89%
4. Present value future benefits (Table 2)	\$ 7,330,373,403	\$ 29,407,679,596	\$ 36,738,052,999
5. Present value future employer normal cost	\$ 637,639,225	\$ 2,119,482,767	\$ 2,757,121,992
6. Present value future employee contributions	\$ 640,268,219	\$ 1,944,215,103	\$ 2,584,483,322
7. Actuarial accrued liability (Item 4 - Item 5 - Item 6)	\$ 6,052,465,959	\$ 25,343,981,726	\$ 31,396,447,685
8. Actuarial value of assets	\$ 3,551,743,411	\$ 13,770,450,696	\$ 17,322,194,107
9. Unfunded actuarial accrued liability (UAAL) (Item 7 - Item 8)	\$ 2,500,722,548	\$ 11,573,531,030	\$ 14,074,253,578
10. Funding Period*	28	25	26

	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

* 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, 2019 (1)	All Other Employees June 30, 2019 (2)	All Employees June 30, 2019 (3)
1. Active members			
a. Service retirement benefits	\$ 3,859,043,305	\$ 13,596,788,804	\$ 17,455,832,109
b. Termination Benefits	110,568,937	845,427,012	955,995,949
c. Survivor benefits	18,791,799	126,515,261	145,307,060
d. Disability retirement benefits	32,201,533	303,820,751	336,022,284
e. Total	\$ 4,020,605,574	\$ 14,872,551,828	\$ 18,893,157,402
2. Retired members			
a. Service retirement	\$ 3,040,786,559	\$ 12,614,610,560	\$ 15,655,397,119
b. Disability retirement	34,619,141	263,829,249	298,448,390
c. Beneficiaries	156,594,832	760,677,866	917,272,698
d. Total	\$ 3,232,000,532	\$ 13,639,117,675	\$ 16,871,118,207
3. Inactive members			
a. Vested terminations	\$ 72,308,757	\$ 783,113,393	\$ 855,422,150
b. Nonvested terminations	5,458,540	112,896,700	118,355,240
c. Total	\$ 77,767,297	\$ 896,010,093	\$ 973,777,390
4. Total actuarial present value of future benefits	\$ 7,330,373,403	\$ 29,407,679,596	\$ 36,738,052,999

	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. Termination 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

TABLE 3**Analysis of Normal Cost**

	Police and Firefighters June 30, 2019 (1)	All Other Employees June 30, 2019 (2)	All Employees June 30, 2019 (3)
1. Normal cost as a percent of pay			
a. Service retirement benefits	23.54%	9.24%	10.93%
b. Deferred termination benefits	1.19%	0.84%	0.88%
c. Refunds	0.87%	1.44%	1.37%
d. Disability retirement benefits	0.41%	0.46%	0.46%
e. Survivor benefits	0.19%	0.13%	0.14%
f. Administrative Expenses	0.35%	0.35%	0.35%
g. Total	26.55%	12.46%	14.13%
2. Employee contribution rate	12.53%	5.39%	6.24%
3. Effective employer normal cost rate (Item 1g - Item 2)	14.02%	7.07%	7.89%

	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%

TABLE 4

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

Item	Valuation as of	
	June 30, 2019	June 30, 2018
1. Cash and cash equivalents	\$ 2,362,691,855	\$ 2,389,282,306
2. Receivables:		
a. Accounts receivable and others	\$ 4,548,592	\$ 4,660,591
b. Investment sale proceeds	115,157,638	106,100,490
c. Accrued income	52,743,120	54,932,158
d. Member and employer contributions	49,826,612	48,713,407
e. Subtotal	<u>\$ 222,275,962</u>	<u>\$ 214,406,646</u>
3. Investments		
a. Equity securities	\$ 7,208,854,437	\$ 7,608,789,085
b. Fixed income securities	4,740,413,816	4,096,606,113
c. Real estate investments	1,322,644,117	1,060,893,051
d. Alternative investments	1,842,502,723	1,512,559,223
e. Subtotal	<u>\$ 15,114,415,093</u>	<u>\$ 14,278,847,472</u>
4. Other		
a. Invested securities lending collateral	\$ 1,021,730,729	\$ 1,097,510,629
b. Equipment at cost, net of depreciation	6,617,009	5,510,268
c. Other assets	-	-
d. Subtotal	<u>\$ 1,028,347,738</u>	<u>\$ 1,103,020,897</u>
5. Total assets	\$ 18,727,730,648	\$ 17,985,557,321
6. Liabilities		
a. Accounts payable	\$ 105,797,810	\$ 42,903,869
b. Investment commitments payable	193,066,322	135,189,850
c. Securities lending collateral	1,021,730,729	1,097,510,629
d. Notes payable	180,108,800	111,545,000
e. Total liabilities	<u>\$ 1,500,703,661</u>	<u>\$ 1,387,149,348</u>
7. Total market value of assets available for benefits (Item 5 - Item 6e)	\$ 17,227,026,987	\$ 16,598,407,973
% in equities	10,374,001,277 60%	10,182,241,359 61%

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

	Year Ending	
	June 30, 2019	June 30, 2018
1. a. Value of assets at beginning of year	\$ 16,598,407,973	\$ 15,698,324,306
b. Adjustment due to post valuation changes in CAFR assets	-	-
c. Adjusted value of assets at beginning of year	\$ 16,598,407,973	\$ 15,698,324,306
2. Revenue for the year		
a. Contributions		
i. Member contributions	\$ 273,223,578	\$ 259,427,934
ii. Employer contributions	922,635,334	847,595,466
iii. Total	\$ 1,195,858,912	\$ 1,107,023,400
b. Income		
i. Interest, dividends, and other income	\$ 474,513,941	\$ 443,350,111
ii. Investment expenses	(40,370,043)	(57,189,048)
iii. Net	\$ 434,143,898	\$ 386,161,063
c. Net realized and unrealized gains/(loss)	\$ 498,552,514	\$ 839,411,536
d. Net income/(loss)	\$ 932,696,412	\$ 1,225,572,599
e. Total revenue	\$ 2,128,555,324	\$ 2,332,595,999
3. Expenditures for the year		
a. Refunds	\$ 16,502,635	\$ 20,846,500
b. Benefit payments	1,469,634,809	1,395,881,342
c. Administrative and miscellaneous expenses	13,798,866	15,784,490
d. Total expenditures	\$ 1,499,936,310	\$ 1,432,512,332
4. Increase/(decrease) in net assets (Item 2e - Item 3d)	\$ 628,619,014	\$ 900,083,667
5. Value of assets at end of year (Item 1c + Item 4)	\$ 17,227,026,987	\$ 16,598,407,973

TABLE 6

Development of Actuarial Value of Assets

	Year Ending June 30, 2019				
1. Actuarial value of assets, beginning of year	\$ 16,512,744,474				
2. Net new investments					
a. Contributions	\$ 1,195,858,912				
b. Benefits paid and Refunds	(1,486,137,444)				
c. Administrative expenses	(13,798,866)				
d. Subtotal	(304,077,398)				
3. Market value of assets at end of year	\$ 17,227,026,987				
4. Expected return on actuarial value of assets	\$ 1,145,249,404				
5. Expected actuarial value of assets, end of year	\$ 17,353,916,480				
6. Excess/(shortfall) return (Item 3-Item 5)	\$ (126,889,493)				
7. Development of amounts to be recognized as of June 30, 2019:					
Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
Fiscal Year End					
2016	\$ 0	\$ 0	\$ 0	1	\$ 0
2017	0	0	0	2	0
2018	85,663,499	(85,663,499)	0	3	0
2019	(212,552,992)	85,663,499	(126,889,493)	4	(31,722,373)
Total	\$ (126,889,493)	\$ 0	\$ (126,889,493)		\$ (31,722,373)
8. Actuarial value of assets as of June 30, 2019 (Item 3 - Item 7)	\$ 17,322,194,107				
9. Ratio of actuarial value to market value					100.6%
10. Asset gain/(loss) for year (Item 8 - Item 5)	\$ (31,722,373)				

TABLE 7

Estimation of Yields

	June 30, 2019 (1)	June 30, 2018 (2)
A. Market value yield		
1. Beginning of year market assets	\$ 16,598,407,973	\$ 15,698,324,306
2. Investment income		
a. Change in assets (Item 3 - Item 1)	\$ 628,619,014	\$ 900,083,667
b. Cash Flow	<u>(304,077,398)</u>	<u>(325,488,932)</u>
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 932,696,412	\$ 1,225,572,599
3. End of year market assets	\$ 17,227,026,987	\$ 16,598,407,973
4. Estimated dollar weighted market value yield (net of investment and administrative expenses)	5.67%	7.89%
B. Actuarial value yield		
1. Beginning of year actuarial assets	\$ 16,512,744,474	\$ 15,720,627,120
2. Investment income (based on asset valuation method)		
a. Change in assets (Item 3 - Item 1)	\$ 809,449,633	\$ 792,117,354
b. Cash Flow	<u>(304,077,398)</u>	<u>(325,488,932)</u>
c. Total investment income based on market value (Item 2a less Item 2b)	\$ 1,113,527,031	\$ 1,117,606,286
3. End of year actuarial assets	\$ 17,322,194,107	\$ 16,512,744,474
4. Estimated actuarial value yield (net of investment and administrative expenses)	6.81%	7.18%

TABLE 8

Allocation of Cash and Investments

	<u>June 30, 2019</u> (1)	<u>June 30, 2018</u> (2)
1. Cash and short-term equivalents	13.5%	14.3%
2. Fixed income securities	27.1%	24.6%
3. Equity securities	41.3%	45.6%
4. Real estate	7.6%	6.4%
5. Other	<u>10.5%</u>	<u>9.1%</u>
6. Total investments	100.0%	100.0%

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

Item (1)	Police and Firefighters (2)	All Other Employees (3)	All Employees (4)
A. Calculation of total actuarial gain or loss			
1. Unfunded actuarial accrued liability (UAAL), as of June 30, 2018	\$ 2,312,527,694	\$ 11,092,129,215	\$ 13,404,656,909
2. Normal cost for the year (include admin expense)	\$ 138,167,980	\$ 495,135,164	\$ 633,303,144
3. Less: contributions and assessments for the year	\$ (240,295,205)	\$ (955,563,707)	\$ (1,195,858,912)
4. Interest at 7.00%			
a. On UAAL	\$ 161,876,939	\$ 776,449,045	\$ 938,325,984
b. On normal cost	4,835,879	17,329,731	22,165,610
c. On contributions	(8,410,332)	(33,444,730)	(41,855,062)
d. Total	\$ 158,302,486	\$ 760,334,046	\$ 918,636,532
5. Expected UAAL as of June 30, 2019 (Sum of Items 1 - 4)	\$ 2,368,702,955	\$ 11,392,034,718	\$ 13,760,737,673
6. Actual UAAL as of June 30, 2019	\$ 2,500,722,548	\$ 11,573,531,030	\$ 14,074,253,578
7. Total gain/(loss) for the year (Item 5 - Item 6)	\$ (132,019,593)	\$ (181,496,312)	\$ (313,515,905)
B. Source of gains and losses			
8. Asset gain/(loss) for the year (Table 9b)	\$ (6,504,357)	\$ (25,218,016)	\$ (31,722,373)
9. Gain/(loss) due to change in actuarial assumptions	4,125,964	(64,446,001)	(60,320,037)
10. Other liability gain/(loss)	(129,641,200)	(91,832,295)	(221,473,495)
11. Change in benefit provisions	-	-	-
12. Total gain/(loss) for the year	\$ (132,019,593)	\$ (181,496,312)	\$ (313,515,905)

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

Item (1)	June 30, 2019 (2)	June 30, 2018 (3)
1. Actuarial assets, beginning of year	\$ 16,512,744,474	\$ 15,720,627,120
2. Total contributions during year	\$ 1,195,858,912	\$ 1,107,023,400
3. Benefits and refunds paid	\$ (1,486,137,444)	\$ (1,416,727,842)
4. Administrative expenses paid	\$ (13,798,866)	\$ (15,784,490)
5. Assumed net investment income at 7.00%		
a. Beginning of year assets	\$ 1,155,892,113	\$ 1,100,443,898
b. Contributions	41,855,062	38,745,819
c. Benefits and refunds paid	(52,014,811)	(49,585,474)
d. Administrative expenses paid	(482,960)	(552,457)
e. Total	\$ 1,145,249,404	\$ 1,089,051,786
6. Expected actuarial assets, end of year (Sum of items 1 through 5)	\$ 17,353,916,480	\$ 16,484,189,974
7. Actual actuarial assets, end of year	\$ 17,322,194,107	\$ 16,512,744,474
8. Asset gain/(loss) for year (Item 7 - Item 6)	\$ (31,722,373)	\$ 28,554,500
9. Asset gain/(loss) as a percent of actuarial value of assets, end of year (Item 8 / Item 7)	(0.18%)	0.17%

TABLE 9C

Projection Results Based on June 30, 2019 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)
2019	23.61%	\$ 4,520	\$ 1,067	\$ 31,396	\$ 17,322	\$ 14,074	55.2%
2020	25.89%	4,633	1,200	32,617	18,292	14,325	56.1%
2021	25.89%	4,761	1,233	33,838	19,384	14,453	57.3%
2022	25.89%	4,893	1,267	35,061	20,504	14,557	58.5%
2023	25.89%	5,033	1,303	36,285	21,654	14,631	59.7%
2024	25.89%	5,176	1,340	37,511	22,836	14,674	60.9%
2025	25.89%	5,326	1,379	38,734	24,052	14,682	62.1%
2026	25.89%	5,483	1,420	39,954	25,303	14,651	63.3%
2027	25.89%	5,647	1,462	41,171	26,595	14,576	64.6%
2028	25.89%	5,818	1,507	42,386	27,933	14,453	65.9%
2029	25.89%	5,998	1,553	43,598	29,321	14,276	67.3%
2030	25.89%	6,186	1,602	44,810	30,770	14,041	68.7%
2031	25.89%	6,382	1,653	46,024	32,284	13,740	70.1%
2032	25.89%	6,586	1,705	47,239	33,871	13,368	71.7%
2033	25.89%	6,798	1,760	48,457	35,539	12,918	73.3%
2034	25.89%	7,019	1,818	49,679	37,296	12,383	75.1%
2035	25.89%	7,249	1,877	50,908	39,154	11,754	76.9%
2036	25.89%	7,488	1,939	52,146	41,123	11,023	78.9%
2037	25.89%	7,737	2,003	53,395	43,215	10,181	80.9%
2038	25.89%	7,997	2,071	54,661	45,444	9,217	83.1%
2039	25.89%	8,269	2,141	55,948	47,826	8,122	85.5%
2040	25.89%	8,552	2,215	57,262	50,379	6,883	88.0%
2041	25.89%	8,848	2,291	58,609	53,120	5,489	90.6%
2042	25.89%	9,155	2,371	59,996	56,070	3,926	93.5%
2043	25.89%	9,474	2,453	61,429	59,249	2,180	96.5%
2044	25.89%	9,806	2,539	62,916	62,680	236	99.6%
2045	25.89%	10,150	2,628	64,463	66,385	(1,923)	103.0%
2046	25.89%	10,507	2,721	66,075	70,388	(4,313)	106.5%
2047	25.89%	10,877	2,817	67,761	74,714	(6,953)	110.3%
2048	25.89%	11,260	2,916	69,526	79,390	(9,865)	114.2%

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, 2019	March 31, 2018	March 31, 2019	March 31, 2018	March 31, 2019	March 31, 2018
	(1)	(2)	(3)	(4)	(5)	(6)
State of Hawaii	\$ 19,410,030	\$ 19,179,233	\$3,226,364,174	\$ 3,134,152,168	\$ 3,245,774,204	\$3,153,331,401
City & County of Honolulu	313,593,919	296,786,547	355,800,251	345,081,101	669,394,170	641,867,648
Board of Water Supply	-	-	37,828,935	36,260,420	37,828,935	36,260,420
County of Hawaii	77,788,640	74,840,058	104,793,756	98,632,901	182,582,396	173,472,959
County of Maui	62,596,539	61,769,872	109,321,019	107,133,093	171,917,558	168,902,965
County of Kauai	28,255,604	27,728,776	57,232,285	55,677,801	85,487,889	83,406,577
Total All Employers	\$ 501,644,732	\$ 480,304,486	\$3,891,340,420	\$ 3,776,937,484	\$ 4,392,985,152	\$4,257,241,970

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, 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%
June 30, 2019**	17,322.2	31,396.4	14,074.3	55.2%	4,519.7	311.4%

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, 2019	June 30, 2018	June 30, 2019	June 30, 2018	June 30, 2019	June 30, 2018
	(1)	(2)	(3)	(4)	(5)	(6)
1. Active members						
a. Number	4,857	4,890	61,526	61,381	66,383	66,271
b. Total salary	\$ 501,644,732	\$ 480,304,486	\$ 3,891,340,420	\$ 3,776,937,484	\$ 4,392,985,152	\$ 4,257,241,970
c. Average salary	\$ 103,283	\$ 98,222	\$ 63,247	\$ 61,533	\$ 66,176	\$ 64,240
d. Average age	42.7	42.7	48.4	48.3	47.9	47.9
e. Average service	14.4	14.4	13.0	13.1	13.1	13.2
2. Inactive members						
a. Number	387	382	8,934	8,867	9,321	9,249
b. Total annual deferred benefits	\$ 6,758,663	\$ 6,427,960	\$ 96,469,915	\$ 92,406,838	\$ 103,228,578	\$ 98,834,798
c. Average annual deferred benefit	\$ 17,464	\$ 16,827	\$ 10,798	\$ 10,421	\$ 11,075	\$ 10,686
3. Service retirees						
a. Number	3,750	3,633	40,015	39,029	43,765	42,662
b. Total annual benefits	\$ 223,126,890	\$ 206,589,158	\$ 1,091,736,349	\$ 1,043,197,275	\$ 1,314,863,239	\$ 1,249,786,433
c. Average annual benefit	\$ 59,501	\$ 56,865	\$ 27,283	\$ 26,729	\$ 30,044	\$ 29,295
4. Disabled retirees						
a. Number	128	125	1,547	1,518	1,675	1,643
b. Total annual benefits	\$ 3,062,338	\$ 2,825,661	\$ 21,973,444	\$ 20,913,676	\$ 25,035,782	\$ 23,739,337
c. Average annual benefit	\$ 23,925	\$ 22,605	\$ 14,204	\$ 13,777	\$ 14,947	\$ 14,449
5. Beneficiaries						
a. Number	321	312	4,124	3,952	4,445	4,264
b. Total annual benefits	\$ 12,811,415	\$ 11,934,021	\$ 70,305,830	\$ 65,573,518	\$ 83,117,245	\$ 77,507,539
c. Average annual benefit	\$ 39,911	\$ 38,250	\$ 17,048	\$ 16,592	\$ 18,699	\$ 18,177

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)
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
2019	66,383	0.2%	4,393.0	3.2%	66,176	3.0%	47.9	13.1

TABLE 13**History of Cash Flow**

Year Ending June 30, (1)	Contributions			Expenditures				External Cash Flow for the Year ² (9)	Market Value of Assets (10)	External Cash Flow as Percent of Market Value (11)
	Employee (2)	Employer (3)	Total (4)	Benefit	Administrative		Total (8)			
				Payments (5)	Refunds (6)	Expenses ¹ (7)				
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%)
2019	273.2	922.6	1,195.8	(1,469.6)	(16.5)	(13.8)	(1,499.9)	(304.1)	17,227.0	(1.8%)

Amounts in \$ millions

¹ Excludes investment expenses

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

TABLE 14

Solvency Test

	June 30, 2019 (1)	June 30, 2018 (2)
1. Actuarial accrued liability (AAL)		
a. Active member contributions	\$ 2,202,196,568	\$ 2,181,288,334
b. Retirees and beneficiaries	16,871,118,207	16,008,847,800
c. Active and inactive members	12,323,132,910	11,727,265,249
d. Total	\$ 31,396,447,685	\$ 29,917,401,383
2. Actuarial value of assets	\$ 17,322,194,107	\$ 16,512,744,474
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
2015 through 2019**

Item	Valuation Date: June 30				
	2015	2016	2017	2018	2019
Number of active members	67,310	67,377	65,911	66,271	66,383
Number of inactive members	7,413	7,741	9,241	9,249	9,321
Number of pensioners	40,657	41,654	42,857	44,305	45,440
Number of beneficiaries	3,626	3,852	4,070	4,264	4,445
Average monthly contributory member pension amount	\$ 2,621	\$ 2,730	\$ 2,854	\$ 2,994	\$ 3,136
Average monthly noncontributory member pension amount	\$ 1,611	\$ 1,637	\$ 1,669	\$ 1,702	\$ 1,736
Average monthly hybrid member pension amount	\$ 2,114	\$ 2,139	\$ 2,178	\$ 2,238	\$ 2,285
Average monthly beneficiary amount	\$ 1,361	\$ 1,419	\$ 1,472	\$ 1,515	\$ 1,558
Total actuarial value of assets (\$millions)	\$ 14,464	\$ 14,999	\$ 15,721	\$ 16,513	\$ 17,322
Unfunded actuarial accrued liability (\$millions)	\$ 8,774.7	\$ 12,440.5	\$ 12,928.0	\$ 13,404.7	\$ 14,074.3
Funding Period (in years) ⁽¹⁾	26	66	26	25	26
Item (Dollar amounts in millions)	Fiscal Year				
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Employer contributions ⁽²⁾	\$ 717.8	\$ 756.6	\$ 781.2	\$ 847.6	\$ 922.6

⁽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, 2014, the employer contribution rate was 24.0% for Police and Fire, 16.5% for All Other Employees. Beginning July 1, 2015, the employer contribution rate was 25.0% for Police and Fire, 17.0% for All Other Employees. Beginning July 1, 2016, the employer contribution rate was 25.0% for Police and Fire, 17.0% for All Other Employees. Beginning July 1, 2017, the employer contribution rate was 28.0% for Police and Fire, 18.0% for All Other Employees. Beginning July 1, 2018, the employer contribution rate was 31.0% for Police and Fire, 19.0% for All Other Employees.

TABLE 16**Summary of Benefit Provisions
(For Members Hired Prior to 7/1/2012)**

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

TABLE 16 (CONTINUED)

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

TABLE 16 (CONTINUED)

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

TABLE 16 (CONTINUED)

Post Retirement Benefit

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

Retirement Options

Contributory or Hybrid Member

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

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

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

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

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

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

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.

TABLE 16 (CONTINUED)

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 retiree 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 retiree is entitled to the pension for the entire month that death occurs.

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

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

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

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

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.

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.

TABLE 17 (CONTINUED)

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 August 12, 2019. Rationale for the recommendations are in the most recent experience study dated July 30, 2019.

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 V 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
15-19	2	\$54,605
20-24	175	67,871
25-29	418	67,484
30-34	285	66,402
35-39	136	66,933
40-44	51	69,181
45-49	13	69,063
50-54	2	66,592
55-59	3	76,214
Total	1,085	67,290

It is assumed that 89.2% of new hires will be male.

TABLE 18 (CONTINUED)

New Entrant Profile for All Other Employees		
Entry Age	# of Employees	Average Salary
15-19	17	\$38,029
20-24	1,490	46,860
25-29	3,976	50,043
30-34	3,265	52,785
35-39	2,730	53,415
40-44	2,190	52,444
45-49	1,877	52,641
50-54	1,576	52,497
55-59	1,216	53,769
60-64	633	55,860
65-69	88	63,781
Total	19,058	51,966

It is assumed that 41.8% of new hires will be male.

VI. Actuarial Assumptions

A. Economic Assumptions

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

TABLE 18 (CONTINUED)

3. Salary increase rates: As shown below

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

TABLE 18 (CONTINUED)

3. Salary increase rates (continued):

Police & Firefighters		
Years of Service	Service-related Component	Total Annual Rate of Increase Including 2.50% Inflation Component and 2.5% General Increase Rate
1	2.00%	7.00%
2	2.00%	7.00%
3	1.00%	6.00%
4	1.00%	6.00%
5	1.00%	6.00%
6	0.75%	5.75%
7	0.75%	5.75%
8	0.75%	5.75%
9	0.50%	5.50%
10	0.50%	5.50%
11	0.50%	5.50%
12	0.50%	5.50%
13	0.25%	5.25%
14	0.25%	5.25%
15	0.25%	5.25%
16	0.25%	5.25%
17	0.25%	5.25%
18	0.25%	5.25%
19	0.25%	5.25%
20	0.25%	5.25%
21	0.25%	5.25%
22	0.25%	5.25%
23	0.25%	5.25%
24	0.25%	5.25%
25 or more	0.00%	5.00%

TABLE 18 (CONTINUED)

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

TABLE 18 (CONTINUED)

B. Demographic Assumptions

1. Mortality rates:

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

Type	General Employees	Teachers	Police and Fire
	Male & Female	Male & Female	Male & Female
Ordinary	94%	92%	83%
% of Ordinary	41%	52%	24%
Choosing Annuity			
Duty Related	6%	8%	17%

Healthy Retirees: The 2019 Public Retirees of Hawaii mortality table, generational projection using the BB projection table from the year 2019 and with multipliers based on plan and group experience. The following are sample rates of the base table as of 2019 with the corresponding multipliers:

Healthy Annuitant Mortality Rates Before Projection (Multiplier Applied)

Age	General Employees		Teachers		Police and Fire	
	Male	Female	Male	Female	Male	Female
50	0.2901%	0.2376%	0.2640%	0.1980%	0.3394%	0.2376%
55	0.4195%	0.3042%	0.3817%	0.2535%	0.4908%	0.3042%
60	0.5773%	0.3175%	0.5253%	0.2646%	0.6754%	0.3175%
65	0.8603%	0.3175%	0.7829%	0.2646%	1.0066%	0.3175%
70	1.2866%	0.7022%	1.1708%	0.5852%	1.5053%	0.7022%
75	2.0370%	1.3340%	1.8537%	1.1117%	2.3833%	1.3340%
80	3.4486%	2.2177%	3.1382%	1.8481%	4.0349%	2.2177%
85	6.2716%	3.9579%	5.7072%	3.2982%	7.3378%	3.9579%
90	11.8489%	7.7873%	10.7825%	6.4895%	13.8632%	7.7873%
Multiplier	100%	108%	91%	90%	117%	108%
Setback	0	0	0	0	0	0

TABLE 18 (CONTINUED)

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

<u>Life Expectancy for an Age 65 Retiree in Years</u>					
Gender	Year of Retirement				
	2025	2030	2035	2040	2045
<u>General Retirees</u>					
Male	23.8	24.2	24.7	25.2	25.6
Female	26.8	27.2	27.5	27.9	28.2
<u>Teachers</u>					
Male	24.5	25.0	25.4	25.9	26.3
Female	28.2	28.5	28.8	29.1	29.5
<u>Police and Fire</u>					
Male	22.5	23.0	23.5	24.0	24.5
Female	26.8	27.2	27.5	27.9	28.2

Disabled retirees: Base Table for healthy retiree's occupation, set forward 5 years, generational projection using the BB projection table from the year 2019. 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	240%	85%	70%
Accidental	40%	7%	100%

TABLE 18 (CONTINUED)

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

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

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	13.5
46	0	0	0	0	0	0	0	0	13.5
47	0	0	0	0	0	0	0	0	13.5
48	0	0	0	0	0	0	0	0	13.5
49	0	0	0	0	0	0	0	0	13.5
50	0	0	0	0	0	0	1	0	16.0
51	0	0	2	1	0	0	1	1	16.0
52	0	0	2	1	0	0	1	1	16.0
53	0	0	2	1	0	0	2	2	16.0
54	0	0	3	2	0	0	3	3	16.0
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

Age	Expected Retirements per 100 Lives									
	General Employees				Teachers				Reduced Retirement	
	Unreduced		25 & Out		Reduced		Unreduced		Male	Female
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
55	20	11	15	11	1	1	10	13	1	2
56	18	11	23	11	1	1	10	7	1	2
57	13	11	18	11	1	1	10	8	1	2
58	10	11	15	11	1	1	10	10	2	2
59	10	11	15	11	2	2	10	20	3	3
60	10	14	15	14	3	3	10	11	5	5
61	11	18	16	18	4	4	10	16	7	5
62	20	20	25	20			16	25		
63	20	20	25	20			12	20		
64	12	20	17	20			10	15		
65	14	20	19	20			20	25		
66	20	20	25	20			15	25		
67	20	20	25	20			15	25		
68	20	20	25	20			15	25		
69	20	20	25	20			15	25		
70	20	20	25	20			15	25		
71	20	20	25	20			15	25		
72	20	20	25	20			15	25		
73	20	20	25	20			15	25		
74	20	20	25	20			15	25		
75	100	100	100	100			100	100		

Note: Retirement rates for the 25&out group age 50-54 are 15% for male and 11% for female.

TABLE 18 (CONTINUED)

Hybrid Members

Age	Expected Retirements per 100 Lives							
	General Employees				Teachers			
	Unreduced		Reduced		Unreduced		Reduced	
Male	Female	Male	Female	Male	Female	Male	Female	
55	18	18	1	1	20	16	2	2
56	12	13	1	1	13	10	2	2
57	12	13	1	1	13	10	2	2
58	16	13	1	2	13	12	2	2
59	16	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 and multiplying by the ratio of current active members to the average number of active members during the previous fiscal year.
2. Age difference: Male members are assumed to be four years older than their spouses, and female members are assumed to be four years younger than their spouses.
3. Marriage Assumption: While not implicitly used in the valuation, 100% of active members are assumed to be married when setting other benefit election and eligibility assumptions.
4. Percent electing annuity on death for contributory participants (when eligible): All of the spouses of married participants who die after becoming eligible for a retirement benefit are assumed to elect an annuity or a refund, whichever is more valuable at time of participant's death.
5. Payment Option: Future healthy retirees are assumed to choose the life only payment option. 50% of future disabled retirees are assumed to choose the 100% Joint and Survivor option.
6. Percent electing deferred termination benefit: vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.
7. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt when eligible for early retirement.
8. Administrative expenses: Administrative expenses are assumed to be 0.35% of active member payroll.
9. Reemployment, purchase of service, transfers: No recognition is made of (i) future member reimbursements upon reemployment, (ii) future purchase of additional service, or (iii) special transfer provisions.
10. Sick Leave: It is assumed that all members will have their benefit service increased by sick leave and the following loads will be applied by group:

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

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 continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
19. Benefit Service: All members are assumed to accrue 1 year of service each year. Exact fractional service is used to determine the amount of benefit payable.
20. Police officers, firefighters, investigators of the Department of the Prosecuting Attorney and the Attorney General, narcotic enforcement investigators, and public safety investigators hired prior to June 30, 2012 are not assumed to retire at age 55 unless they have 10 years of service.

VII. Participant Data

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

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

TABLE 18 (CONTINUED)

VIII. Dates of Adoption of Assumptions and Methods

The actuarial assumptions and methods were adopted by the Board of Trustees on August 12, 2019 as recommended by Gabriel, Roeder, Smith & Company (GRS).

IX. Changes in Assumptions and Methods since Prior Valuation

The actuarial assumptions have been revised since the prior valuation. Please see our Experience Study report dated July 30, 2019 for a more extensive discussion of the changes in the actuarial assumptions and the rationale for the current assumptions.

SECTION N – STATISTICAL TABLES

TABLE NO.	PAGE NUMBER	CONTENT OF TABLE
19	70	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – ALL EMPLOYEES
20	71	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – NONCONTRIBUTORY MEMBERS, ALL
21	72	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – NONCONTRIBUTORY MEMBERS, GENERAL EMPLOYEES
22	73	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – NONCONTRIBUTORY MEMBERS, TEACHERS
23	74	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – CONTRIBUTORY MEMBERS, ALL
24	75	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – CONTRIBUTORY MEMBERS, GENERAL EMPLOYEES
25	76	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – CONTRIBUTORY MEMBERS, TEACHERS
26	77	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – CONTRIBUTORY MEMBERS, POLICE AND FIRE
27	78	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – HYBRID MEMBERS, ALL
28	79	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – HYBRID MEMBERS, GENERAL EMPLOYEES
29	80	DISTRIBUTION OF ACTIVE MEMBERS BY AGE AND BY YEARS OF SERVICE – HYBRID MEMBERS, TEACHERS
30	81	SUMMARY OF PENSION IN FORCE BY TYPE OF RETIREMENT
31	82	SUMMARY OF PENSION IN FORCE BY AGE AND TYPE – GENERAL EMPLOYEES
32	83	SUMMARY OF PENSION IN FORCE BY AGE AND TYPE – TEACHERS
33	84	SUMMARY OF PENSION IN FORCE BY AGE AND TYPE – POLICE AND FIRE
34	85	NONCONTRIBUTORY PENSIONS IN FORCE BY YEARS OF SERVICE
35	86	NONCONTRIBUTORY PENSIONS IN FORCE BY YEARS SINCE RETIREMENT
36-1	87	CONTRIBUTORY PENSIONS IN FORCE BY YEARS OF SERVICE
36-2	88	HYBRID PENSIONS IN FORCE BY YEARS OF SERVICE
37-1	89	CONTRIBUTORY PENSIONS IN FORCE BY YEARS SINCE RETIREMENT
37-2	90	HYBRID PENSIONS IN FORCE BY YEARS SINCE RETIREMENT
38,41	91/94	PENSIONS IN FORCE BY PAYMENT OPTION – GENERAL EMPLOYEES/NEW
39,42	92/95	PENSIONS IN FORCE BY PAYMENT OPTION – TEACHERS/NEW
40,43	93/96	PENSIONS IN FORCE BY PAYMENT OPTION – POLICE AND FIRE/NEW

TABLE 19

**Distribution of Active Members by Age and by Years of Service - All Employees
As of 06/30/2019**

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	388 \$44,968	216 \$42,589	69 \$43,843	27 \$40,602	9 \$45,105	1 \$40,315	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	710 \$43,964
25-29	764 \$47,233	962 \$45,981	765 \$49,006	574 \$49,239	394 \$52,620	393 \$55,674	2 \$59,688	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,854 \$48,989
30-34	702 \$50,674	841 \$49,124	697 \$51,047	666 \$50,263	641 \$54,929	2,007 \$62,466	343 \$68,040	1 \$56,258	0 \$0	0 \$0	0 \$0	0 \$0	5,898 \$55,937
35-39	572 \$50,777	707 \$50,199	615 \$51,996	501 \$50,911	518 \$56,463	2,183 \$63,373	2,120 \$69,705	316 \$72,844	1 \$79,575	0 \$0	0 \$0	0 \$0	7,533 \$61,129
40-44	477 \$52,037	504 \$50,453	451 \$50,740	409 \$53,022	389 \$55,734	1,731 \$63,994	2,199 \$70,332	1,828 \$77,753	197 \$85,997	1 \$75,698	0 \$0	0 \$0	8,186 \$66,099
45-49	317 \$50,072	455 \$49,916	370 \$50,739	328 \$52,005	338 \$53,640	1,340 \$61,172	1,834 \$69,432	2,109 \$76,959	1,700 \$86,945	347 \$84,401	2 \$83,262	0 \$0	9,140 \$70,177
50-54	257 \$51,329	355 \$52,831	294 \$51,691	276 \$51,044	259 \$54,133	1,089 \$58,678	1,491 \$65,967	1,534 \$72,679	1,467 \$82,640	1,959 \$85,273	296 \$86,106	1 \$107,935	9,278 \$71,446
55-59	240 \$49,635	257 \$50,548	247 \$53,541	233 \$54,655	222 \$53,722	981 \$60,910	1,463 \$61,978	1,366 \$65,055	1,081 \$73,404	1,833 \$79,739	1,278 \$85,295	158 \$79,117	9,359 \$69,356
60-64	146 \$56,918	157 \$51,010	193 \$55,549	160 \$50,621	169 \$59,216	805 \$59,354	1,113 \$61,733	1,111 \$64,275	836 \$71,012	1,229 \$77,232	877 \$83,889	542 \$86,057	7,338 \$69,166
65 & Over	91 \$52,639	92 \$56,417	104 \$61,559	85 \$59,135	99 \$61,401	575 \$62,523	777 \$66,730	809 \$66,609	523 \$73,642	668 \$79,445	531 \$88,707	733 \$99,160	5,087 \$74,807
Total	3,954 \$49,836	4,546 \$49,125	3,805 \$51,320	3,259 \$51,253	3,038 \$55,115	11,105 \$61,752	11,342 \$67,256	9,074 \$71,982	5,805 \$79,809	6,037 \$81,259	2,984 \$85,568	1,434 \$92,005	66,383 \$66,176

TABLE 20

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, All
As of 06/30/2019**

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	7 \$53,182	1 \$56,258	0 \$0	0 \$0	0 \$0	0 \$0	9 \$54,365
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$31,953	273 \$64,135	133 \$62,767	1 \$79,575	0 \$0	0 \$0	0 \$0	408 \$63,648
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3 \$22,442	374 \$65,657	690 \$69,630	68 \$61,127	0 \$0	0 \$0	0 \$0	1,135 \$67,687
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$21,340	285 \$63,797	778 \$67,196	566 \$73,959	120 \$67,077	1 \$80,608	0 \$0	1,751 \$68,802
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$20,041	265 \$63,012	648 \$65,373	570 \$71,449	710 \$73,644	114 \$70,592	0 \$0	2,308 \$69,385
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$40,368	202 \$56,200	653 \$60,520	496 \$67,285	738 \$73,712	460 \$77,587	44 \$73,804	2,594 \$68,474
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	179 \$54,791	469 \$59,724	389 \$65,137	588 \$69,890	372 \$77,730	141 \$83,946	2,138 \$67,822
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$55,903	126 \$63,746	359 \$59,332	267 \$65,340	339 \$75,402	272 \$80,335	259 \$93,742	1,624 \$73,018
Total	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	10 \$35,359	1,711 \$62,250	3,731 \$64,304	2,357 \$69,147	2,495 \$72,702	1,219 \$77,592	444 \$88,655	11,967 \$68,948

TABLE 21

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, General Employees
As of 06/30/2019**

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	7 \$53,182	1 \$56,258	0 \$0	0 \$0	0 \$0	0 \$0	9 \$54,365
35-39	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$31,953	143 \$58,234	90 \$58,424	1 \$79,575	0 \$0	0 \$0	0 \$0	235 \$58,286
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3 \$22,442	223 \$61,467	346 \$66,057	45 \$55,651	0 \$0	0 \$0	0 \$0	617 \$63,427
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$21,340	209 \$58,680	515 \$63,446	277 \$69,072	100 \$62,961	1 \$80,608	0 \$0	1,103 \$63,889
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$20,041	209 \$58,590	507 \$61,888	375 \$68,111	475 \$68,913	95 \$67,523	0 \$0	1,662 \$65,182
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$40,368	173 \$53,578	529 \$55,196	376 \$62,212	567 \$69,309	323 \$73,634	41 \$72,679	2,010 \$63,663
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	147 \$52,100	382 \$55,302	310 \$61,129	488 \$65,433	287 \$72,745	115 \$80,672	1,729 \$63,517
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$42,381	97 \$59,152	304 \$55,972	214 \$59,035	258 \$65,989	195 \$71,737	173 \$84,726	1,242 \$65,298
Total	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	9 \$31,573	1,208 \$57,601	2,674 \$59,672	1,598 \$63,976	1,888 \$67,418	901 \$72,304	329 \$81,807	8,607 \$64,018

TABLE 22

**Distribution of Active Members by Age and by Years of Service
Noncontributory Members, Teachers
As of 06/30/2019**

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	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	130 \$70,626	43 \$71,857	0 \$0	0 \$0	0 \$0	0 \$0	173 \$70,932
40-44	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	151 \$71,846	344 \$73,223	23 \$71,841	0 \$0	0 \$0	0 \$0	518 \$72,761
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	76 \$77,869	263 \$74,540	289 \$78,643	20 \$87,657	0 \$0	0 \$0	648 \$77,165
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	56 \$79,514	141 \$77,903	195 \$77,867	235 \$83,207	19 \$85,938	0 \$0	646 \$80,198
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	29 \$71,840	124 \$83,232	120 \$83,179	171 \$88,312	137 \$86,907	3 \$89,172	584 \$85,035
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	32 \$67,151	87 \$79,139	79 \$80,866	100 \$91,638	85 \$94,559	26 \$98,431	409 \$86,022
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$69,425	29 \$79,112	55 \$77,902	53 \$90,798	81 \$105,385	77 \$102,107	86 \$111,878	382 \$98,116
Total	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$69,425	503 \$73,414	1,057 \$76,024	759 \$80,035	607 \$89,140	318 \$92,575	115 \$108,245	3,360 \$81,576

TABLE 23

**Distribution of Active Members by Age and by Years of Service
Contributory Members, All
As of 06/30/2019**

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	23 \$68,077	16 \$57,986	12 \$67,626	1 \$60,547	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	52 \$64,723
25-29	45 \$67,892	61 \$63,246	66 \$67,490	50 \$68,598	47 \$71,710	63 \$76,469	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	332 \$69,233
30-34	38 \$65,697	65 \$61,333	57 \$65,900	60 \$69,720	82 \$68,565	294 \$86,248	76 \$101,933	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	672 \$79,091
35-39	15 \$64,720	24 \$60,953	38 \$65,911	22 \$62,693	56 \$67,386	237 \$83,442	311 \$98,684	66 \$108,722	0 \$0	0 \$0	0 \$0	0 \$0	769 \$88,080
40-44	7 \$67,773	15 \$63,732	8 \$83,607	11 \$68,564	17 \$70,828	176 \$85,518	292 \$99,041	305 \$111,886	62 \$125,051	0 \$0	0 \$0	0 \$0	893 \$100,680
45-49	5 \$60,534	6 \$85,093	3 \$65,292	7 \$91,900	10 \$81,078	66 \$86,441	179 \$101,682	387 \$109,499	364 \$128,983	67 \$144,903	0 \$0	0 \$0	1,094 \$114,629
50-54	3 \$60,863	0 \$0	1 \$72,143	1 \$94,875	3 \$107,776	22 \$81,362	72 \$102,186	172 \$111,545	245 \$125,215	242 \$138,347	49 \$157,445	1 \$107,935	811 \$124,521
55-59	2 \$129,218	1 \$72,783	0 \$0	0 \$0	0 \$0	15 \$96,279	27 \$103,384	36 \$117,421	66 \$121,672	111 \$137,198	71 \$145,430	54 \$85,411	383 \$122,692
60-64	1 \$24,851	0 \$0	5 \$88,600	0 \$0	2 \$63,230	7 \$90,237	12 \$145,330	14 \$138,652	29 \$131,955	43 \$133,753	39 \$147,082	136 \$86,209	288 \$110,936
65 & Over	1 \$77,240	1 \$205,947	1 \$77,240	1 \$197,998	1 \$205,947	7 \$76,222	12 \$103,059	12 \$99,721	12 \$126,737	11 \$115,642	18 \$163,998	167 \$95,992	244 \$104,536
Total	140 \$67,203	189 \$63,389	191 \$67,979	153 \$70,218	218 \$70,812	887 \$84,674	981 \$100,600	992 \$111,117	778 \$126,939	474 \$138,061	177 \$151,009	358 \$90,713	5,538 \$102,560

TABLE 24

**Distribution of Active Members by Age and by Years of Service
Contributory Members, General Employees
As of 06/30/2019**

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	1 \$63,230	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$63,230
30-34	1 \$70,708	0 \$0	1 \$63,230	0 \$0	1 \$72,098	6 \$71,682	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	9 \$70,681
35-39	3 \$64,542	1 \$22,753	3 \$91,366	1 \$63,230	1 \$61,517	7 \$63,455	5 \$61,124	3 \$83,931	0 \$0	0 \$0	0 \$0	0 \$0	24 \$67,368
40-44	0 \$0	0 \$0	1 \$194,088	0 \$0	0 \$0	3 \$105,060	7 \$55,526	9 \$74,473	0 \$0	0 \$0	0 \$0	0 \$0	20 \$78,410
45-49	1 \$70,708	2 \$119,542	1 \$59,209	2 \$128,659	3 \$106,513	3 \$109,342	12 \$110,520	20 \$85,107	5 \$124,713	0 \$0	0 \$0	0 \$0	49 \$100,527
50-54	2 \$61,188	0 \$0	0 \$0	1 \$94,875	1 \$197,779	2 \$50,767	7 \$128,970	21 \$97,123	15 \$114,090	12 \$104,687	1 \$85,252	1 \$107,935	63 \$105,075
55-59	2 \$129,218	0 \$0	0 \$0	0 \$0	0 \$0	6 \$120,463	6 \$88,339	7 \$139,509	8 \$88,719	8 \$80,935	8 \$127,398	39 \$67,193	84 \$89,104
60-64	1 \$24,851	0 \$0	4 \$103,944	0 \$0	2 \$63,230	6 \$95,987	8 \$167,336	9 \$160,904	10 \$143,382	9 \$142,756	16 \$149,760	92 \$74,543	157 \$101,290
65 & Over	1 \$77,240	1 \$205,947	1 \$77,240	1 \$197,998	1 \$205,947	5 \$81,769	12 \$103,059	8 \$100,133	6 \$136,196	5 \$126,847	11 \$173,089	116 \$86,854	168 \$99,056
Total	11 \$74,358	4 \$116,946	12 \$95,573	5 \$122,684	9 \$109,260	38 \$87,541	57 \$105,768	77 \$102,462	44 \$120,356	34 \$112,434	36 \$150,127	248 \$79,280	575 \$96,450

TABLE 25

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Teachers
As of 06/30/2019**

Attained Age	Years of Credited Service												Total
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	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 \$49,925	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$49,925
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 \$48,756	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$48,756
45-49	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2 \$94,574	0 \$0	0 \$0	0 \$0	2 \$94,574
50-54	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$91,789	1 \$66,187	0 \$0	0 \$0	2 \$78,988
55-59	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$53,135	0 \$0	0 \$0	3 \$105,267	1 \$61,598	5 \$101,307	10 \$93,707
60-64	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$179,736	3 \$125,243	1 \$89,310	32 \$95,226	37 \$99,784
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$59,681	0 \$0	1 \$62,575	1 \$84,929	2 \$101,070	3 \$154,278	45 \$109,505	53 \$109,432
Total	0 \$0	1 \$49,925	0 \$0	0 \$0	0 \$0	1 \$59,681	2 \$50,945	1 \$62,575	5 \$109,120	9 \$106,651	5 \$122,748	82 \$103,433	106 \$102,592

TABLE 26

**Distribution of Active Members by Age and by Years of Service
Contributory Members, Police and Firefighters
As of 06/30/2019**

Attained Age	Years of Credited Service												Total	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	23 \$68,077	16 \$57,986	12 \$67,626	1 \$60,547	0 #DIV/0!	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	52 \$64,723
25-29	45 \$67,892	60 \$63,468	65 \$67,556	50 \$68,598	47 \$71,710	63 \$76,469	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	330 \$69,310
30-34	37 \$65,562	65 \$61,333	56 \$65,948	60 \$69,720	81 \$68,521	288 \$86,551	76 \$101,933	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	663 \$79,205
35-39	12 \$64,764	23 \$62,614	35 \$63,729	21 \$62,667	55 \$67,493	230 \$84,050	306 \$99,298	63 \$109,903	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	745 \$88,747
40-44	7 \$67,773	15 \$63,732	7 \$67,824	11 \$68,564	17 \$70,828	173 \$85,179	284 \$100,291	296 \$113,024	62 \$125,051	0 \$0	0 \$0	0 \$0	0 \$0	872 \$101,250
45-49	4 \$57,990	4 \$67,869	2 \$68,334	5 \$77,196	7 \$70,177	63 \$85,350	167 \$101,047	367 \$110,828	357 \$129,236	67 \$144,903	0 \$0	0 \$0	0 \$0	1,043 \$115,330
50-54	1 \$60,212	0 \$0	1 \$72,143	0 \$0	2 \$62,774	20 \$84,422	65 \$99,302	151 \$113,551	229 \$126,090	229 \$140,426	48 \$158,949	0 \$0	0 \$0	746 \$126,285
55-59	0 \$0	1 \$72,783	0 \$0	0 \$0	0 \$0	9 \$80,157	20 \$110,410	29 \$112,090	58 \$126,217	100 \$142,657	62 \$149,109	10 \$148,516	289 \$133,457	
60-64	0 \$0	0 \$0	1 \$27,226	0 \$0	0 \$0	1 \$55,741	4 \$101,316	5 \$98,599	18 \$122,952	31 \$131,963	22 \$147,760	12 \$151,598	94 \$131,437	
65 & Over	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1 \$65,028	0 \$0	3 \$111,006	5 \$123,749	4 \$108,921	4 \$146,289	6 \$171,315	23 \$133,283	
Total	129 \$66,593	184 \$62,298	179 \$66,129	148 \$68,445	209 \$69,156	848 \$84,575	922 \$100,388	914 \$111,899	729 \$127,459	431 \$140,738	136 \$152,281	28 \$154,722	4,857 \$103,283	

TABLE 27

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, All
As of 06/30/2019**

Attained Age	Years of Credited Service												Total
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	365 \$43,512	200 \$41,358	57 \$38,836	26 \$39,835	9 \$45,105	1 \$40,315	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	658 \$42,323
25-29	719 \$45,940	901 \$44,812	699 \$47,261	524 \$47,391	347 \$50,034	330 \$51,703	2 \$59,688	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,522 \$47,080
30-34	664 \$49,814	776 \$48,102	640 \$49,724	606 \$48,336	559 \$52,929	1,712 \$58,383	260 \$58,533	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5,217 \$52,957
35-39	557 \$50,401	683 \$49,821	577 \$51,080	479 \$50,370	462 \$55,139	1,945 \$60,944	1,536 \$64,827	117 \$64,061	0 \$0	0 \$0	0 \$0	0 \$0	6,356 \$57,706
40-44	470 \$51,803	489 \$50,046	443 \$50,146	398 \$52,592	372 \$55,044	1,552 \$61,633	1,533 \$66,004	833 \$71,983	67 \$75,100	1 \$75,698	0 \$0	0 \$0	6,158 \$60,791
45-49	312 \$49,905	449 \$49,445	367 \$50,620	321 \$51,135	328 \$52,803	1,273 \$59,893	1,370 \$66,390	944 \$71,665	770 \$76,618	160 \$72,059	1 \$85,916	0 \$0	6,295 \$62,835
50-54	254 \$51,217	355 \$52,831	293 \$51,621	275 \$50,885	256 \$53,504	1,066 \$58,246	1,154 \$64,386	714 \$69,946	652 \$76,426	1,007 \$80,718	133 \$73,120	0 \$0	6,159 \$65,230
55-59	238 \$48,966	256 \$50,462	247 \$53,541	233 \$54,655	222 \$53,722	965 \$60,382	1,234 \$62,018	677 \$66,645	519 \$73,115	984 \$77,777	747 \$84,325	60 \$77,349	6,382 \$66,513
60-64	145 \$57,139	157 \$51,010	188 \$54,670	160 \$50,621	167 \$59,168	798 \$59,083	922 \$61,993	628 \$66,016	418 \$72,251	598 \$80,386	466 \$83,517	265 \$87,102	4,912 \$67,302
65 & Over	90 \$52,366	91 \$54,773	103 \$61,407	84 \$57,482	98 \$59,926	566 \$62,377	639 \$66,636	438 \$71,666	244 \$80,116	318 \$82,502	241 \$92,533	307 \$105,453	3,219 \$73,457
Total	3,814 \$49,198	4,357 \$48,506	3,614 \$50,440	3,106 \$50,318	2,820 \$53,901	10,208 \$59,787	8,650 \$64,465	4,351 \$69,643	2,670 \$75,488	3,068 \$79,442	1,588 \$84,396	632 \$95,090	48,878 \$61,375

TABLE 28

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, General Employees
As of 06/30/2019**

Attained Age	Years of Credited Service												Total	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	176 \$41,123	131 \$38,829	52 \$38,330	25 \$39,121	9 \$45,105	1 \$40,315	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	394 \$39,954
25-29	457 \$43,981	592 \$42,966	409 \$45,228	310 \$43,813	203 \$46,555	224 \$48,929	2 \$59,688	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2,197 \$44,673
30-34	450 \$46,950	562 \$46,827	460 \$48,563	437 \$46,278	402 \$51,453	972 \$56,454	171 \$55,096	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	3,454 \$50,662
35-39	381 \$48,472	516 \$47,848	420 \$48,753	350 \$48,594	349 \$52,979	1,257 \$59,666	850 \$62,732	72 \$58,198	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	4,195 \$55,219
40-44	327 \$48,638	355 \$47,844	344 \$47,469	305 \$51,071	279 \$53,141	1,086 \$58,872	1,000 \$64,043	410 \$68,446	41 \$73,360	1 \$75,698	0 \$0	0 \$0	0 \$0	4,148 \$57,557
45-49	218 \$46,739	347 \$46,599	279 \$47,808	248 \$48,788	265 \$49,508	935 \$56,481	987 \$62,938	608 \$69,214	347 \$71,981	119 \$67,866	1 \$85,916	0 \$0	0 \$0	4,354 \$58,582
50-54	193 \$49,204	285 \$50,135	232 \$48,992	224 \$48,827	202 \$50,244	843 \$54,923	896 \$60,939	540 \$65,762	389 \$72,496	605 \$78,485	110 \$70,409	0 \$0	0 \$0	4,519 \$61,093
55-59	175 \$46,595	210 \$48,341	210 \$51,731	193 \$52,595	194 \$51,896	774 \$57,823	985 \$58,541	541 \$62,877	371 \$68,780	730 \$74,951	455 \$79,295	55 \$75,719	55 \$75,719	4,893 \$62,599
60-64	113 \$56,162	131 \$50,600	154 \$53,432	134 \$49,127	149 \$56,525	660 \$56,463	746 \$57,603	498 \$61,855	303 \$66,475	473 \$77,388	324 \$79,055	201 \$82,572	201 \$82,572	3,886 \$63,357
65 & Over	65 \$50,306	76 \$57,382	82 \$60,682	67 \$56,677	81 \$57,093	472 \$60,144	527 \$62,876	351 \$66,961	178 \$74,162	224 \$75,250	160 \$82,831	202 \$96,585	202 \$96,585	2,485 \$67,958
Total	2,555 \$47,082	3,205 \$46,837	2,642 \$48,603	2,293 \$48,380	2,133 \$51,683	7,224 \$57,354	6,164 \$61,226	3,020 \$65,619	1,629 \$70,624	2,152 \$76,120	1,050 \$78,835	458 \$87,929	458 \$87,929	34,525 \$58,270

TABLE 29

**Distribution of Active Members by Age and by Years of Service
Hybrid Members, Teachers
As of 06/30/2019**

Attained Age	Years of Credited Service												Total	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.		
Under 25	189 \$45,736	69 \$46,159	5 \$44,097	1 \$57,684	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	264 \$45,860
25-29	262 \$49,357	309 \$48,348	290 \$50,128	214 \$52,575	144 \$54,939	106 \$57,566	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,325 \$51,073
30-34	214 \$55,837	214 \$51,449	180 \$52,690	169 \$53,659	157 \$56,708	740 \$60,918	89 \$65,137	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	1,763 \$57,454
35-39	176 \$54,577	167 \$55,917	157 \$57,304	129 \$55,190	113 \$61,808	688 \$63,280	686 \$67,422	45 \$73,442	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	2,161 \$62,535
40-44	143 \$59,040	134 \$55,879	99 \$59,448	93 \$57,582	93 \$60,751	466 \$68,068	533 \$69,684	423 \$75,411	26 \$77,843	0 \$0	0 \$0	0 \$0	0 \$0	2,010 \$67,465
45-49	94 \$57,246	102 \$59,128	88 \$59,536	73 \$59,106	63 \$66,665	338 \$69,333	383 \$75,288	336 \$76,101	423 \$80,423	41 \$84,231	0 \$0	0 \$0	0 \$0	1,941 \$72,374
50-54	61 \$57,583	70 \$63,811	61 \$61,621	51 \$59,925	54 \$65,702	223 \$70,805	258 \$76,359	174 \$82,930	263 \$82,239	402 \$84,079	23 \$86,086	0 \$0	0 \$0	1,640 \$76,628
55-59	63 \$55,554	46 \$60,144	37 \$63,812	40 \$64,594	28 \$66,371	191 \$70,751	249 \$75,775	136 \$81,635	148 \$83,982	254 \$85,901	292 \$92,164	5 \$95,279	5 \$79,375	1,489 \$79,375
60-64	32 \$60,588	26 \$53,076	34 \$60,277	26 \$58,318	18 \$81,046	138 \$71,611	176 \$80,601	130 \$81,958	115 \$87,471	125 \$91,732	142 \$93,698	64 \$101,330	64 \$82,244	1,026 \$82,244
65 & Over	25 \$57,721	15 \$41,555	21 \$64,236	17 \$60,652	17 \$73,424	94 \$73,589	112 \$84,326	87 \$90,648	66 \$96,175	94 \$99,784	81 \$111,698	105 \$122,515	734 \$92,073	734 \$92,073
Total	1,259 \$53,494	1,152 \$53,149	972 \$55,433	813 \$55,785	687 \$60,789	2,984 \$65,675	2,486 \$72,496	1,331 \$78,773	1,041 \$83,101	916 \$87,247	538 \$95,250	174 \$113,940	14,353 \$68,844	

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	19,043	\$ 3,136	15,940	\$ 1,736	10,457	\$ 2,285
	<u>Service</u>		<u>Service</u>		<u>Service</u>	
Total	18,648	\$ 3,169	15,036	\$ 1,780	10,081	\$ 2,315
General Employees - male	3,562	2,728	4,793	1,748	2,988	2,377
General Employees - female	5,761	2,000	5,943	1,368	4,341	1,984
Teachers - male	1,501	3,735	1,436	2,521	835	3,106
Teachers - female	4,074	3,361	2,864	2,319	1,917	2,625
Police and Firefighters	3,750	4,949	-	-	-	-
	<u>Ordinary Disability</u>		<u>Ordinary Disability</u>		<u>Ordinary Disability</u>	
Total	156	\$ 1,069	716	\$ 1,004	308	\$ 1,471
General Employees - male	48	1,082	332	990	131	1,373
General Employees - female	51	782	297	902	115	1,402
Teachers - male	7	1,597	34	1,529	15	1,968
Teachers - female	20	1,309	53	1,326	47	1,751
Police and Firefighters	30	1,253	-	-	-	-
	<u>Accidental Disability</u>		<u>Accidental Disability</u>		<u>Accidental Disability</u>	
Total	239	\$ 1,892	188	\$ 969	68	\$ 1,486
General Employees - male	84	1,681	99	983	29	1,453
General Employees - female	52	1,532	79	895	35	1,493
Teachers - male	1	2,000	4	1,338	1	1,539
Teachers - female	4	3,848	6	1,448	3	1,692
Police and Firefighters	98	2,183	-	-	-	-

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

Age	Type of Pension			
	Total	Service	Ordinary Disability	Accidental Disability
Total	28,740	27,388	974	378
	Contributory			
Total	9,558	9,323	99	136
30-39	-	-	-	-
40-44	1	1	-	-
45-49	2	2	-	-
50-54	5	4	-	1
55-59	122	110	3	9
60-64	447	423	8	16
65-69	938	909	19	10
70-74	1,341	1,303	15	23
75-79	1,495	1,459	14	22
80-84	1,673	1,645	13	15
85-89	1,790	1,757	14	19
90-94	1,280	1,254	10	16
95-99	407	401	3	3
100 & over	57	55	-	2
	Noncontributory			
Total	11,543	10,736	629	178
30-39	-	-	-	-
40-44	1	-	1	-
45-49	11	-	8	3
50-54	32	-	27	5
55-59	291	200	74	17
60-64	1,054	882	128	44
65-69	2,689	2,480	170	39
70-74	3,125	2,971	128	26
75-79	2,500	2,400	69	31
80-84	1,220	1,192	21	7
85-89	482	476	3	3
90-94	125	122	-	3
95-99	13	13	-	-
100 & over	-	-	-	-
	Hybrid			
Total	7,639	7,329	246	64
30-39	-	-	-	-
40-44	4	-	3	1
45-49	4	-	1	3
50-54	23	-	21	2
55-59	383	325	49	9
60-64	1,547	1,471	64	12
65-69	3,011	2,915	75	21
70-74	2,025	1,988	26	11
75-79	517	507	5	5
80-84	105	103	2	-
85-89	18	18	-	-
90-94	2	2	-	-
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	12,822	12,627	176	19
	Contributory			
Total	5,607	5,575	27	5
30-39	-	-	-	-
40-44	1	1	-	-
45-49	4	4	-	-
50-54	4	4	-	-
55-59	32	32	-	-
60-64	152	150	2	-
65-69	436	434	2	-
70-74	1,124	1,115	7	2
75-79	1,176	1,169	6	1
80-84	1,130	1,127	3	-
85-89	984	982	1	1
90-94	424	420	3	1
95-99	115	114	1	-
100 & over	25	23	2	-
	Noncontributory			
Total	4,397	4,300	87	10
30-39	-	-	-	-
40-44	-	-	-	-
45-49	3	2	1	-
50-54	8	5	3	-
55-59	90	69	18	3
60-64	215	196	16	3
65-69	814	793	18	3
70-74	1,505	1,483	21	1
75-79	1,139	1,131	8	-
80-84	440	438	2	-
85-89	146	146	-	-
90-94	34	34	-	-
95-99	3	3	-	-
100 & over	-	-	-	-
	Hybrid			
Total	2,818	2,752	62	4
30-39	1	-	1	-
40-44	-	-	-	-
45-49	8	3	5	-
50-54	15	6	9	-
55-59	133	124	9	-
60-64	440	423	15	2
65-69	1,116	1,097	18	1
70-74	835	829	5	1
75-79	211	211	-	-
80-84	48	48	-	-
85-89	7	7	-	-
90-94	3	3	-	-
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	3,878	3,750	30	98
30-39	-	-	-	-
40-44	3	-	1	2
45-49	42	34	2	6
50-54	274	264	5	5
55-59	579	567	5	7
60-64	660	648	2	10
65-69	720	691	6	23
70-74	755	731	3	21
75-79	470	449	4	17
80-84	252	246	1	5
85-89	89	86	1	2
90-94	32	32	-	-
95-99	2	2	-	-
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	15,036	\$ 1,780	10,736	\$ 1,538	4,300	\$ 2,386
Less than 5	5	944	4	723	1	1,830
5-9	12	627	10	606	2	732
10-14	2,917	588	2,364	556	553	727
15-19	2,206	959	1,715	901	491	1,164
20-24	2,369	1,287	1,810	1,191	559	1,597
25-29	1,889	1,832	1,370	1,656	519	2,296
30-34	3,381	2,602	2,030	2,375	1,351	2,942
35 and over	2,257	3,376	1,433	3,067	824	3,912

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	15,036	\$ 1,780	10,736	\$ 1,538	4,300	\$ 2,386
Less than 5	3,869	1,591	2,983	1,470	886	1,996
5-9	3,454	1,693	2,558	1,477	896	2,312
10-14	3,443	1,836	2,437	1,584	1,006	2,448
15-19	2,726	1,967	1,767	1,602	959	2,641
20-24	1,292	1,996	849	1,673	443	2,616
25-29	233	2,047	130	1,715	103	2,467
30 and over	19	1,211	12	1,045	7	1,496

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	18,648	\$ 3,169	9,323	\$ 2,278	5,575	\$ 3,461	3,750	\$ 4,949
Less than 5	7	1,351	4	1,256	2	755	1	2,923
5-9	519	439	374	409	137	512	8	559
10-14	1,018	855	767	714	199	1,297	52	1,241
15-19	1,412	1,393	1,058	1,146	277	2,074	77	2,325
20-24	1,991	1,942	1,389	1,596	430	2,471	172	3,411
25-29	5,872	3,382	2,245	2,339	1,428	3,068	2,199	4,652
30-34	5,543	3,995	2,146	3,147	2,278	3,801	1,119	6,013
35 and over	2,286	4,442	1,340	3,806	824	5,208	122	6,261

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	10,081	\$ 2,315	7,329	\$ 2,144	2,752	\$ 2,771
Less than 5	6	1,278	2	-	4	1,917
5-9	1,028	691	838	689	190	699
10-14	1,312	968	1,049	927	263	1,129
15-19	1,266	1,414	922	1,343	344	1,604
20-24	1,508	1,783	1,044	1,631	464	2,125
25-29	1,349	2,477	932	2,300	417	2,872
30-34	2,124	3,305	1,504	3,194	620	3,574
35 and over	1,488	4,376	1,038	4,119	450	4,970

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	18,648	\$ 3,169	9,323	\$ 2,278	5,575	\$ 3,461	3,750	\$ 4,949
Less than 5	1,493	5,297	451	3,495	207	5,574	835	6,201
5-9	1,907	4,527	847	3,271	382	4,936	678	5,867
10-14	2,468	3,733	1,199	2,796	705	4,165	564	5,186
15-19	3,138	3,281	1,455	2,509	1,068	3,792	615	4,220
20-24	3,538	2,964	1,811	2,324	1,167	3,429	560	4,068
25-29	2,907	2,394	1,600	1,812	1,013	2,982	294	3,539
30-34	2,153	1,909	1,238	1,532	766	2,325	149	2,910
35 and over	1,044	1,426	722	1,230	267	1,759	55	2,380

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	10,081	\$ 2,315	7,329	\$ 2,144	2,752	\$ 2,771
Less than 5	5,264	2,242	3,983	2,077	1,281	2,756
5-9	3,766	2,442	2,632	2,280	1,134	2,816
10-14	1,051	2,230	714	2,020	337	2,676

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	28,740	\$ 1,913	27,388	\$ 1,952	974	\$ 1,057	378	\$ 1,279	-	\$ -
	Contributory									
Total	9,558	\$ 2,255	9,323	\$ 2,278	99	\$ 927	136	\$ 1,624	-	\$ -
Maximum	1,298	2,391	1,267	2,417	16	1,374	15	1,318	-	-
Option 1	563	1,644	534	1,673	16	1,010	13	1,220	-	-
Option 2	562	2,537	540	2,571	8	1,481	14	1,798	-	-
Option 3	342	3,220	334	3,256	5	1,081	3	2,820	-	-
Option 4	4,170	2,515	4,080	2,539	29	817	61	1,719	-	-
Option 5	2,623	1,718	2,568	1,732	25	509	30	1,558	-	-
	Noncontributory									
Total	11,543	\$ 1,496	10,736	\$ 1,538	629	\$ 948	178	\$ 944	-	\$ -
Maximum	6,026	1,493	5,703	1,524	242	926	81	976	-	-
Option A	2,384	1,590	2,251	1,621	98	1,083	35	968	-	-
Option B	2,505	1,412	2,194	1,483	257	906	54	918	-	-
Option C	628	1,513	588	1,550	32	1,047	8	691	-	-
	Hybrid									
Total	7,639	\$ 2,114	7,329	\$ 2,144	246	\$ 1,387	64	\$ 1,475	-	\$ -
Maximum	2,781	2,052	2,703	2,070	51	1,438	27	1,390	-	-
Option 1	525	1,932	508	1,951	13	1,314	4	1,505	-	-
Option 2	1,695	2,113	1,588	2,163	90	1,323	17	1,596	-	-
Option 3	1,109	2,583	1,078	2,618	22	1,403	9	1,359	-	-
Option 4	942	2,143	896	2,178	44	1,424	2	2,430	-	-
Option 5	587	1,645	556	1,656	26	1,467	5	1,327	-	-

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	12,822	\$ 2,924	12,627	\$ 2,945	176	\$ 1,542	19	\$ 2,003	-	\$ -
Contributory										
Total	5,607	\$ 3,452	5,575	\$ 3,461	27	\$ 1,384	5	\$ 3,478	-	\$ -
Maximum	864	3,822	856	3,838	7	1,752	1	4,557	-	-
Option 1	239	2,841	236	2,864	3	1,055	-	-	-	-
Option 2	272	4,038	271	4,045	-	-	1	2,000	-	-
Option 3	175	4,510	173	4,532	2	2,599	-	-	-	-
Option 4	2,241	3,779	2,229	3,790	10	1,395	2	2,970	-	-
Option 5	1,816	2,762	1,810	2,767	5	558	1	4,895	-	-
Noncontributory										
Total	4,397	\$ 2,364	4,300	\$ 2,386	87	\$ 1,405	10	\$ 1,404	-	\$ -
Maximum	2,750	2,423	2,694	2,443	49	1,479	7	1,344	-	-
Option A	748	2,480	740	2,492	7	1,369	1	1,215	-	-
Option B	667	2,039	638	2,072	27	1,274	2	1,710	-	-
Option C	232	2,237	228	2,251	4	1,449	-	-	-	-
Hybrid										
Total	2,818	\$ 2,748	2,752	\$ 2,771	62	\$ 1,804	4	\$ 1,654	-	\$ -
Maximum	1,188	2,695	1,164	2,712	23	1,880	1	1,582	-	-
Option 1	143	2,563	138	2,591	5	1,802	-	-	-	-
Option 2	588	2,647	571	2,667	14	2,063	3	1,678	-	-
Option 3	391	3,221	384	3,253	7	1,447	-	-	-	-
Option 4	272	2,908	262	2,959	10	1,574	-	-	-	-
Option 5	236	2,409	233	2,419	3	1,610	-	-	-	-

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	3,878	\$ 4,851	3,750	\$ 4,949	30	\$ 1,253	98	\$ 2,183	-	\$ -
Maximum	165	5,467	151	5,757	-	-	14	2,338	-	-
Option 1	47	5,055	40	5,378	1	2,636	6	3,305	-	-
Option 2	246	5,200	225	5,466	9	1,803	12	2,752	-	-
Option 3	113	6,333	110	6,460	2	1,346	1	2,375	-	-
Option 4	2,334	5,207	2,299	5,257	10	1,038	25	2,295	-	-
Option 5	973	3,621	925	3,729	8	707	40	1,715	-	-

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	1,673	\$ 1,846	1,604	\$ 1,874	59	\$ 1,205	10	\$ 1,121	-	\$ -
	Contributory									
Total	64	\$ 3,754	64	\$ 3,754	-	\$ -	-	\$ -	-	\$ -
Maximum	13	3,484	13	3,484	-	-	-	-	-	-
Option 1	-	-	-	-	-	-	-	-	-	-
Option 2	9	3,211	9	3,211	-	-	-	-	-	-
Option 3	6	3,386	6	3,386	-	-	-	-	-	-
Option 4	31	4,263	31	4,263	-	-	-	-	-	-
Option 5	5	2,721	5	2,721	-	-	-	-	-	-
	Noncontributory									
Total	651	\$ 1,483	617	\$ 1,501	29	\$ 1,154	5	\$ 1,141	-	\$ -
Maximum	279	1,451	269	1,454	10	1,348	-	-	-	-
Option A	152	1,571	149	1,583	1	390	2	1,244	-	-
Option B	188	1,451	167	1,497	18	1,088	3	1,072	-	-
Option C	32	1,534	32	1,534	-	-	-	-	-	-
	Hybrid									
Total	958	\$ 1,965	923	\$ 1,993	30	\$ 1,255	5	\$ 1,101	-	\$ -
Maximum	304	1,916	294	1,945	6	1,173	4	936	-	-
Option 1	66	2,068	64	2,094	1	709	1	1,759	-	-
Option 2	201	1,973	191	2,015	10	1,185	-	-	-	-
Option 3	129	2,458	126	2,480	3	1,545	-	-	-	-
Option 4	150	1,997	145	2,031	5	1,024	-	-	-	-
Option 5	108	1,389	103	1,376	5	1,660	-	-	-	-

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	511	\$ 2,597	506	\$ 2,611	5	\$ 1,178	-	\$ -	-	\$ -
Contributory										
Total	35	\$ 4,824	35	\$ 4,824	-	\$ -	-	\$ -	-	\$ -
Maximum	10	4,830	10	4,830	-	-	-	-	-	-
Option 1	1	3,738	1	3,738	-	-	-	-	-	-
Option 2	8	5,799	8	5,799	-	-	-	-	-	-
Option 3	3	3,199	3	3,199	-	-	-	-	-	-
Option 4	12	4,914	12	4,914	-	-	-	-	-	-
Option 5	1	1,824	1	1,824	-	-	-	-	-	-
Noncontributory										
Total	191	\$ 1,952	190	\$ 1,950	1	\$ 2,384	-	\$ -	-	\$ -
Maximum	98	2,017	98	2,017	-	-	-	-	-	-
Option A	43	2,125	43	2,125	-	-	-	-	-	-
Option B	43	1,526	43	1,526	-	-	-	-	-	-
Option C	7	2,607	6	2,645	1	2,384	-	-	-	-
Hybrid										
Total	285	\$ 2,756	281	\$ 2,783	4	\$ 877	-	\$ -	-	\$ -
Maximum	102	2,610	100	2,627	2	1,753	-	-	-	-
Option 1	15	3,416	15	3,416	-	-	-	-	-	-
Option 2	67	2,771	67	2,771	-	-	-	-	-	-
Option 3	30	3,476	30	3,476	-	-	-	-	-	-
Option 4	47	2,844	45	2,874	2	2,166	-	-	-	-
Option 5	24	2,031	24	2,031	-	-	-	-	-	-

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	195	\$ 6,297	192	\$ 6,363	3	\$ 2,041	-	\$ -	-	\$ -
Maximum	16	7,515	16	7,515	-	-	-	-	-	-
Option 1	3	-	3	6,553	-	-	-	-	-	-
Option 2	27	5,900	25	6,184	2	2,353	-	-	-	-
Option 3	15	7,271	15	7,271	-	-	-	-	-	-
Option 4	120	6,417	120	6,417	-	-	-	-	-	-
Option 5	14	3,534	13	3,697	1	1,417	-	-	-	-

Section O – 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.