

Alameda County Employees' Retirement Association

Actuarial Valuation and Review

As of December 31, 2019



This report has been prepared at the request of the Board of Retirement to assist in administering the Fund. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Board of Retirement and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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May 27, 2020

Board of Retirement
Alameda County Employees' Retirement Association
475 14th Street, Suite 1000
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Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of December 31, 2019. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal year 2020-2021.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement Association. The census information and financial information on which our calculations were based was prepared by the staff of the Association. That assistance is gratefully acknowledged.

The actuarial calculations were directed under the supervision of Eva Yum, FSA, MAAA, Enrolled Actuary. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Association.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,
Segal

A handwritten signature in black ink that reads "Andy Yeung".

Andy Yeung, ASA, EA, MAAA, FCA
Vice President and Actuary

A handwritten signature in black ink that reads "Eva Yum".

Eva Yum, FSA, EA, MAAA
Senior Actuary

EK/jl

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Section 1: Actuarial Valuation Summary

Purpose and Basis

This report was prepared by Segal to present a valuation of the Alameda County Employees' Retirement Association ("the Plan") as of December 31, 2019. The valuation was performed to determine whether the assets and contribution rates are sufficient to provide the prescribed benefits. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligations.

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; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law.

The contribution requirements presented in this report are based on:

- The benefit provisions of the pension plan, as administered by the Board of Retirement;
- The characteristics of covered active members, inactive vested members, and retired members and beneficiaries as of November 30, 2019, provided by the Retirement Association;
- The assets of the Plan as of December 31, 2019, provided by the Retirement Association;
- Economic assumptions regarding future salary increases and investment earnings adopted by the Board for the December 31, 2019 valuation;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc. adopted by the Board for the December 31, 2019 valuation and
- The funding policy adopted by the Board of Retirement.

One of the general goals of an actuarial valuation is to establish contributions which fully fund the Association's liabilities, and which, as a percentage of payroll, remain as level as possible for each generation of active members. Annual actuarial valuations measure the progress toward this goal, as well as test the adequacy of the contribution rates.

Section 1: Actuarial Valuation Summary

In preparing this valuation, we have employed generally accepted actuarial methods and assumptions to evaluate the Association's liabilities and future contribution requirements. Our calculations are based upon member data and financial information provided to us by the Association's staff. This information has not been audited by us, but it has been reviewed and found to be consistent, both internally and with prior year's information.

The contribution requirements are determined as a percentage of payroll.¹ The Association's employer rates provide for both Normal Cost and a contribution to amortize any unfunded or overfunded actuarial accrued liabilities. In this valuation, we have applied the funding policy adopted by the Board on September 18, 2014 (and reconfirmed by the Board on October 18, 2018). Details of the funding policy are provided in *Section 4, Exhibit I* on page 101.

A schedule of current amortization balances and payments may be found in *Section 3, Exhibit H* on page 82. A graphical projection of the Unfunded Actuarial Accrued Liability (UAAL) amortization balances and payments has been included in *Section 3, Exhibit I* on page 88.

The rates calculated in this report may be adopted by the Board for the fiscal year that extends from July 1, 2020 through June 30, 2021.

¹ The contribution requirement for an employer with active member payroll is expressed as a level percentage of payroll for that employer. The contribution requirement for the Alameda County Office of Education with no active member payroll is expressed as a level dollar amount.

Section 1: Actuarial Valuation Summary

Valuation Highlights

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1. In the December 31, 2018 valuation, the ratio of the Valuation Value of Assets (VVA) to Actuarial Accrued Liabilities (AAL) was 77.2%. In this December 31, 2019 valuation, the funded ratio has increased slightly to 77.6%. The funded ratio if measured on a Market Value of Assets (MVA) basis increased from 71.8% as of December 31, 2018 to 79.4% as of December 31, 2019. The change in the VVA funded ratio was primarily the result of an expected increase due to contributions made to pay down the unfunded liability, offset somewhat by a slight loss on the Valuation Value of Assets from the recognition of past investment losses after smoothing. The change to the MVA funded ratio was primarily the result of the gain on the Market Value of Assets during 2019. These measurements are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.

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2. The Association's UAAL as of December 31, 2018 was \$2,137.1 million. In this year's valuation, the UAAL has increased to \$2,195.0 million. The increase in the UAAL was primarily due to (a) lower than expected return on investments (after smoothing), (b) higher than expected salary increases for active members, (c) the loss due to actual contributions lower than expected¹, and (d) other actuarial losses, offset somewhat by (e) the expected decrease due to contributions made to pay down the UAAL. A reconciliation of the Association's UAAL is provided in *Section 2, Subsection E*. A schedule of the current UAAL amortization amounts may be found in *Section 3, Exhibit H*. Note that a graphical projection of the UAAL amortization bases and payments has been included in *Section 3, Exhibit I*.

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3. The aggregate employer rate² calculated in this valuation has increased from 27.85% of payroll to 28.56% of payroll. This change was primarily due to (a) lower than expected return on investments (after smoothing), (b) the effect of amortizing the prior year's UAAL over a smaller than expected total projected payroll, (c) higher than expected individual salary increases for active members, (d) actual contributions lower than expected¹ and (e) other actuarial losses³. A reconciliation of the Association's aggregate employer rate is provided in *Section 2, Subsection F*.

A schedule of the projected contributions by each participating employer is provided in *Section 4, Exhibit IV*. Under the Board of Retirement's current actuarial funding policy, the UAAL is paid off by the employers in the General Tiers 1, 2, and 4 membership group in proportion to their payroll (with the exception of the Alameda County Office of Education and the Livermore Area Recreation and Parks District, as discussed in item 7 below).

Employer rates for AHS/Court/First 5 are higher than the County's rates to reflect that only the County has received a reimbursement for the implicit retiree health benefit subsidy paid by the County for 2019 and in the prior years. The \$6.5 million (an estimated amount provided by ACERA for the implicit retiree health benefit subsidy paid by the County for 2019) and the

¹ Including scheduled delay in implementing contribution rates after the date of the valuation.

² For employers with active member payroll.

³ Including changes in membership demographics.

Section 1: Actuarial Valuation Summary

unused credit from prior years' transfers (the balance of prior transfers was about \$71.7 million¹ as of December 31, 2019) have been recognized over separate 20-year periods.

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4. The aggregate member rate calculated in this valuation increased from 9.33% of payroll as of December 31, 2018 to 9.34% of payroll as of December 31, 2019 due to changes in membership demographics. A reconciliation of the Association's aggregate member rate is provided in *Section 2, Subsection F*.

The individual member rates have been updated to reflect the valuation as of December 31, 2019. The detailed member rates are provided in *Section 4, Exhibit III* of this report.

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5. As indicated in *Section 2, Subsection B* of this report, the total unrecognized net investment gain as of December 31, 2019 is \$260.7 million (in the previous valuation, this amount was a \$569.1 million net loss). This net investment gain will be recognized in the determination of the Actuarial Value of Assets for funding purposes in the next few years, and will offset any investment losses that may occur after December 31, 2019. This implies that if the Association earns the assumed net rate of investment return of 7.25% per year on a **market value basis**, it will result in investment gains on the Actuarial Value of Assets in the next few years. So, if the actual market return is equal to the assumed 7.25% rate and all other actuarial assumptions are met, the contribution requirements would generally decrease in the next few years.

The net deferred gain of \$260.7 million represents 3.0% of the Market Value of Assets as of December 31, 2019. Unless offset by future investment losses or other unfavorable experience, the recognition of the \$260.7 million deferred market gain is expected to have an impact on the Association's future funded percentage and contribution rate requirements. Under a simplified approach, which takes into account the size of the valuation and the SRBR reserves, this potential impact may be illustrated as follows:

- a. If a proportion of the net deferred gain that is commensurate with the size of the valuation reserves were recognized immediately in the valuation value of assets, the funded percentage would increase from 77.6% to 79.4%.
 - b. If a proportion of the net deferred gain that is commensurate with the size of the valuation reserves were recognized immediately in the valuation value of assets, the aggregate employer rate² would decrease from 28.56% to about 27.5% of payroll.
6. Similar to what we disclosed in our December 21, 2018 valuation report, the 7.25% investment return assumption that the Board approved on December 21, 2017 for determining the liabilities for funding purposes and used for establishing the employer and member contribution rates in this report has continued to be developed without considering the impact of any future 50/50 excess earnings allocation. This is based on our understanding that Article 5.5 of the Statute, which authorizes the allocation of 50% of excess earnings to the SRBR, does not allow for the use of a different investment return for funding than is used for

¹ See *Section 4, Exhibit V* for a schedule of the outstanding balances of the unused credit.

² For employers with active member payroll.

Section 1: Actuarial Valuation Summary

interest crediting. This would appear in effect to preclude the prefunding of the SRBR through the use of an assumption lower than the market earnings assumption of 7.25%.

As required by the Actuarial Standard of Practice (ASOP) No. 4 (“Measuring Pension Obligations and Determining Pension Plan Costs or Contributions”), we performed a stochastic model, as detailed in our 2013-2016 experience study report, to estimate the impact of the 50% allocation of future excess earnings to the SRBR. The results of our model indicated that the 50/50 allocation of future excess earnings would have about the same impact as an “outflow” (i.e., assets not available to fund the benefits included in this valuation) that would average approximately 0.60% of assets over time. **For informational purposes only**, when we applied the results of our stochastic model to this valuation, we have estimated that such an annual outflow would increase the AAL measured in this valuation using a 7.25% investment return assumption from \$9.80 billion to \$10.51 billion (for a difference of \$0.71 billion) and would increase the employer’s UAAL contribution rate by about 4% - 5% of payroll.

7. The Board adopted the Declining Employer Payroll Policy on October 18, 2018 and determined that the policy applies to the Alameda County Office of Education (ACOE) and the Livermore Area Recreation and Parks District (LARPD) Tier 1 members who were included as part of the General cost group in prior valuations. As a result, an unfunded actuarial accrued liability (UAAL) was allocated to each of these two employers as of December 31, 2017.
8. The Actuarial Standards Board approved Actuarial Standard of Practice No. 51 (ASOP 51) regarding risk assessment, which was first effective with ACERA’s December 31, 2018 actuarial valuation. ASOP 51 requires actuaries to identify risks that “may reasonably be anticipated to significantly affect the plan’s future financial condition”. Investment risk, asset/liability mismatch risk, interest rate risk, longevity and other demographic risks and contribution risk are also cited as examples in ASOP 51. The standard does not require the actuary to evaluate the likelihood of contributing entities to make contributions when due, nor does it require the actuary to assess the likelihood or consequences of future changes in applicable law.

The actuary’s assessment can be qualitative or quantitative (e.g., based on numerical demonstrations). The actuary may use non-numerical methods for assessing risks that might take the form of commentary about potential adverse experience and the likely effect on future results. While the standard does not require that every valuation include a quantitative risk assessment, the actuary may recommend that a more detailed risk assessment be performed. When making that decision, the actuary will take into account such factors as the Plan’s design, maturity, size, funded status, asset allocation, cash flow, possible insolvency and current market conditions.

A copy of the risk assessment report including the analysis recommended by Segal in consultation with ACERA staff will be available later in 2020.

9. Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The funding policy adopted by the Board meets this standard.

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10. The actuarial loss from investment and other experience is \$99.6 million, or 1.0% of actuarial accrued liability.

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11. The net experience loss from sources other than investments and contributions was 0.3% of the actuarial accrued liability. About half of the loss was due to higher than expected individual salary increases for actives.

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12. The rate of return on the market value of assets was 17.86% for the 2019 plan year. The return on the valuation value of assets was 6.33% for the same period due to the recognition of prior years' investment gains and losses. This resulted in an actuarial loss when measured against the assumed rate of return of 7.25%. This actuarial investment loss increased the average employer contribution rate by 0.41% of payroll. Given the low fixed income interest rate environment, target asset allocation and expectations of future investment returns for various classes, we advise the Board to continue to monitor actual and anticipated investment returns relative to the assumed long-term rate of return on investments of 7.25%.

13. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution under the Plan's funding policy and measuring the progress of that funding policy. The Net Pension Liability (NPL) and Pension Expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68, for inclusion in the plan and employer's financial statements as of December 31, 2019 will be provided separately. In addition to being based on a different measurement date, the accounting disclosures will utilize different methodologies from those employed in the funding valuation, as required by the GASB. However, the actuarially determined contribution in this valuation is expected to be used as the actuarially determined contribution (ADC) for GASB financial reporting.

14. This actuarial report as of December 31, 2019 is based on financial data as of that date and demographic data as of November 30, 2019. Changes subsequent to that date are not reflected and will affect future actuarial costs of the plan.

15. It is important to note that this actuarial valuation is based on plan assets as of December 31, 2019. Due to the COVID-19 pandemic, market conditions have changed significantly since the valuation date. The Plan's actuarial status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the Plan Year. While it is impossible to determine how the market will perform over the next several months, and how that will affect the results of next year's valuation, Segal is available to prepare projections of potential outcomes upon request.

Section 1: Actuarial Valuation Summary

Summary of Key Valuation Results

	December 31, 2019		December 31, 2018	
	Total Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)	Total Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Employer Contribution Rates:²				
County Only				
• General Tier 1	22.90%	\$1,738	22.31%	\$1,693
• General Tier 2	21.92	85,631	21.40	83,600
• General Tier 4	21.43	46,119	20.83	44,828
• Safety Tier 1	83.07	632	80.60	613
• Safety Tier 2	63.66	73,163	62.34	71,648
• Safety Tier 2C	64.94	2,023	63.63	1,981
• Safety Tier 2D	63.31	9,918	61.60	9,651
• Safety Tier 4	60.49	25,729	59.20	25,180
County Combined	30.98	244,953	30.26	239,194
AHS, Court & First 5 Only				
• General Tier 1	23.77	373	23.13	362
• General Tier 2	22.79	44,301	22.22	43,192
• General Tier 4	22.30	29,861	21.65	28,991
Housing Only				
• General Tier 1	28.97	834	28.34	816
• General Tier 2	27.99	63	27.43	61
• General Tier 4	27.50	394	26.86	384
LARPD Only³				
• General Tier 1	38.07	237	33.62	209
• General Tier 3	43.82	794	38.41	696
• General Tier 4	36.60	694	32.14	610
All Categories Combined	28.56	322,504	27.85	314,515

¹ Based on December 31, 2019 projected annual compensation.

² For employers with active member payroll. The UAAL contribution for ACOE, expressed as a level dollar amount, is \$89 K when made on April 1, 2021.

³ For LARPD, the combined rate is 39.83% as of December 31, 2019 and 34.98% as of December 31, 2018.

Section 1: Actuarial Valuation Summary

		December 31, 2019		December 31, 2018	
		Total Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)	Total Rate ²	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Average Member	• General Tier 1	9.43%	\$1,193	9.47%	\$1,198
Contribution Rates:	• General Tier 2	7.70	45,065	7.70	45,065
	• General Tier 3	14.41	261	14.13	256
	• General Tier 4	8.85	31,191	8.80	31,015
	• Safety Tier 1	9.96	76	10.12	77
	• Safety Tier 2	15.81	18,170	15.82	18,182
	• Safety Tier 2C	13.48	420	13.52	421
	• Safety Tier 2D	16.09	2,521	16.07	2,518
	• Safety Tier 4	15.42	6,559	15.58	6,627
	All Categories Combined		9.34	105,456	9.33

¹ Based on December 31, 2019 projected annual compensation.

² Average rates have been recalculated by applying the individual entry age based member rates determined in the December 31, 2018 valuation to the Association membership as of December 31, 2019.

Section 1: Actuarial Valuation Summary

Summary of Key Valuation Results (continued)

		December 31, 2019 (\$ in '000s)	December 31, 2018 (\$ in '000s)
Actuarial Accrued Liability as of December 31:	• Retired members and beneficiaries	\$6,006,226	\$5,696,148
	• Inactive vested members	260,753	243,463
	• Active members	<u>3,528,040</u>	<u>3,436,786</u>
	• Total Actuarial Accrued Liability ¹	\$9,795,019	\$9,376,397
	• Normal Cost for plan year beginning December 31	\$224,598	\$218,336
Assets as of December 31:	• Valuation Value of Assets (VVA) ²	\$7,599,977	\$7,239,327
	• Market Value of Assets (MVA) ³	7,774,898	6,734,526
	• Valuation Value of Assets as a percentage of Market Value of Assets	97.8%	107.4%
Funded status as of December 31:	• Unfunded Actuarial Accrued Liability on Valuation Value of Assets basis	\$2,195,042	\$2,137,070
	• Funded percentage on VVA basis	77.6%	77.2%
	• Unfunded Actuarial Accrued Liability on Market Value of Assets basis	\$2,020,121	\$2,641,871
	• Funded percentage on MVA basis	79.4%	71.8%
	• Amortization period ⁴	Varies	Varies
Key assumptions:	• Net investment return	7.25%	7.25%
	• Price Inflation	3.00%	3.00%
	• Payroll growth increase	3.50%	3.50%

¹ Excludes liabilities held for SRBR and other non-valuation reserves.

² Excludes Reserve for Interest Fluctuations (Contingency Reserve) if positive, Supplemental Retirees Benefit Reserve, and 401(h) Reserve.

³ The Market Value of Assets as of December 31, 2019 equals the Valuation Value of Assets plus one-half of the deferred market gains after adjustment to include the balance in the Contingency Reserve. The Market Value of Assets as of December 31, 2018 equals the Valuation Value of Assets plus a proportion of the deferred market losses after netting out the balance in the Contingency Reserve that is commensurate with the size of the valuation reserves.

⁴ New UAAL established on each valuation after December 31, 2011 are amortized as follows: plan amendments are amortized over separate decreasing 15-year periods; early retirement incentive programs (ERIPs) are amortized over separate decreasing 5-year periods; assumption and method changes are amortized over separate decreasing 20-year periods; and experience gains/losses are also amortized over separate decreasing 20-year periods.

Section 1: Actuarial Valuation Summary

Summary of Key Valuation Results (continued)

		December 31, 2019	December 31, 2018	Change From Prior Year
Demographic data as of December 31:	Active Members:			
	• Number of members	11,336	11,349	-0.1%
	• Average age	47.1	47.0	0.1
	• Average service	11.3	11.4	-0.1
	• Total projected compensation	\$1,129,175,000	\$1,093,735,000	3.2%
	• Average projected compensation	\$99,610	\$96,373	3.4%
	Retired Members and Beneficiaries:			
	• Number of members:			
	– Service retired	7,888	7,628	3.4%
	– Disability retired	951	924	2.9%
	– Beneficiaries	1,239	1,231	0.6%
	– Total	10,078	9,783	3.0%
	• Average age	71.9	71.7	0.2
	• Average monthly benefit ¹	\$4,111	\$3,983	3.2%
	Inactive Vested Members:			
	• Number of members ²	2,821	2,568	9.9%
	• Average Age	47.3	47.9	-0.6
	Total Members:	24,235	23,700	2.3%

¹ Excludes monthly benefits payable from the SRBR.

² Includes inactive members due a refund of member contributions.

Section 1: Actuarial Valuation Summary

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the Association. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the Association. The Association uses a “valuation value of assets” that differs from market value to gradually reflect six-month changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results that does not mean that the previous assumptions were unreasonable.

Section 1: Actuarial Valuation Summary

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the Association. Segal is not responsible for the use or misuse of its report, particularly by any other party.

An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan. Future contribution requirements may differ from those determined in the valuation because of:

- Differences between actual experience and anticipated experience;
- Changes in actuarial assumptions or methods;
- Changes in statutory provisions; and
- Differences between the contribution rates determined by the valuation and those adopted by the Board.

Some actuarial results in this report are not rounded, but that does not imply precision.

If the Association is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.

Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The Association should look to their other advisors for expertise in these areas.

As Segal has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Plan.

Section 2: Actuarial Valuation Results

A. Member Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered members, including active members, inactive vested members, retired members and beneficiaries.

This section presents a summary of significant statistical data on these member groups.

More detailed information for this valuation year and the preceding valuation can be found in *Section 3, Exhibits A, B, and C.*

Member Population: 2010 – 2019

Year Ended December 31	Active Members	Inactive Vested Members ¹	Retired Members and Beneficiaries	Total Non-Actives	Ratio of Non-Actives to Actives	Ratio of Retired Members and Beneficiaries to Actives
2010	10,879	1,785	7,558	9,343	0.86	0.69
2011	10,724	1,796	7,906	9,702	0.90	0.74
2012	10,800	1,835	8,175	10,010	0.93	0.76
2013	10,877	1,902	8,566	10,468	0.96	0.79
2014	11,025	1,995	8,813	10,808	0.98	0.80
2015	11,071	2,027	8,990	11,017	1.00	0.81
2016	11,111	2,263	9,242	11,505	1.04	0.83
2017	11,323	2,447	9,479	11,926	1.05	0.84
2018	11,349	2,568	9,783	12,351	1.09	0.86
2019	11,336	2,821	10,078	12,899	1.14	0.89

¹ Includes inactive members due a refund of member contributions.

Section 2: Actuarial Valuation Results

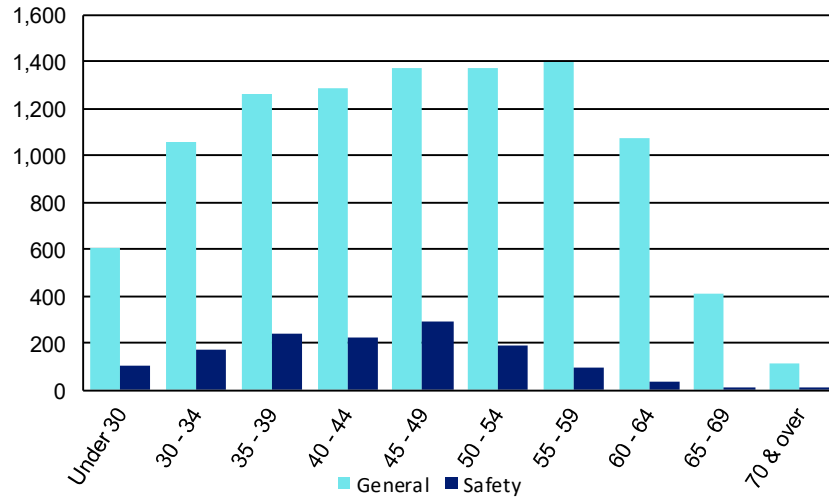
Active Members

Plan costs are affected by the age, years of service and compensation of active members. In this year's valuation, there were 11,336 active members with an average age of 47.1, average years of service of 11.3 and average compensation of \$99,610. The 11,349 active members in the prior valuation had an average age of 47.0, average service of 11.4 and average compensation of \$96,373.

Among the active members, there were none with unknown age information.

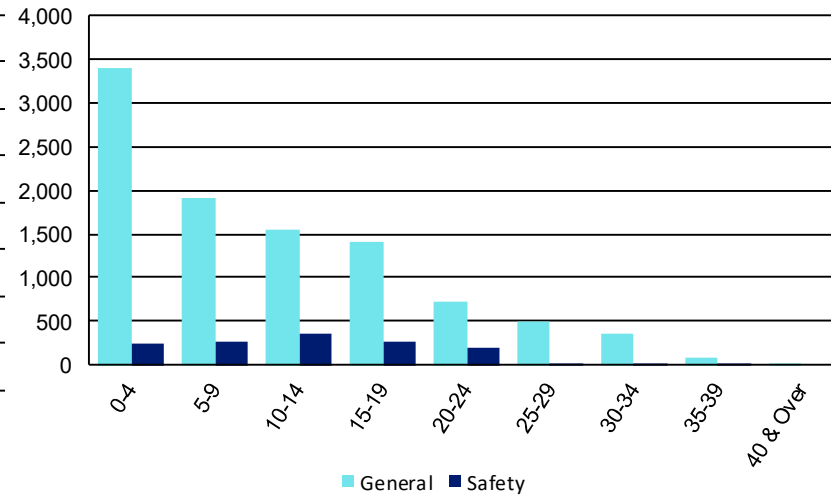
Distribution of Active Members as of December 31, 2019

Actives by Age



Average age	47.1
Prior year average age	47.0
Difference	0.1

Actives by Years of Service



Average years of service	11.3
Prior year average years of service	11.4
Difference	-0.1

Inactive Members

In this year's valuation, there were 2,821 members with a vested right to a deferred or immediate vested benefit or entitled to a refund of their member contributions, versus 2,568 members in the prior valuation.

Section 2: Actuarial Valuation Results

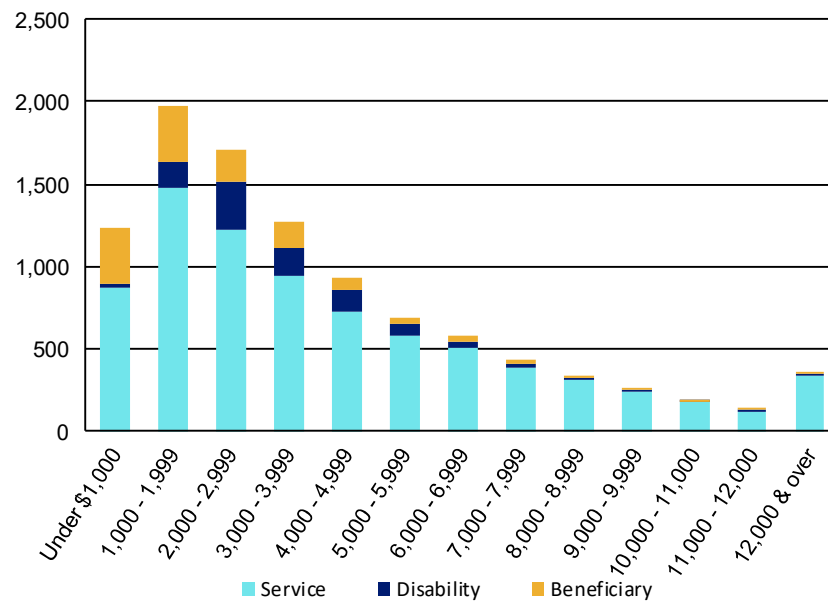
Retired Members and Beneficiaries

As of December 31, 2019, 8,839 retired members and 1,239 beneficiaries were receiving total monthly benefits of \$41,427,406. For comparison, in the previous valuation, there were 8,552 retired members and 1,231 beneficiaries receiving monthly benefits of \$38,968,811. These monthly benefits exclude supplemental COLA benefits payable from the Supplemental Retirees Benefit Reserve (SRBR).

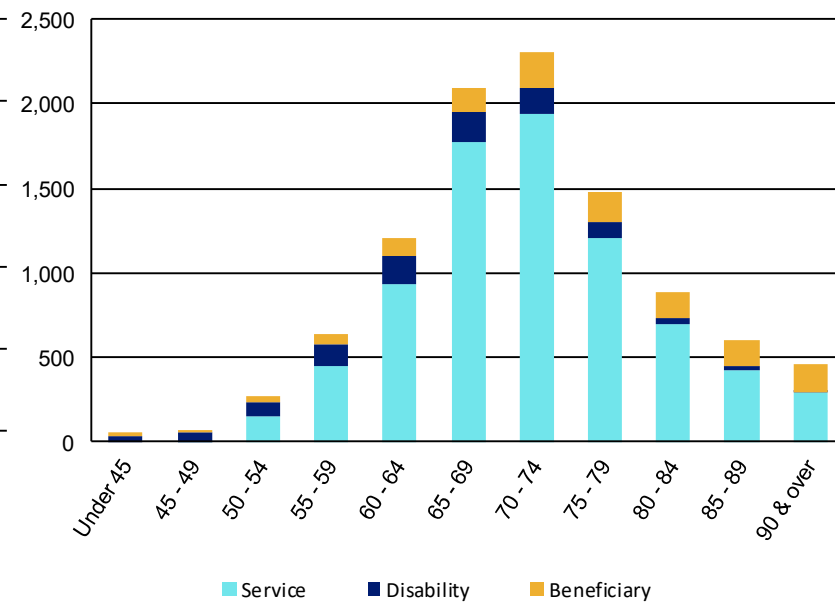
As of December 31, 2019, the average monthly benefit for retired members is \$4,344, compared to \$4,221 in the previous valuation. The average age for retired members is 71.3 in the current valuation, compared with 71.2 in the prior valuation. For beneficiaries as of December 31, 2019, the average monthly benefit is \$2,448, compared to \$2,329 in the previous valuation. The average age for beneficiaries is 75.5 in the current valuation, compared with 75.2 in the prior valuation.

Distribution of Retired Members and Beneficiaries as of December 31, 2019

Retired Members and Beneficiaries
by Type and Monthly Amount



Retired Members and Beneficiaries
by Type and Age



Section 2: Actuarial Valuation Results

Historical Plan Population

The chart below demonstrates the progression of the active population over the last ten years. The chart also shows the growth among the retired population over the same time period.

Member Data Statistics: 2010 – 2019

Year Ended December 31	Active Members			Retired Members and Beneficiaries		
	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2010	10,879	47.4	11.6	7,558	70.4	\$3,067
2011	10,724	47.7	11.8	7,906	70.5	3,190
2012	10,800	47.6	11.8	8,175	70.6	3,332
2013	10,877	47.3	11.5	8,566	70.7	3,442
2014	11,025	47.3	11.5	8,813	70.9	3,549
2015	11,071	47.3	11.6	8,990	71.1	3,648
2016	11,111	47.3	11.6	9,242	71.3	3,757
2017	11,323	47.1	11.4	9,479	71.6	3,880
2018	11,349	47.0	11.4	9,783	71.7	3,983
2019	11,336	47.1	11.3	10,078	71.9	4,111

Section 2: Actuarial Valuation Results

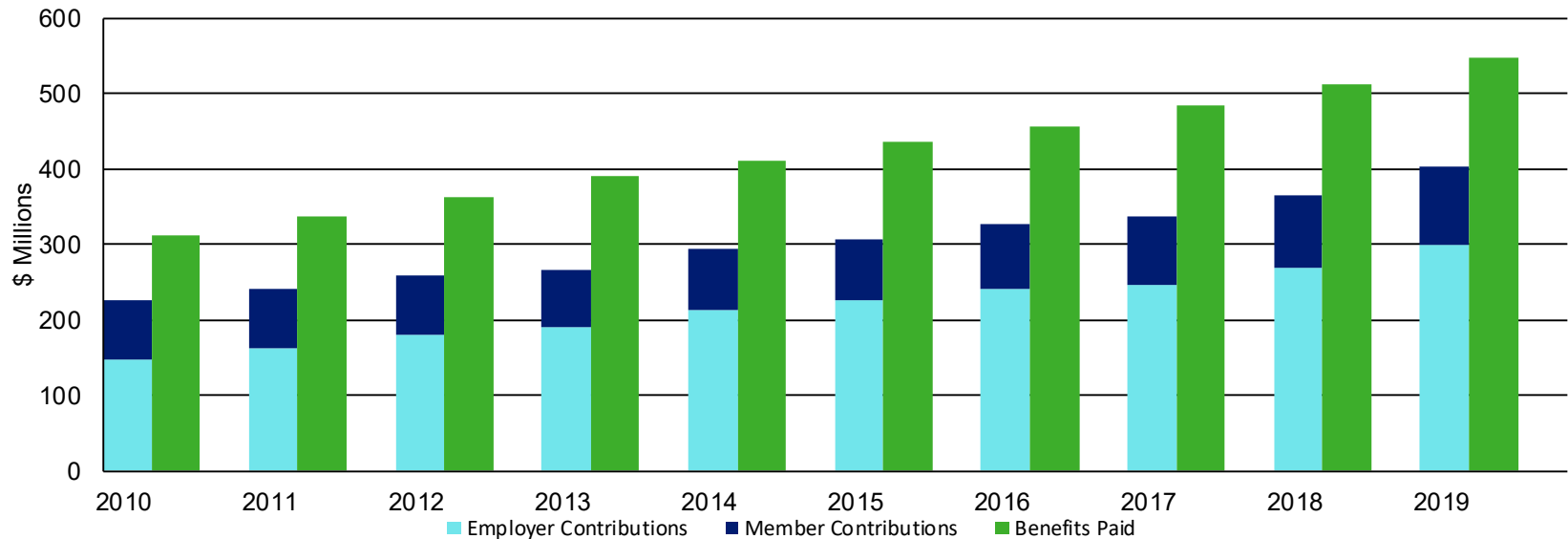
B. Financial information

Retirement plan funding anticipates that, over the long term, both contributions and investment earnings (less investment fees and administrative expenses) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E, F, and G.*

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

Comparison of Contributions Made with Benefits Paid
for Years Ended December 31, 2010 – 2019



Section 2: Actuarial Valuation Results

Determination of Actuarial Value of Assets for Year Ended December 31, 2019

1	Market value of assets						\$8,789,279,051
2	Calculation of unrecognized return						
	Six Month Period		Actual	Expected	Investment	Percent	Deferred
	From	To	Return¹	Return¹	Gain (Loss)	Deferred	Return
a)	1/1/2015	6/30/2015	\$210,088,252	\$263,436,620	\$(53,348,368)	0%	\$0
b)	7/1/2015	12/31/2015	(230,048,258)	262,185,431	(492,233,689)	10	(49,223,369)
c)	1/1/2016	6/30/2016	75,639,795	251,178,961	(175,539,165)	20	(35,107,833)
d)	7/1/2016	12/31/2016	379,000,419	251,534,721	127,465,699	30	38,239,710
e)	1/1/2017	6/30/2017	658,890,554	263,335,665	395,554,890	40	158,221,956
f)	7/1/2017	12/31/2017	634,431,651	285,557,601	348,874,050	50	174,437,025
g)	1/1/2018	6/30/2018	86,346,238	306,788,550	(220,442,312)	60	(132,265,387)
h)	7/1/2018	12/31/2018	(457,457,856)	293,029,561	(750,487,417)	70	(525,341,192)
i)	1/1/2019	6/30/2019	854,836,642	274,040,816	580,795,826	80	464,636,660
j)	7/1/2019	12/31/2019	487,958,159	302,301,626	185,656,533	90	167,090,880
k)	Total unrecognized return ²						\$260,688,449
3	Calculation of Preliminary Actuarial Value of Assets						
a)	Preliminary Actuarial Value of Assets: (1) - (2k)						\$8,528,590,602
b)	Preliminary Actuarial Value as a Percentage of Market Value: (3a) ÷ (1)						97.0%
4	Adjustment to be within 40% corridor						0
5	Final Actuarial value of assets: (3a) + (4)						\$8,528,590,602
6	Non-valuation reserves and deductions						
a)	Reserve for Interest Fluctuations (Contingency Reserve), but no less than \$0						\$0
b)	Supplemental Retirees Benefit Reserve (SRBR)						924,709,823
c)	Other Non-Valuation Reserve (401(h) Reserve)						10,415,538
d)	SRBR Transfer to Employer Advance Reserve						-6,510,876
e)	Subtotal						\$928,614,485
7	Final Valuation Value of Assets: (5) – (6e)						\$7,599,976,117

Note: Results may be slightly off due to rounding.

¹ The actual return on a market value basis is calculated by taking the difference between the ending and beginning Market Value of Assets over the last six month period and adjusting that difference for the non-investment cash flows. Those cash flows include contributions received and benefit payments made during that six month period. The amount subject to smoothing is determined as the actual market return earned during the last six month period that was in excess/below the expected return.

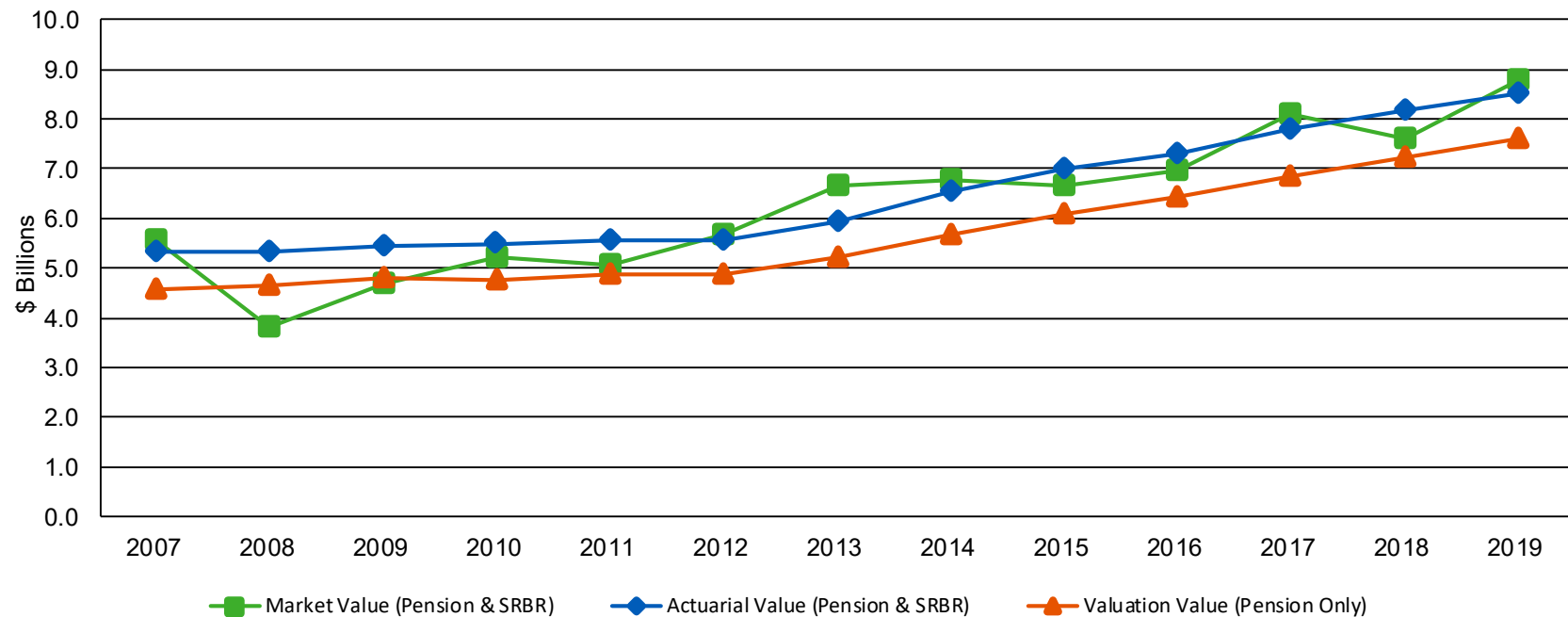
² Deferred return as of December 31, 2019 recognized in each of the next five years:

(a)	Amount recognized on December 31, 2020	\$49,152,251
(b)	Amount recognized on December 31, 2021	120,736,884
(c)	Amount recognized on December 31, 2022	(6,008,069)
(d)	Amount recognized on December 31, 2023	78,241,730
(e)	Amount recognized on December 31, 2024	18,565,653
(f)	Total unrecognized return as of December 31, 2019	\$260,688,449

Section 2: Actuarial Valuation Results

The market value, actuarial value and valuation value of assets are representations of the Plan's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The valuation value of assets is the actuarial value, excluding any non-valuation reserves. The valuation asset value is significant because the Plan's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

Market Value, Actuarial Value, and Valuation Value of Assets as of December 31, 2007 – 2019



Section 2: Actuarial Valuation Results

C. Actuarial experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the actuarially determined contribution will decrease from the previous year. On the other hand, the actuarially determined contribution will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total loss is \$99.6 million, which includes \$65.9 million from investment losses, a loss of \$7.4 million from contribution experience and \$26.3 million in losses from all other sources. The net experience variation from individual sources other than investments and contributions was 0.3% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

Actuarial Experience for Year Ended December 31, 2019

1	Net loss from investments ¹	\$(65,905,000)
2	Net loss from contributions	(7,359,000)
3	Net loss from other experience ²	<u>(26,336,000)</u>
4	Net experience loss: 1 + 2 + 3	\$(99,600,000)

¹ Details on next page.

² See *Subsection E* for further details. Does not include the effect of plan or assumption changes, if any.

Section 2: Actuarial Valuation Results

Investment experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy. The rate of return on the market value of assets was 17.86% for the year ended December 31, 2019.

For valuation purposes, the assumed rate of return on the valuation value of assets is 7.25%. The actual rate of return on a valuation basis for the 2019 plan year was 6.33%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended December 31, 2019 with regard to its investments.

Investment Experience for Year Ended December 31, 2019

	Market Value	Actuarial Value	Valuation Value
1 Net investment income	\$1,342,794,799	\$512,986,851	\$455,280,174
2 Average value of assets	7,519,535,411	8,088,654,910	7,188,756,112
3 Rate of return: 1 ÷ 2	17.86%	6.34%	6.33%
4 Assumed rate of return	7.25%	7.25%	7.25%
5 Expected investment income: 2 x 4	\$545,166,317	\$586,427,481	\$521,184,818
6 Actuarial gain/(loss): 1 - 5	<u>\$797,628,482</u>	<u>\$(73,440,630)</u>	<u>\$(65,904,644)</u>

Section 2: Actuarial Valuation Results

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial and valuation basis compared to the actual market value investment return for the last ten years, including averages over select time periods.

Investment Return – Market Value, Actuarial Value and Valuation Value: 2010 – 2019

Year Ended December 31	Market Value Investment Return ¹		Actuarial Value Investment Return ¹		Valuation Value Investment Return ¹	
	Amount	Percent	Amount	Percent	Amount	Percent
2010	\$635,617,239	13.72%	\$122,091,092	2.26%	\$36,890,575	0.77%
2011	(53,810,165)	(1.04)%	164,671,046	3.03%	149,447,325	3.15%
2012	698,682,557	13.91%	91,936,980	1.67%	76,720,113	1.59%
2013	1,095,188,215	19.53%	533,248,385	9.73%	410,409,663	8.48%
2014	266,028,241	4.04%	710,015,277	12.05%	548,585,891	10.61%
2015	(19,960,005)	(0.30)%	569,295,018	8.78%	489,086,474	8.68%
2016	454,641,033	6.91%	452,144,779	6.53%	436,958,056	7.24%
2017	1,293,322,206	18.77%	640,343,891	8.85%	495,891,253	7.77%
2018	(371,111,618)	(4.62)%	507,081,208	6.56%	508,199,399	7.50%
2019	1,342,794,799	17.86%	512,986,851	6.34%	455,280,174	6.33%
Most recent five-year average return		7.31%	7.41%		7.50%	
Most recent ten-year average return		8.54%	6.53%		6.17%	

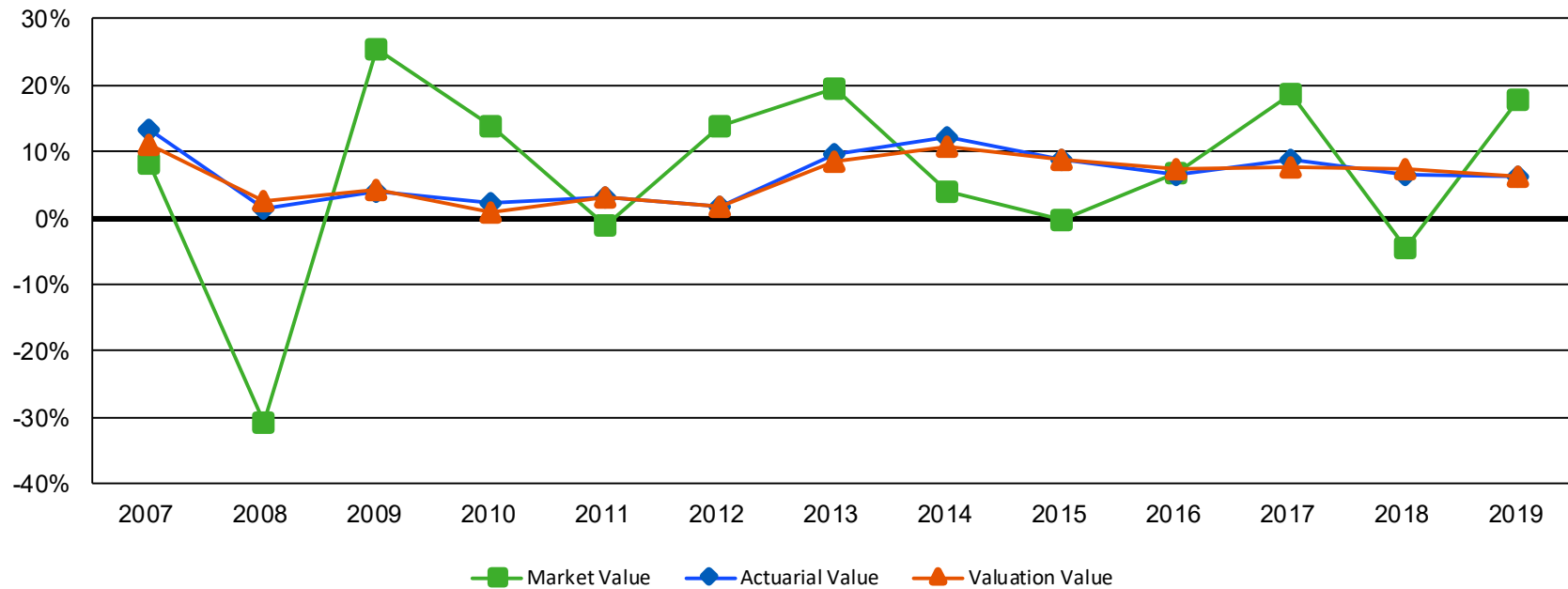
Note: Each year's yield is weighted by the average asset value in that year.

¹ Net of administrative and investment expenses.

Section 2: Actuarial Valuation Results

Subsection B described the actuarial asset valuation method that gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

Market, Actuarial and Valuation Value Rates of Return for Years Ended December 31, 2007 – 2019



Section 2: Actuarial Valuation Results

Contributions

Contributions for the year ended December 31, 2019 totaled \$401.6 million, compared to the projected amount of \$408.7 million. This resulted in a loss of \$7.4 million for the year, when adjusted for timing.

Non-investment experience

Other experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants.
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected),
- salary increases (greater or smaller than projected), and
- cost-of-living adjustments (COLAs) higher or lower than anticipated.

The net loss from this other experience for the year ended December 31, 2019 amounted to \$26.3 million, which is 0.3% of the actuarial accrued liability. About half of the loss was due to higher than expected individual salary increases for actives. See *Subsection E* for a detailed development of the unfunded actuarial accrued liability.

Section 2: Actuarial Valuation Results

D. Other Changes in the Actuarial Accrued Liability

Actuarial assumptions

There are no assumption changes reflected in this report.

Details on actuarial assumptions and methods are in *Section 4, Exhibit I*.

Plan Provisions

There were no changes in plan provisions since the prior valuation.

A summary of plan provisions is in *Section 4, Exhibit II*.

Section 2: Actuarial Valuation Results

E. Development of Unfunded Actuarial Accrued Liability

Development for Year Ended December 31, 2019
Total Plan

1	Unfunded actuarial accrued liability at beginning of year	\$2,137,070,000
2	Total normal cost at middle of year	218,336,000
3	Expected employer and member contributions	(408,747,000)
4	Interest	<u>148,783,000</u>
5	Expected unfunded actuarial accrued liability	\$2,095,442,000
6	Changes due to:	
	a) Investment return less than expected	\$65,905,000
	b) Actual contributions less than expected ¹	7,359,000
	c) Individual salary increases higher than expected	13,106,000
	d) Other experience loss	<u>13,230,000</u>
	Total changes	<u>\$99,600,000</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$2,195,042,000</u>

Note: The sum of items 6c through 6d equals the “Net loss from other experience” shown in *Section 2, Subsection C*.

¹ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll different than expected during 2019.

Section 2: Actuarial Valuation Results

E. Development of Unfunded Actuarial Accrued Liability (continued)

Development for Year Ended December 31, 2019
General (Excluding LARPD & Office of Education) Only

1	Unfunded actuarial accrued liability at beginning of year	\$1,269,655,000
2	Total Normal cost at middle of year	158,675,000
3	Expected employer and member contributions	(271,836,000)
4	Interest	<u>88,429,000</u>
5	Expected unfunded actuarial accrued liability	\$1,244,923,000
6	Changes due to:	
	a) Investment return less than expected	\$49,318,000
	b) Actual contributions less than expected ¹	4,402,000
	c) Individual salary increases higher than expected	12,636,000
	d) Other experience loss	<u>8,011,000</u>
	Total changes	<u>\$74,367,000</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$1,319,290,000</u>

¹ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll different than expected during 2019.

Section 2: Actuarial Valuation Results

E. Development of Unfunded Actuarial Accrued Liability (continued)

Development for Year Ended December 31, 2019
General (Office of Education) Only

1	Unfunded actuarial accrued liability at beginning of year	\$1,516,000
2	Total Normal cost at middle of year	0
3	Expected employer and member contributions	(750,000)
4	Interest	<u>69,000</u>
5	Expected unfunded actuarial accrued liability	\$835,000
6	Changes due to:	
	a) Investment return less than expected	\$30,000
	b) Actual contributions less than expected	0
	c) Individual salary increases higher than expected	0
	d) Other experience loss ¹	<u>80,000</u>
	Total changes	<u>\$110,000</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$945,000</u>

¹ Due primarily to fewer than expected deaths among continuing retirees.

Section 2: Actuarial Valuation Results

E. Development of Unfunded Actuarial Accrued Liability (continued)

Development for Year Ended December 31, 2019
General (LARPD) Only

1	Unfunded actuarial accrued liability at beginning of year	\$13,501,000
2	Total Normal cost at middle of year	1,075,000
3	Expected employer and member contributions	(2,169,000)
4	Interest	<u>943,000</u>
5	Expected unfunded actuarial accrued liability	\$13,350,000
6	Changes due to:	
	a) Investment return less than expected	\$408,000
	b) Actual contributions less than expected ¹	348,000
	c) Individual salary increases higher than expected	216,000
	d) Other experience loss	<u>8,000</u>
	Total changes	<u>\$980,000</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$14,330,000</u>

¹ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll different than expected during 2019.

Section 2: Actuarial Valuation Results

E. Development of Unfunded Actuarial Accrued Liability (continued)

Development for Year Ended December 31, 2019
Safety Only

1	Unfunded actuarial accrued liability at beginning of year	\$852,398,000
2	Total Normal cost at middle of year	58,586,000
3	Expected employer and member contributions	(133,992,000)
4	Interest	<u>59,342,000</u>
5	Expected unfunded actuarial accrued liability	\$836,334,000
6	Changes due to:	
	a) Investment return less than expected	\$16,149,000
	b) Actual contributions less than expected ¹	2,609,000
	c) Individual salary increases higher than expected	254,000
	d) Other experience loss	<u>5,131,000</u>
	Total changes	<u>\$24,143,000</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$860,477,000</u>

¹ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll different than expected during 2019.

Section 2: Actuarial Valuation Results

F. Recommended Contribution

The recommended contribution is equal to the employer Normal Cost payment and a payment on the Unfunded Actuarial Accrued Liability. As of December 31, 2019, the average recommended employer contribution is 28.56% of compensation.

The Board sets the funding policy used to calculate the recommended contribution based on layered amortization periods. See *Section 4, Exhibit I* for further details on the funding policy.

The contribution requirement as of December 31, 2019 is based on the data previously described, the actuarial assumptions and Plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

Average Recommended Employer Contribution for Year Ended December 31

	2019		2018	
	Amount (\$ in '000s)	% of Projected Compensation	Amount (\$ in '000s)	% of Projected Compensation
1 Total normal cost	\$224,598	19.89%	\$218,336	19.96%
2 Expected member normal cost contributions	<u>105,456</u>	<u>9.34%</u>	<u>102,139</u>	<u>9.34%</u>
3 Employer normal cost: (1) - (2)	\$119,142	10.55%	\$116,197	10.62%
4 Actuarial accrued liability	9,795,019		9,376,397	
5 Valuation value of assets	<u>7,599,977</u>		<u>7,239,327</u>	
6 Unfunded actuarial accrued liability (UAAL): (4) - (5)	\$2,195,042		\$2,137,070	
7 Payment on UAAL	203,362	18.01%	189,661	17.34%
8 Projected compensation	1,129,175		1,093,735	
9 Total average recommended employer contribution: (3) + (7)	<u>\$322,504</u>	<u>28.56%</u>	<u>\$305,858</u>	<u>27.96%</u>

Note: Contributions are assumed to be paid at the middle of the year.

Section 2: Actuarial Valuation Results

Reconciliation of Average Recommended Employer Contribution Rate

The charts below details the changes in the average recommended employer contribution rate from the prior valuation to the current year's valuation.

Reconciliation from December 31, 2018 to December 31, 2019 Total Plan

	Contribution Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Average Recommended Employer Contribution as of December 31, 2018²	27.85%	\$314,515
• Effect of investment return less than expected	0.41%	4,630
• Effect of actual contributions less than expected ³	0.05%	565
• Effect of individual salary increases higher than expected	0.06%	678
• Effect of amortizing prior year's UAAL over a smaller than expected total projected payroll	0.09%	1,016
• Effect of changes in member demographics on Normal Cost	0.01%	113
• Effect of other losses	<u>0.09%</u>	<u>987</u>
Total change	0.71%	7,989
Average Recommended Employer Contribution as of December 31, 2019	28.56%	\$322,504

¹ Based on December 31, 2019 projected compensation.

² Determined by applying the recommended employer contribution rates as of December 31, 2018 to the projected compensation as of December 31, 2019 by cost group, membership class and tier.

³ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll during 2019 different than expected.

Section 2: Actuarial Valuation Results

Reconciliation of Average Recommended Employer Contribution Rate (continued)

Reconciliation from December 31, 2018 to December 31, 2019
General (Excluding LARPD & Office of Education) Only

	Contribution Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Average Recommended Employer Contribution as of December 31, 2018²	21.51%	\$203,927
• Effect of investment return less than expected	0.37%	3,507
• Effect of actual contributions less than expected ³	0.03%	284
• Effect of individual salary increases higher than expected	0.08%	758
• Effect of amortizing prior year's UAAL over a smaller than expected total projected payroll	0.01%	95
• Effect of changes in member demographics on Normal Cost	0.01%	95
• Effect of other losses	<u>0.07%</u>	<u>648</u>
Total change	0.57%	5,387
Average Recommended Employer Contribution as of December 31, 2019	22.08%	\$209,314

¹ Based on December 31, 2019 projected compensation.

² Determined by applying the recommended employer contribution rates as of December 31, 2018 to the projected compensation as of December 31, 2019 by cost group, membership class and tier.

³ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll during 2019 different than expected.

Section 2: Actuarial Valuation Results

Reconciliation of Average Recommended Employer Contribution Rate (continued)

Reconciliation from December 31, 2018 to December 31, 2019
General (LARPD) Only

	Contribution Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Average Recommended Employer Contribution as of December 31, 2018²	34.98%	\$1,515
• Effect of investment return less than expected	0.65%	28
• Effect of actual contributions less than expected ³	0.58%	25
• Effect of individual salary increases higher than expected	0.47%	20
• Effect of amortizing prior year's UAAL over a smaller than expected total projected payroll ⁴	2.80%	121
• Effect of changes in member demographics on Normal Cost	0.36%	16
• Effect of other gains	<u>(0.01)%</u>	<u>0⁵</u>
Total change	4.85%	210
Average Recommended Employer Contribution as of December 31, 2019	39.83%	\$1,725

¹ Based on December 31, 2019 projected compensation.

² Determined by applying the recommended employer contribution rates as of December 31, 2018 to the projected compensation as of December 31, 2019 by cost group, membership class and tier.

³ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll during 2019 different than expected.

⁴ Nine active members in the December 31, 2018 valuation data were classified as either retired or vested terminated members in the December 31, 2019 valuation data; two new active members were added. This net reduction in the number of active members resulted in a reduction in projected compensation from \$4,687,000 as of December 31, 2018 to \$4,331,000 as of December 31, 2019 (versus an expected projected compensation of \$4,851,000 for a reduction of about 12%).

⁵ Less than \$1,000 when rounded.

Section 2: Actuarial Valuation Results

Reconciliation of Average Recommended Employer Contribution Rate (continued)

Reconciliation from December 31, 2018 to December 31, 2019
Safety Only

	Contribution Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Average Recommended Employer Contribution as of December 31, 2018²	61.62%	\$109,073
• Effect of investment return less than expected	0.65%	1,151
• Effect of actual contributions less than expected ³	0.11%	195
• Effect of individual salary increases higher than expected	(0.03)%	(53)
• Effect of amortizing prior year's UAAL over a smaller than expected total projected payroll	0.47%	832
• Effect of changes in member demographics on Normal Cost	(0.05)%	(89)
• Effect of other losses	<u>0.20%</u>	<u>356</u>
Total change	1.35%	2,392
Average Recommended Employer Contribution as of December 31, 2019	62.97%	\$111,465

¹ Based on December 31, 2019 projected compensation.

² Determined by applying the recommended employer contribution rates as of December 31, 2018 to the projected compensation as of December 31, 2019 by cost group, membership class and tier.

³ Includes impact of delay in rate implementation and difference between Normal Cost and UAAL contributions due to actual payroll during 2019 different than expected.

Section 2: Actuarial Valuation Results

Reconciliation of Average Recommended Member Contribution Rate

The charts below details the changes in the average recommended member contribution rate from the prior valuation to the current year's valuation.

Reconciliation from December 31, 2018 to December 31, 2019

	Contribution Rate	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Average Recommended Member Contribution as of December 31, 2018	9.33%	\$105,359
• Effect of changes in member demographics	<u>0.01%</u>	<u>97</u>
Average Recommended Member Contribution as of December 31, 2019	9.34%	\$105,456

By Membership and Tier

	General Tier 1	General Tier 2	General Tier 3	General Tier 4
Average Recommended Member Contribution as of December 31, 2018	9.47%	7.70%	14.13%	8.80%
• Effect of changes in member demographics	<u>-0.04%</u>	<u>0.00%</u>	<u>0.28%</u>	<u>0.05%</u>
Average Recommended Member Contribution as of December 31, 2019	9.43%	7.70%	14.41%	8.85%

	Safety Tier 1	Safety Tier 2	Safety Tier 2C	Safety Tier 2D	Safety Tier 4
Average Recommended Member Contribution as of December 31, 2018	10.12%	15.82%	13.52%	16.07%	15.58%
• Effect of changes in member demographics	<u>-0.16%</u>	<u>-0.01%</u>	<u>-0.04%</u>	<u>0.02%</u>	<u>-0.16%</u>
Average Recommended Member Contribution as of December 31, 2019	9.96%	15.81%	13.48%	16.09%	15.42%

¹ Based on December 31, 2019 projected compensation.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates¹

County Only	December 31, 2019 Actuarial Valuation				December 31, 2018 Actuarial Valuation			
	Basic	COLA	Total	Estimated Annual Dollar Amount ² (\$ in '000s)	Basic	COLA	Total	Estimated Annual Dollar Amount ² (\$ in '000s)
General Tier 1 Members								
Normal Cost	7.57%	2.75%	10.32%	\$783	7.55%	2.73%	10.28%	\$780
UAAL (Before POB Credit)	13.96%	4.69%	18.65%	1,415	13.53%	4.53%	18.06%	1,370
Pension Obligation Bond Credit	-3.64%	-1.56%	-5.20%	-394	-3.64%	-1.57%	-5.21%	-395
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-66	-0.82%	0.00%	-0.82%	-62
Total Contributions	17.02%	5.88%	22.90%	\$1,738	16.62%	5.69%	22.31%	\$1,693
General Tier 2 Members								
Normal Cost	7.74%	1.60%	9.34%	\$36,487	7.77%	1.60%	9.37%	\$36,604
UAAL (Before POB Credit)	13.96%	4.69%	18.65%	72,857	13.53%	4.53%	18.06%	70,552
Pension Obligation Bond Credit	-3.64%	-1.56%	-5.20%	-20,314	-3.64%	-1.57%	-5.21%	-20,353
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-3,399	-0.82%	0.00%	-0.82%	-3,203
Total Contributions	17.19%	4.73%	21.92%	\$85,631	16.84%	4.56%	21.40%	\$83,600
General Tier 4 Members								
Normal Cost	7.22%	1.63%	8.85%	\$19,046	7.18%	1.62%	8.80%	\$18,938
UAAL (Before POB Credit)	13.96%	4.69%	18.65%	40,136	13.53%	4.53%	18.06%	38,867
Pension Obligation Bond Credit	-3.64%	-1.56%	-5.20%	-11,191	-3.64%	-1.57%	-5.21%	-11,212
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-1,872	-0.82%	0.00%	-0.82%	-1,765
Total Contributions	16.67%	4.76%	21.43%	\$46,119	16.25%	4.58%	20.83%	\$44,828

¹ For employers with active member payroll. The UAAL contribution for ACOE, expressed as a level dollar amount, is \$89 K when made on April 1, 2021.

² Amounts are based on the December 31, 2019 projected compensation shown on page 47.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

County Only	December 31, 2019 Actuarial Valuation				December 31, 2018 Actuarial Valuation			
	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Safety Tier 1 Members								
Normal Cost	29.04%	11.96%	41.00%	\$312	28.37%	11.61%	39.98%	\$304
Member Cost Sharing Contributions (Adjusted for Refunds)	-3.00%	0.00%	-3.00%	-23	-3.00%	0.00%	-3.00%	-23
UAAL (Before POB Credit)	38.85%	12.28%	51.13%	389	37.80%	11.78%	49.58%	377
Pension Obligation Bond Credit	-3.21%	-1.98%	-5.19%	-39	-3.17%	-1.97%	-5.14%	-39
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-7	-0.82%	0.00%	-0.82%	-6
Total Contributions	60.81%	22.26%	83.07%	\$632	59.18%	21.42%	80.60%	\$613
Safety Tier 2 Members								
Normal Cost	17.86%	3.67%	21.53%	\$24,744	17.96%	3.69%	21.65%	\$24,882
Member Cost Sharing Contributions (Adjusted for Refunds)	-2.94%	0.00%	-2.94%	-3,379	-2.93%	0.00%	-2.93%	-3,367
UAAL (Before POB Credit)	38.85%	12.28%	51.13%	58,763	37.80%	11.78%	49.58%	56,982
Pension Obligation Bond Credit	-3.21%	-1.98%	-5.19%	-5,965	-3.17%	-1.97%	-5.14%	-5,907
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-1,000	-0.82%	0.00%	-0.82%	-942
Total Contributions	49.69%	13.97%	63.66%	\$73,163	48.84%	13.50%	62.34%	\$71,648
Safety Tier 2C Members								
Normal Cost	16.31%	3.56%	19.87%	\$619	16.51%	3.50%	20.01%	\$623
Member Cost Sharing Contributions (Adjusted for Refunds)	0.00%	0.00%	0.00%	0	0.00%	0.00%	0.00%	0
UAAL (Before POB Credit)	38.85%	12.28%	51.13%	1,593	37.80%	11.78%	49.58%	1,544
Pension Obligation Bond Credit	-3.21%	-1.98%	-5.19%	-162	-3.17%	-1.97%	-5.14%	-160
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-27	-0.82%	0.00%	-0.82%	-26
Total Contributions	51.08%	13.86%	64.94%	\$2,023	50.32%	13.31%	63.63%	\$1,981

¹ Amounts are based on the December 31, 2019 projected compensation shown on page 47.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

County Only	December 31, 2019 Actuarial Valuation				December 31, 2018 Actuarial Valuation			
	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)
Safety Tier 2D Members								
Normal Cost	17.45%	3.70%	21.15%	\$3,313	17.22%	3.69%	20.91%	\$3,276
Member Cost Sharing Contributions (Adjusted for Refunds)	-2.91%	0.00%	-2.91%	-456	-2.93%	0.00%	-2.93%	-459
UAAL (Before POB Credit)	38.85%	12.28%	51.13%	8,010	37.80%	11.78%	49.58%	7,767
Pension Obligation Bond Credit	-3.21%	-1.98%	-5.19%	-813	-3.17%	-1.97%	-5.14%	-805
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-136	-0.82%	0.00%	-0.82%	-128
Total Contributions	49.31%	14.00%	63.31%	\$9,918	48.10%	13.50%	61.60%	\$9,651
Safety Tier 4 Members								
Normal Cost	12.16%	3.26%	15.42%	\$6,559	12.29%	3.29%	15.58%	\$6,627
Member Cost Sharing Contributions (Adjusted for Refunds)	0.00%	0.00%	0.00%	0	0.00%	0.00%	0.00%	0
UAAL (Before POB Credit)	38.85%	12.28%	51.13%	21,748	37.80%	11.78%	49.58%	21,088
Pension Obligation Bond Credit	-3.21%	-1.98%	-5.19%	-2,208	-3.17%	-1.97%	-5.14%	-2,186
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-370	-0.82%	0.00%	-0.82%	-349
Total Contributions	46.93%	13.56%	60.49%	\$25,729	46.10%	13.10%	59.20%	\$25,180
All County Categories Combined								
Normal Cost	9.55%	2.07%	11.62%	\$91,863	9.57%	2.07%	11.64%	\$92,034
Member Cost Sharing Contributions (Adjusted for Refunds)	-0.49%	0.00%	-0.49%	-3,858	-0.49%	0.00%	-0.49%	-3,849
UAAL (Before POB Credit)	19.53%	6.39%	25.92%	204,911	18.96%	6.16%	25.12%	198,547
Pension Obligation Bond Credit	-3.54%	-1.66%	-5.20%	-41,086	-3.53%	-1.66%	-5.19%	-41,057
Implicit Retiree Health Benefit Subsidy	-0.87%	0.00%	-0.87%	-6,877	-0.82%	0.00%	-0.82%	-6,481
Total Contributions	24.18%	6.80%	30.98%	\$244,953	23.69%	6.57%	30.26%	\$239,194

¹ Amounts are based on the December 31, 2019 projected compensation shown on page 47.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

AHS, Court & First 5 Only	December 31, 2019 Actuarial Valuation				December 31, 2018 Actuarial Valuation			
	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)
General Tier 1 Members								
Normal Cost	7.57%	2.75%	10.32%	\$162	7.55%	2.73%	10.28%	\$161
UAAL (Before POB Credit)	13.96%	4.69%	18.65%	292	13.53%	4.53%	18.06%	283
Pension Obligation Bond Credit	-3.64%	-1.56%	-5.20%	-81	-3.64%	-1.57%	-5.21%	-82
Total Contributions	17.89%	5.88%	23.77%	\$373	17.44%	5.69%	23.13%	\$362
General Tier 2 Members								
Normal Cost	7.74%	1.60%	9.34%	\$18,156	7.77%	1.60%	9.37%	\$18,214
UAAL (Before POB Credit)	13.96%	4.69%	18.65%	36,253	13.53%	4.53%	18.06%	35,106
Pension Obligation Bond Credit	-3.64%	-1.56%	-5.20%	-10,108	-3.64%	-1.57%	-5.21%	-10,128
Total Contributions	18.06%	4.73%	22.79%	\$44,301	17.66%	4.56%	22.22%	\$43,192
General Tier 4 Members								
Normal Cost	7.22%	1.63%	8.85%	\$11,851	7.18%	1.62%	8.80%	\$11,784
UAAL (Before POB Credit)	13.96%	4.69%	18.65%	24,973	13.53%	4.53%	18.06%	24,183
Pension Obligation Bond Credit	-3.64%	-1.56%	-5.20%	-6,963	-3.64%	-1.57%	-5.21%	-6,976
Total Contributions	17.54%	4.76%	22.30%	\$29,861	17.07%	4.58%	21.65%	\$28,991

¹ Amounts are based on the December 31, 2019 projected compensation shown on page 47.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

Housing Authority	December 31, 2019 Actuarial Valuation				December 31, 2018 Actuarial Valuation			
	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)	Basic	COLA	Total	Estimated Annual Dollar Amount ¹ (\$ in '000s)
General Tier 1 Members								
Normal Cost	7.57%	2.75%	10.32%	\$297	7.55%	2.73%	10.28%	\$296
UAAL	13.96%	4.69%	18.65%	537	13.53%	4.53%	18.06%	520
Total Contributions	21.53%	7.44%	28.97%	\$834	21.08%	7.26%	28.34%	\$816
General Tier 2 Members								
Normal Cost	7.74%	1.60%	9.34%	\$21	7.77%	1.60%	9.37%	\$21
UAAL	13.96%	4.69%	18.65%	42	13.53%	4.53%	18.06%	40
Total Contributions	21.70%	6.29%	27.99%	\$63	21.30%	6.13%	27.43%	\$61
General Tier 4 Members								
Normal Cost	7.22%	1.63%	8.85%	\$127	7.18%	1.62%	8.80%	\$126
UAAL	13.96%	4.69%	18.65%	267	13.53%	4.53%	18.06%	258
Total Contributions	21.18%	6.32%	27.50%	\$394	20.71%	6.15%	26.86%	\$384

¹ Amounts are based on the December 31, 2019 projected compensation shown on page 47.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

LARPD	December 31, 2019 Actuarial Valuation				December 31, 2018 Actuarial Valuation			
	Basic	COLA	Total ¹	Estimated Annual Dollar Amount ² (\$ in '000s)	Basic	COLA	Total ¹	Estimated Annual Dollar Amount ² (\$ in '000s)
General Tier 1 Members								
Normal Cost	7.57%	2.75%	10.32%	\$64	7.55%	2.73%	10.28%	\$64
UAAL	18.63%	9.12%	27.75%	173	15.70%	7.64%	23.34%	145
Total Contributions	26.20%	11.87%	38.07%	\$237	23.25%	10.37%	33.62%	\$209
General Tier 3 Members								
Normal Cost	11.82%	4.25%	16.07%	\$291	10.92%	4.15%	15.07%	\$273
UAAL	18.63%	9.12%	27.75%	503	15.70%	7.64%	23.34%	423
Total Contributions	30.45%	13.37%	43.82%	\$794	26.62%	11.79%	38.41%	\$696
General Tier 4 Members								
Normal Cost	7.22%	1.63%	8.85%	\$168	7.18%	1.62%	8.80%	\$167
UAAL	18.63%	9.12%	27.75%	526	15.70%	7.64%	23.34%	443
Total Contributions	25.85%	10.75%	36.60%	\$694	22.88%	9.26%	32.14%	\$610

¹ For LARPD, the combined rate is 39.83% as of December 31, 2019 and 34.98% as of December 31, 2018.

² Amounts are based on the December 31, 2019 projected compensation shown on page 47.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

All Categories Combined	December 31, 2019 Actuarial Valuation			Estimated Annual Dollar Amount ¹ (\$ in '000s)	December 31, 2018 Actuarial Valuation			Estimated Annual Dollar Amount ¹ (\$ in '000s)
	Basic	COLA	Total		Basic	COLA	Total	
All Categories Combined								
Normal Cost (Net)	8.61%	1.94%	10.55%	\$119,142	8.62%	1.94%	10.56%	\$119,291
UAAL (Net)	13.73%	4.28%	18.01%	203,362	13.23%	4.06%	17.29%	195,224
Total Contributions	22.34%	6.22%	28.56%	\$322,504	21.85%	6.00%	27.85%	\$314,515

Payroll Breakdown (\$ in '000s)

	County Only	AHS, Court, & First 5	Housing Authority	LARPD	Total
General Tier 1	\$7,586	\$1,566	\$2,879	\$623	\$12,654
General Tier 2	390,655	194,387	224		585,266
General Tier 3				1,811	1,811
General Tier 4	215,208	133,904	1,430	1,897	352,439
Safety Tier 1	761				761
Safety Tier 2	114,929				114,929
Safety Tier 2C	3,115				3,115
Safety Tier 2D	15,666				15,666
Safety Tier 4	42,534				42,534
Total	\$790,454	\$329,857	\$4,533	\$4,331	\$1,129,175

¹ Amounts are based on the December 31, 2019 projected compensation shown above.

Section 2: Actuarial Valuation Results

Recommended Employer Contribution Rates (continued)

A breakdown of the approximate¹ portion of the employer contribution rate by the various types of benefit is as follows:

	General	Safety
Service and non-service connected disability benefits	8%	24%
Service retirement and other benefits	92%	76%
Total	100%	100%

¹ In developing these percentages, we made the simplifying assumption that the liability for active and inactive members (including members who have already retired) can be approximated by the proportion of the normal cost required to fund disability and non-disability benefits.

Section 2: Actuarial Valuation Results

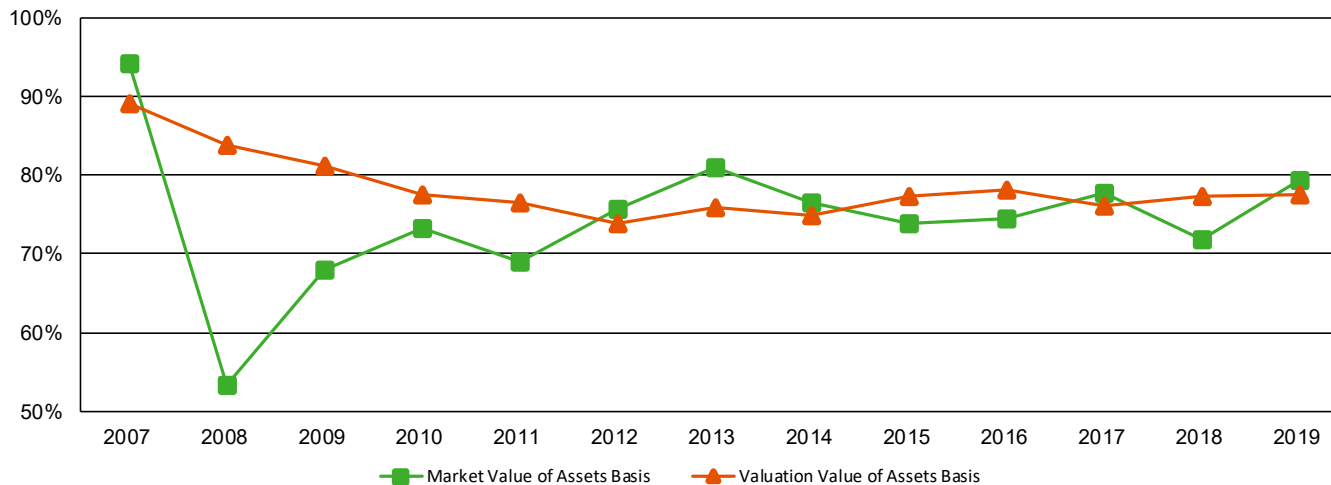
G. Funded Status

A commonly reported piece of information regarding the Plan's financial status is the funded ratio. These ratios compare the Market and Valuation Value of Assets to the Actuarial Accrued Liability of the Plan. High ratios indicate a well-funded plan with assets sufficient to cover the Plan's Actuarial Accrued Liability. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other changes.

The chart below depicts a history of the funded ratio for the Plan. The chart on the next page shows the Plan's schedule of funding progress for the last ten years.

The funded status measures shown in this valuation are appropriate for assessing the need for or amount of future contributions. However, they are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligations. As the chart below shows, the measures are different depending on whether the Valuation or Market Value of Assets is used.

Funded Ratio for Years Ended December 31, 2007 – 2019¹



¹ Prior to the December 31, 2013 valuation, the Funded Ratio on a Market Value basis was calculated using the end-of-year Valuation Value of Assets plus any deferred market gains. Beginning with the December 31, 2013 valuation, the Market Value of Assets for this purpose includes either one-half of any deferred market gains (after adjustment to include the balance in the Contingency Reserve) or a proportion of any deferred investment losses after netting out the Contingency Reserve that is commensurate with the size of the valuation reserves.

Section 2: Actuarial Valuation Results

Schedule of Funding Progress for Years Ended December 31, 2010 – 2019

Actuarial Valuation Date as of December 31	Valuation Value of Assets ¹ (a)	Actuarial Accrued Liability (AAL) ² (b)	Unfunded AAL (UAAL) (b) - (a)	Funded Ratio (%) (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll (%) [(b) - (a)] / (c)
2010	\$4,776,128,000	\$6,162,740,000	\$1,386,612,000	77.5%	\$898,342,000	154.4%
2011	4,868,689,000	6,359,483,000	1,490,794,000	76.6%	892,489,000	167.0%
2012	4,883,872,000	6,612,929,000	1,729,057,000	73.9%	906,500,000	190.7%
2013	5,210,944,000	6,861,687,000	1,650,743,000	75.9%	916,803,000	180.1%
2014	5,681,097,000	7,592,072,000	1,910,975,000	74.8%	948,848,000	201.4%
2015	6,083,536,000	7,875,020,000	1,791,484,000	77.3%	969,534,000	184.8%
2016	6,436,138,000	8,237,715,000	1,801,577,000	78.1%	1,003,651,000	179.5%
2017	6,830,379,000	8,987,061,000	2,156,682,000	76.0%	1,055,661,000	204.3%
2018	7,239,327,000	9,376,397,000	2,137,070,000	77.2%	1,093,735,000	195.4%
2019	7,599,977,000	9,795,019,000	2,195,042,000	77.6%	1,129,175,000	194.4%

¹ Excludes assets for SRBR and other non-valuation reserves, and includes the following (whole dollar) reimbursement amounts of implicit retiree health benefit subsidy paid by the County (amounts beginning with the December 31, 2010 valuation date are estimates provided by ACERA):

Actuarial Valuation Date	Reimbursement Amount	For Year	Actuarial Valuation Date	Reimbursement Amount	For Year
12/31/2009	\$5,287,767	2009	12/31/2015	\$5,324,502	2015
12/31/2010	4,500,000	2010	12/31/2016	8,865,275	2016
12/31/2011	4,411,206	2011	12/31/2017	5,830,283	2017
12/31/2012	7,370,466	2012	12/31/2018	6,939,808	2018
12/31/2013	6,993,032	2013	12/31/2019	6,510,876	2019
12/31/2014	5,215,355	2014			

² Excludes liabilities for SRBR and other non-valuation reserves.

Section 2: Actuarial Valuation Results

H. Actuarial Balance Sheet

An overview of the Plan's funding is given by an Actuarial Balance Sheet. In this approach, first the amount and timing of all future payments that will be made by the Plan for current participants is determined. Then these payments are discounted at the valuation interest rate to the date of the valuation, thereby determining the present value, referred to as the actuarial present value of future benefits of the Plan.

Second, this actuarial present value of future benefits is compared to the assets. The "assets" for this purpose include the net amount of assets already accumulated by the Plan, the present value of future member contributions, the present value of future employer normal cost contributions, and the present value of future employer amortization payments for the unfunded actuarial accrued liability.

Actuarial Balance Sheet for Year Ended December 31, 2019

	Basic (\$ in '000s)	COLA (\$ in '000s)	Total (\$ in '000s)
Actuarial present value of future benefits			
• Present value of benefits for retired members and beneficiaries	\$3,736,215	\$2,270,011	\$6,006,226
• Present value of benefits for inactive vested members	221,112	39,641	260,753
• Present value of benefits for active members	<u>4,255,512</u>	<u>997,239</u>	<u>5,252,751</u>
Total actuarial present value of future benefits	\$8,212,839	\$3,306,891	\$11,519,730
Current and future assets			
• Total valuation value of assets	\$5,164,550	\$2,435,427	\$7,599,977
• Present value of future contributions by members	705,079	175,682	880,761
• Present value of future employer contributions for:			
• Entry age normal cost	697,986	145,964	843,950
• Unfunded actuarial accrued liability	<u>1,645,224</u>	<u>549,818</u>	<u>2,195,042</u>
Total of current and future assets	<u>\$8,212,839</u>	<u>\$3,306,891</u>	<u>\$11,519,730</u>

Section 2: Actuarial Valuation Results

I. Volatility Ratios

Retirement plans are subject to volatility in the level of required contributions. This volatility tends to increase as retirement plans become more mature.

The Asset Volatility Ratio (AVR), which is equal to the market value of assets divided by total payroll, provides an indication of the potential contribution volatility for any given level of investment volatility. A higher AVR indicates that the plan is subject to a greater level of contribution volatility. This is a current measurement since it is based on the current level of assets.

The current AVR is about 6.9. This means that a 1% asset gain or loss (relative to the assumed investment return) translates to about 6.9% of one-year's payroll. Since actuarial gains and losses are amortized over 20 years, there would be a 0.5% of payroll decrease/(increase) in the required contribution for each 1% asset gain or loss.

The Liability Volatility Ratio (LVR), which is equal to the actuarial accrued liability divided by payroll, provides an indication of the longer-term potential for contribution volatility for any given level of investment volatility. This is because, over an extended period of time, the plan's assets should track the plan's liabilities.

The LVR also indicates how volatile contributions will be in response to changes in the actuarial accrued liability due to actual experience or to changes in actuarial assumptions. The current LVR is about 8.7, but is 7.4 for General (non-LARPD) compared to 14.1 for General (LARPD) and 15.4 for Safety. This means that assumption changes will have a greater impact on employer contribution rates for General (LARPD) and Safety than for General (non-LARPD).

The increase in the AVR and LVR for LARPD this year was caused by an about 12% reduction in the payroll for LARPD (relative to the assumption) as reported in the December 31, 2019 valuation.

The chart on the next page shows how the asset and liability volatility ratios have varied over time.

Section 2: Actuarial Valuation Results

Volatility Ratios for Years Ended 2010 – 2019

Year Ended December 31	Asset Volatility Ratio ^{1,2}				Liability Volatility Ratio ²			
	General (non-LARPD)	General (LARPD)	Safety	Total	General (non-LARPD)	General (LARPD)	Safety	Total
2010	4.6	3.9	7.0	5.0	6.0	5.6	11.2	6.9
2011	4.5	4.2	7.0	4.9	6.2	6.8	11.9	7.1
2012	5.0	4.9	8.2	5.5	6.3	7.0	12.7	7.3
2013	5.5	5.7	9.1	6.1	6.4	7.4	13.1	7.5
2014	5.5	5.9	9.3	6.1	6.9	7.7	13.9	8.0
2015	5.5	5.7	8.8	6.0	7.0	7.3	13.7	8.1
2016	5.6	6.1	8.9	6.1	7.1	7.7	13.8	8.2
2017	6.0	7.6	9.8	6.6	7.3	9.1	14.6	8.5
2018	5.5	9.0	9.5	6.2	7.3	12.5	15.1	8.6
2019	6.1	11.1	10.8	6.9	7.4	14.1	15.4	8.7

¹ Prior to the December 31, 2013 valuation, the Asset Volatility Ratio was calculated using the end-of-year Valuation Value of Assets plus any deferred market gains. Beginning with the December 31, 2013 valuation, the adjusted Valuation Value of Assets for this purpose includes either one-half of any deferred market gains (after restoring the Contingency Reserve to 1% of total assets, if applicable) or a proportion of any deferred investment losses after netting out the Contingency Reserve that is commensurate with the size of the valuation reserves.

² Prior to the December 31, 2018 valuation, volatility ratios for the General (non-LARPD) group were calculated including assets, liabilities, and payroll attributable to Tier 1 members from the Livermore Area Recreation and Park District (LARPD) and the Alameda County Office of Education (payroll was \$0 as of December 31, 2017). Beginning with the December 31, 2018 valuation, the assets, liabilities, and payroll attributable to LARPD Tier 1 members are included in calculating the volatility ratios for the General (LARPD) group, and the assets and liabilities attributable to Office of Education Tier 1 members are excluded from this table.

Section 2: Actuarial Valuation Results

J. Risk Assessment

Since the actuarial valuation results are dependent on a fixed set of assumptions and data as of a specific date, there is risk that emerging results may differ, perhaps significantly, as actual experience is fluid and will not exactly track current assumptions. This potential divergence may have a significant impact on the future financial condition of the plan.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a concise discussion of some of the primary risks that may affect the Plan's future financial condition. We recommend a more detailed assessment of the risks to provide the Board with a better understanding of the risks inherent in the Plan that can inform both financial preparation and future decision making. This assessment would enable us to work with the Board to highlight and illustrate particular risks or potential future outcomes they may be interested in discussing and could include scenario testing, sensitivity testing, stress testing and stochastic modeling. As noted in the valuation highlights section of this report, a copy of the risk assessment report including the analysis recommended by Segal in consultation with ACERA staff will be available later in 2020.

This section provides descriptions and basic assessments of the primary risks that are likely to have an ongoing influence on the Plan's financial health, as well as a discussion of historical trends and maturity measures:

Risk Assessments

- Asset/Liability Mismatch Risk (the potential that future plan experience does not affect asset and liability values in the same way, causing them to diverge)

The most significant asset/liability mismatch risk to the Plan is investment risk, as discussed below. In fact, investment risk has the potential to impact asset/liability mismatch in two ways. The first mismatch is evident in annual valuations: when asset values deviate from assumptions they are typically independent from liability changes. The second mismatch can be caused when systemic asset deviations from assumptions may signal the need for an assumption change, which causes liability values and contribution rates to move in the opposite direction from any change in the expected experience of asset growth rates.

Asset/liability mismatch can also be caused by demographic assumption risk such as longevity, which affects liabilities but have no impact on asset levels. This risk is also discussed below.

- Investment Risk (the risk that investment returns will be different than expected)

The investment return assumption is a long-term, static assumption for valuation purposes even though in reality market experience can be quite volatile in any given year. That volatility can cause significant changes in the financial condition of the Plan, affecting both funded status and contribution rates. The inherent year-to-year volatility is reduced by smoothing through the Actuarial Value of Assets, however investment experience can still have a sizable impact. As discussed in *Section 2*,

Section 2: Actuarial Valuation Results

Subsection I, Volatility Ratios, on page 52, a 1% asset gain or loss (relative to the assumed investment return) translates to about 6.9% of one-year's payroll. Since actuarial gains and losses are amortized over 20 years, there would be a 0.5% of payroll decrease/(increase) in the required contribution for each 1% asset gain/(loss).

The year-by-year market value rate of return over the last 10 years has ranged from a low of -4.62% to a high of 19.53%.

- Longevity Risk (the risk that mortality experience will be different than expected)

The actuarial valuation includes current life expectancy assumptions and an expectation of future improvement in life expectancy, which are significant assumptions given the relatively long duration of liabilities for pension plans. Emerging plan experience that does not match these expectations will result in increases or decreases in the actuarially determined contribution over time. This risk can be reduced by using tables appropriate for the Plan (public experience tables) that are weighted by benefit levels, and by using generational mortality projections.

- Other Risks

In addition to longevity, the valuation includes a variety of other assumptions that are unlikely to match future experience exactly. One example is projected salary scales over time. As salary is central to the determination of benefits paid in retirement, deviations from the projected salary scales could have a material impact on the benefits anticipated for each member. Examples of demographic assumptions include retirement, termination and disability assumptions, and will likely vary in significance for different groups (for example, disability assumptions are typically more significant for Safety groups).

Some plans also carry significant contribution risk, defined as the potential for actual future contributions deviating from expected future contributions. However, the employer has a proven track-record of making the Actuarially Determined Contributions based on the Board's Actuarial Funding Policy, so contribution risk is minimal.

Evaluation of Historical Trends

Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past ten years:

- The funded percentage on the Valuation Value of Assets has fluctuated within a relatively narrow band from 73.9% to 78.1%. This is primarily due to contributions made to amortize the UAAL (i.e., amortizing each gain/loss layer of UAAL over 20 years) being roughly offset by lower than assumed average investment returns over recent years on a smoothed basis. For a more detailed history see *Section 2, Subsection G, Funded Status* starting on page 49.
- The geometric average investment return on the Actuarial Value of Assets over the last 10 years was 6.53%. This includes a high of 12.05% return and a low of 1.67%. The average over the last 5 years was 7.41%. For more details see the Investment Return table in *Section 2, Subsection C* on page 26.

Section 2: Actuarial Valuation Results

- Beyond investment losses, the primary source of new UAAL was the strengthening of assumptions through multiple assumption changes. For example, the assumption changes in 2014 added \$459 million in unfunded liability. The assumption changes in 2017 changed the discount rate from 7.60% to 7.25% (as well as various other changes) adding \$396 million in unfunded liability. For more details on unfunded liability changes see *Section 3, Exhibit H, Table of Amortization Bases* starting on page 82. A graphical representation of historical changes in UAAL by source will be included in the stand-alone risk assessment report.
- The plan's funding policy effectively deals with these unfunded liabilities over time. This can be seen most clearly in the *Section 3, Exhibit I, Projection of UAAL Balances and Payments* provided on pages 88 and 89.

Maturity Measures

In the last 10 years the ratio of members in pay status to active participants has increased from 0.69 to 0.89. An increased ratio indicates that the plan has grown in maturity over time. This is to be expected, but is also informative to understanding plan sensitivity to particular risks. For more details see *Section 2, Subsection A, Member Data* on page 17.

As pension plans mature, the cash needed to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities. For the prior year, benefits paid were \$101 million more than contributions received. Plans with high levels of negative cash flows may have a need for a larger allocation to income generating assets, which can create a drag on investment return. However, the plan currently has a relatively low level of negative cash flow. For more details on historical cash flows see the Comparison of Contributions with Benefits in *Section 2, Subsection B* on page 21.

A further discussion of plan maturity measures and how they relate to changes in assets and liabilities is included in *Section 2, Subsection I, Volatility Ratios* starting on page 52.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage

Total Plan

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	11,336	11,349	-0.1%
• Average age	47.1	47.0	0.1
• Average years of service	11.3	11.4	-0.1
• Total projected compensation	\$1,129,176,948	\$1,093,735,678	3.2%
• Average projected compensation	\$99,610	\$96,373	3.4%
• Account balances	\$1,258,309,062	\$1,223,982,697	2.8%
• Total active vested members	7,699	7,665	0.4%
Inactive vested members:			
• Number ¹	2,821	2,568	9.9%
• Average Age	47.3	47.9	-0.6
Retired members:			
• Number in pay status	7,888	7,628	3.4%
• Average age	72.1	72.0	0.1
• Average monthly benefit ²	\$4,425	\$4,301	2.9%
Disabled members:			
• Number in pay status	951	924	2.9%
• Average age	64.7	64.7	0.0
• Average monthly benefit ²	\$3,672	\$3,565	3.0%
Beneficiaries:			
• Number in pay status	1,239	1,231	0.6%
• Average age	75.5	75.2	0.3
• Average monthly benefit ²	\$2,448	\$2,329	5.1%

Notes: For all the General and Safety Tiers combined, the average age at retirement for the service retirees and disabled retirees was 60.1 and 49.8, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

General Tier 1

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	133	158	-15.8%
• Average age	60.6	60.0	0.6
• Average years of service	30.3	29.9	0.4
• Total projected compensation	\$12,653,976	\$14,710,117	-14.0%
• Average projected compensation	\$95,143	\$93,102	2.2%
• Account balances	\$55,949,318	\$63,233,064	-11.5%
• Total active vested members	133	158	-15.8%
Inactive vested members:			
• Number ¹	43	52	-17.3%
• Average Age	62.7	62.3	0.4
Retired members:			
• Number in pay status	3,084	3,189	-3.3%
• Average age	76.8	76.3	0.5
• Average monthly benefit ²	\$5,143	\$4,902	4.9%
Disabled members:			
• Number in pay status	143	151	-5.3%
• Average age	74.3	73.8	0.5
• Average monthly benefit ²	\$3,348	\$3,209	4.3%
Beneficiaries:			
• Number in pay status	680	706	-3.7%
• Average age	80.3	79.9	0.4
• Average monthly benefit ²	\$2,465	\$2,332	5.7%

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the General Tier 1 service and disabled retirees was 59.3 and 51.7, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

General Tier 2

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	5,659	6,075	-6.8%
• Average age	52.1	51.6	0.5
• Average years of service	16.6	15.9	0.7
• Total projected compensation	\$585,265,989	\$600,715,279	-2.6%
• Average projected compensation	\$103,422	\$98,883	4.6%
• Account balances	\$774,077,768	\$772,973,971	0.1%
• Total active vested members	5,528	5,926	-6.7%
Inactive vested members:			
• Number ¹	1,768	1,792	-1.3%
• Average Age	50.3	50.0	0.3
Retired members:			
• Number in pay status	3,562	3,250	9.6%
• Average age	69.6	69.4	0.2
• Average monthly benefit ²	\$2,855	\$2,693	6.0%
Disabled members:			
• Number in pay status	472	458	3.1%
• Average age	64.8	64.5	0.3
• Average monthly benefit ²	\$2,681	\$2,616	2.5%
Beneficiaries:			
• Number in pay status	283	255	11.0%
• Average age	68.0	66.8	1.2
• Average monthly benefit ²	\$1,447	\$1,360	6.4%

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the General Tier 2 service and disabled retirees was 62.5 and 50.6, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

General Tier 3

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	20	24	-16.7%
• Average age	53.9	54.0	-0.1
• Average years of service	14.0	15.8	-1.8
• Total projected compensation	\$1,811,498	\$2,050,537	-11.7%
• Average projected compensation	\$90,575	\$85,439	6.0%
• Account balances	\$3,421,771	\$4,558,015	-24.9%
• Total active vested members	18	22	-18.2%
Inactive vested members:			
• Number ¹	13	12	8.3%
• Average Age	49.5	49.2	0.3
Retired members:			
• Number in pay status	30	26	15.4%
• Average age	63.4	63.0	0.4
• Average monthly benefit ²	\$4,429	\$4,169	6.2%
Disabled members:			
• Number in pay status	1	1	0.0%
• Average age	66.1	65.1	1.0
• Average monthly benefit ²	\$2,191	\$2,127	3.0%
Beneficiaries:			
• Number in pay status	3	3	0.0%
• Average age	63.0	62.0	1.0
• Average monthly benefit ²	\$3,493	\$3,391	3.0%

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the General Tier 3 service and disabled retirees was 58.7 and 62.6, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

General Tier 4

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	4,148	3,703	12.0%
• Average age	41.0	40.2	0.8
• Average years of service	3.1	2.7	0.4
• Total projected compensation	\$352,439,734 ¹	\$303,387,662	16.2%
• Average projected compensation	\$84,966	\$81,930	3.7%
• Account balances	\$88,004,346	\$62,652,374	40.5%
• Total active vested members	895	450	98.9%
Inactive vested members:			
• Number ²	820	552	48.6%
• Average Age	40.5	40.0	0.5
Retired members:			
• Number in pay status	21	8	162.5%
• Average age	67.1	69.6	-2.5
• Average monthly benefit ³	\$1,178	\$1,447	-18.6%
Disabled members:			
• Number in pay status	2	1	100.0%
• Average age	61.3	66.9	-5.6
• Average monthly benefit ³	\$2,017	\$1,727	16.8%
Beneficiaries:			
• Number in pay status	0	0	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit ³	N/A	N/A	N/A

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the General Tier 4 service and disabled retirees was 66.0 and 58.2, respectively.

¹ Projected compensation for 2020 has been limited. It is our understanding that in the determination of pension benefits under the CalPEPRA formulas, the compensation that can be taken into account for 2020 is equal to \$126,291. (For an employer that is not enrolled in Social Security, the maximum amount is 120% of \$126,291, or \$151,549). (reference: Section 7522.10). These amounts should be adjusted for changes to the Consumer Price Index for All Urban Consumers after 2020. (reference: Section 7522.10(d)).

² Includes inactive members due a refund of member contributions.

³ Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

Safety Tier 1

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	3	4	-25.0%
• Average age	64.5	61.9	2.6
• Average years of service	29.2	29.2	0.0
• Total projected compensation	\$761,481	\$972,954	-21.7%
• Average projected compensation	\$253,827	\$243,239	4.4%
• Account balances	\$3,309,986	\$3,992,044	-17.1%
• Total active vested members	3	4	-25.0%
Inactive vested members:			
• Number ¹	6	8	-25.0%
• Average Age	62.7	59.4	3.3
Retired members:			
• Number in pay status	605	612	-1.1%
• Average age	73.0	72.2	0.8
• Average monthly benefit ²	\$8,546	\$8,303	2.9%
Disabled members:			
• Number in pay status	94	99	-5.1%
• Average age	70.4	69.7	0.7
• Average monthly benefit ²	\$5,874	\$5,750	2.2%
Beneficiaries:			
• Number in pay status	196	195	0.5%
• Average age	75.4	74.8	0.6
• Average monthly benefit ²	\$3,743	\$3,481	7.5%

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the Safety Tier 1 service and disabled retirees was 54.9 and 48.4, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

Safety Tier 2

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	844	917	-8.0%
• Average age	47.1	46.5	0.6
• Average years of service	17.1	16.3	0.8
• Total projected compensation	\$114,928,537	\$119,570,783	-3.9%
• Average projected compensation	\$136,171	\$130,393	4.4%
• Account balances	\$293,552,702	\$285,854,627	2.7%
• Total active vested members	844	916	-7.9%
Inactive vested members:			
• Number ¹	122	125	-2.4%
• Average Age	47.2	47.1	0.1
Retired members:			
• Number in pay status	579	537	7.8%
• Average age	63.0	62.8	0.2
• Average monthly benefit ²	\$6,107	\$5,982	2.1%
Disabled members:			
• Number in pay status	233	212	9.9%
• Average age	56.7	56.5	0.2
• Average monthly benefit ²	\$4,996	\$4,855	2.9%
Beneficiaries:			
• Number in pay status	77	72	6.9%
• Average age	61.7	60.1	1.6
• Average monthly benefit ²	\$2,634	\$2,573	2.4%

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the Safety Tier 2 service and disabled retirees was 55.6 and 47.3, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

Safety Tier 2C

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	25	28	-10.7%
• Average age	44.0	43.2	0.8
• Average years of service	9.1	8.0	1.1
• Total projected compensation	\$3,115,284	\$3,348,788	-7.0%
• Average projected compensation	\$124,611	\$119,600	4.2%
• Account balances	\$2,926,564	\$2,724,956	7.4%
• Total active vested members	24	24	0.0%
Inactive vested members:			
• Number ¹	10	7	42.9%
• Average Age	45.0	44.6	0.4
Retired members:			
• Number in pay status	1	1	0.0%
• Average age	52.5	51.5	1.0
• Average monthly benefit ²	\$858	\$841	2.0%
Disabled members:			
• Number in pay status	0	0	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit ²	N/A	N/A	N/A
Beneficiaries:			
• Number in pay status	0	0	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit ²	N/A	N/A	N/A

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the Safety Tier 2C service retirees was 50.0.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

Safety Tier 2D

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	125	121	3.3%
• Average age	41.1	39.9	1.2
• Average years of service	8.9	8.0	0.9
• Total projected compensation	\$15,666,177	\$14,392,198	8.9%
• Average projected compensation	\$125,329	\$118,944	5.4%
• Account balances	\$16,239,989	\$13,249,563	22.6%
• Total active vested members	110	102	7.8%
Inactive vested members:			
• Number ¹	12	10	20.0%
• Average Age	41.3	40.7	0.6
Retired members:			
• Number in pay status	1	2	-50.0%
• Average age	53.7	56.0	-2.3
• Average monthly benefit ²	\$616	\$1,182	-47.9%
Disabled members:			
• Number in pay status	6	2	200.0%
• Average age	49.6	45.4	4.2
• Average monthly benefit ²	\$4,254	\$4,586	-7.2%
Beneficiaries:			
• Number in pay status	0	0	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit ²	N/A	N/A	N/A

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the Safety Tier 2D service and disabled retirees was 52.0 and 47.9, respectively.

¹ Includes inactive members due a refund of member contributions.

² Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit A: Table of Plan Coverage (continued)

Safety Tier 4

Category	Year Ended December 31		Change From Prior Year
	2019	2018	
Active members in valuation:			
• Number	379	319	18.8%
• Average age	36.1	35.9	0.2
• Average years of service	3.8	3.5	0.3
• Total projected compensation	\$42,534,273 ¹	\$34,587,361	23.0%
• Average projected compensation	\$112,228	\$108,424	3.5%
• Account balances	\$20,826,619	\$14,744,082	41.3%
• Total active vested members	144	63	128.6%
Inactive vested members:			
• Number ²	27	10	170.0%
• Average Age	34.1	36.4	-2.3
Retired members:			
• Number in pay status	5	3	66.7%
• Average age	59.9	57.4	2.5
• Average monthly benefit ³	\$1,437	\$1,478	-2.8%
Disabled members:			
• Number in pay status	0	0	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit ³	N/A	N/A	N/A
Beneficiaries:			
• Number in pay status	0	0	N/A
• Average age	N/A	N/A	N/A
• Average monthly benefit ³	N/A	N/A	N/A

Notes: Based on the data provided for the December 31, 2019 actuarial valuation, the average age at retirement for the Safety Tier 4 service retirees was 58.9.

¹ Projected compensation for 2020 has been limited. It is our understanding that in the determination of pension benefits under the CalPEPRA formulas, the compensation that can be taken into account for 2020 is equal to \$126,291. (For an employer that is not enrolled in Social Security, the maximum amount is 120% of \$126,291, or \$151,549). (reference: Section 7522.10). These amounts should be adjusted for changes to the Consumer Price Index for All Urban Consumers after 2020. (reference: Section 7522.10(d)).

² Includes inactive members due a refund of member contributions.

³ Excludes supplemental benefits paid from SRBR.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation

Total Plan

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	106	106	--	--	--	--	--	--	--	--
	\$65,779	\$65,779	--	--	--	--	--	--	--	--
25 – 29	604	547	57	--	--	--	--	--	--	--
	78,791	77,722	\$89,056	--	--	--	--	--	--	--
30 – 34	1,235	819	364	52	--	--	--	--	--	--
	89,308	85,629	96,627	\$96,016	--	--	--	--	--	--
35 – 39	1,499	637	441	383	37	1	--	--	--	--
	97,149	87,876	100,349	107,558	\$108,414	\$189,374	--	--	--	--
40 – 44	1,512	463	350	396	252	51	--	--	--	--
	101,949	92,042	100,044	111,529	105,282	114,117	--	--	--	--
45 – 49	1,669	357	280	351	417	230	33	1	--	--
	106,733	92,490	103,417	110,711	111,068	119,249	\$105,482	\$79,016	--	--
50 – 54	1,562	297	220	260	347	235	157	45	1	--
	105,725	99,004	102,184	105,872	107,156	116,062	107,322	96,043	\$102,598	--
55 – 59	1,503	224	198	223	309	192	172	160	25	--
	101,561	92,209	105,156	104,519	96,848	104,439	107,225	106,611	95,357	--
60 – 64	1,115	144	173	157	221	147	118	108	41	6
	103,643	92,488	108,326	100,326	100,948	105,626	105,675	111,828	116,071	\$101,537
65 – 69	419	44	73	80	70	53	33	46	14	6
	101,070	97,303	103,839	92,379	91,585	97,359	108,808	113,354	126,807	157,540
70 & over	112	15	15	18	24	10	16	5	2	7
	95,617	85,274	114,975	83,364	95,467	101,439	91,820	83,888	98,478	116,248
Total	11,336	3,653	2,171	1,920	1,677	919	529	365	83	19
	\$99,610	\$87,645	\$101,253	\$106,609	\$104,340	\$111,496	\$106,432	\$107,315	\$111,056	\$124,642

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

General Tier 1

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
25 – 29	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
30 – 34	1	--	1	--	--	--	--	--	--	--
	\$61,296	--	\$61,296	--	--	--	--	--	--	--
35 – 39	2	--	--	2	--	--	--	--	--	--
	71,012	--	--	\$71,012	--	--	--	--	--	--
40 – 44	6	--	2	3	1	--	--	--	--	--
	82,837	--	74,667	70,864	\$135,095	--	--	--	--	--
45 – 49	5	--	1	2	2	--	--	--	--	--
	73,313	--	55,082	85,807	69,933	--	--	--	--	--
50 – 54	10	--	--	3	6	1	--	--	--	--
	83,596	--	--	67,167	93,607	\$72,821	--	--	--	--
55 – 59	24	--	--	--	4	2	1	4	13	--
	84,391	--	--	--	74,156	76,308	\$60,788	\$88,586	\$89,308	--
60 – 64	51	--	3	3	1	1	3	7	27	6
	97,635	--	101,436	83,067	73,173	143,952	61,511	94,138	102,076	\$101,537
65 – 69	27	--	--	2	2	2	2	3	10	6
	108,615	--	--	129,108	83,927	64,597	96,164	80,386	99,861	157,540
70 & over	7	--	--	--	--	--	--	--	--	7
	116,248	--	--	--	--	--	--	--	--	116,248
Total	133	--	7	15	16	6	6	14	50	19
	\$95,143	--	\$81,432	\$82,343	\$85,891	\$83,097	\$72,941	\$89,605	\$98,313	\$124,642

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

General Tier 2

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
25 – 29	5	2	3	--	--	--	--	--	--	--
	\$60,212	\$56,971	\$62,372	--	--	--	--	--	--	--
30 – 34	158	12	115	31	--	--	--	--	--	--
	88,008	101,171	91,039	\$71,670	--	--	--	--	--	--
35 – 39	487	21	194	248	24	--	--	--	--	--
	101,953	114,695	108,316	97,506	\$85,322	--	--	--	--	--
40 – 44	738	26	192	295	191	34	--	--	--	--
	102,684	138,341	104,274	105,785	93,840	\$89,212	--	--	--	--
45 – 49	926	23	145	278	315	137	27	1	--	--
	106,078	140,974	109,994	106,507	104,696	101,248	\$92,538	\$79,016	--	--
50 – 54	1,024	16	134	226	281	179	145	42	1	--
	105,983	171,483	109,562	104,251	102,679	110,027	103,390	92,836	\$102,598	--
55 – 59	1,106	16	113	197	281	170	168	149	12	--
	102,101	124,375	105,988	103,136	94,584	100,772	106,539	106,093	101,910	--
60 – 64	826	13	98	143	211	139	113	98	11	--
	105,979	117,179	120,310	98,112	100,332	105,286	106,364	111,812	128,516	--
65 – 69	304	2	42	71	66	46	31	43	3	--
	100,077	111,693	107,252	89,095	87,922	97,964	109,623	115,654	229,648	--
70 & over	85	1	10	18	24	9	16	5	2	--
	93,965	87,393	126,268	83,364	95,467	84,411	91,820	83,888	98,478	--
Total	5,659	132	1,046	1,507	1,393	714	500	338	29	--
	\$103,422	\$129,877	\$106,936	\$101,495	\$98,812	\$103,125	\$104,551	\$106,912	\$125,003	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

General Tier 3

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
25 – 29	--	--	--	--	--	--	--	--	--	--
30 – 34	--	--	--	--	--	--	--	--	--	--
35 – 39	2	2	--	--	--	--	--	--	--	--
40 – 44	\$109,341	\$109,341	--	--	--	--	--	--	--	--
45 – 49	1	--	--	--	--	1	--	--	--	--
50 – 54	74,323	--	--	--	--	\$74,323	--	--	--	--
55 – 59	2	--	1	--	--	1	--	--	--	--
60 – 64	78,428	--	\$74,823	--	--	82,033	--	--	--	--
65 – 69	4	--	2	1	--	1	--	--	--	--
70 & over	80,363	--	86,758	\$74,323	--	73,613	--	--	--	--
Total	6	--	1	3	2	--	--	--	--	--
	92,683	--	103,200	100,117	\$76,275	--	--	--	--	--
	4	--	2	--	1	1	--	--	--	--
	99,085	--	107,729	--	73,717	107,165	--	--	--	--
	1	--	--	--	--	--	--	--	1	--
	87,746	--	--	--	--	--	--	--	\$87,746	--
	--	--	--	--	--	--	--	--	--	--
Total	20	2	6	4	3	4	--	--	1	--
	\$90,575	\$109,341	\$94,500	\$93,668	\$75,423	\$84,283	--	--	\$87,746	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

General Tier 4

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	93	93	--	--	--	--	--	--	--	--
	\$61,889	\$61,889	--	--	--	--	--	--	--	--
25 – 29	508	476	32	--	--	--	--	--	--	--
	74,567	74,743	\$71,936	--	--	--	--	--	--	--
30 – 34	900	743	157	--	--	--	--	--	--	--
	84,676	84,227	86,803	--	--	--	--	--	--	--
35 – 39	770	573	194	3	--	--	--	--	--	--
	85,581	85,400	86,379	\$68,384	--	--	--	--	--	--
40 – 44	545	417	122	5	1	--	--	--	--	--
	87,530	87,593	87,993	72,073	\$82,033	--	--	--	--	--
45 – 49	440	324	113	2	1	--	--	--	--	--
	89,040	88,093	91,151	126,291	82,985	--	--	--	--	--
50 – 54	337	259	74	2	2	--	--	--	--	--
	89,623	90,762	85,618	76,529	103,420	--	--	--	--	--
55 – 59	266	198	61	6	--	--	1	--	--	--
	88,485	87,082	91,645	96,335	--	--	\$126,291	--	--	--
60 – 64	193	129	61	2	1	--	--	--	--	--
	88,004	89,542	83,303	113,017	126,291	--	--	--	--	--
65 – 69	77	42	31	4	--	--	--	--	--	--
	96,605	96,617	99,215	76,255	--	--	--	--	--	--
70 & over	19	14	5	--	--	--	--	--	--	--
	87,034	85,122	92,388	--	--	--	--	--	--	--
Total	4,148	3,268	850	24	5	--	1	--	--	--
	\$84,966	\$84,292	\$87,374	\$86,676	\$99,630	--	\$126,291	--	--	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

Safety Tier 1

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
25 – 29	--	--	--	--	--	--	--	--	--	--
30 – 34	--	--	--	--	--	--	--	--	--	--
35 – 39	--	--	--	--	--	--	--	--	--	--
40 – 44	--	--	--	--	--	--	--	--	--	--
45 – 49	--	--	--	--	--	--	--	--	--	--
50 – 54	--	--	--	--	--	--	--	--	--	--
55 – 59	--	--	--	--	--	--	--	--	--	--
60 – 64	2	--	--	--	--	--	--	1	1	--
65 – 69	1	--	--	--	1	--	--	--	--	--
70 & over	--	--	--	--	--	--	--	--	--	--
Total	3	--	--	--	1	--	--	1	1	--
	\$253,827	--	--	--	\$285,000	--	--	\$122,919	\$353,562	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

Safety Tier 2

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
25 – 29	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
30 – 34	19	--	--	19	--	--	--	--	--	--
	\$132,836	--	--	\$132,836	--	--	--	--	--	--
35 – 39	133	--	4	116	12	1	--	--	--	--
	133,275	--	\$128,645	130,865	\$153,434	\$189,374	--	--	--	--
40 – 44	166	--	2	91	57	16	--	--	--	--
	139,662	--	107,939	133,223	142,671	169,528	--	--	--	--
45 – 49	259	--	4	65	93	92	5	--	--	--
	138,010	--	127,732	128,743	134,468	146,459	\$177,099	--	--	--
50 – 54	157	--	5	26	58	54	11	3	--	--
	134,278	--	116,998	128,833	130,374	137,652	157,212	\$140,948	--	--
55 – 59	70	--	3	16	22	20	2	7	--	--
	133,009	--	123,107	126,355	131,756	138,426	178,513	127,918	--	--
60 – 64	30	--	3	9	6	6	2	2	2	--
	130,757	--	147,052	138,445	125,809	106,866	132,964	168,970	\$117,816	--
65 – 69	9	--	--	3	1	5	--	--	--	--
	131,220	--	--	167,102	155,209	104,893	--	--	--	--
70 & over	1	--	--	--	--	1	--	--	--	--
	254,687	--	--	--	--	254,687	--	--	--	--
Total	844	--	21	345	249	195	20	12	2	--
	\$136,171	--	\$125,564	\$131,346	\$135,941	\$143,580	\$161,889	\$138,017	\$117,816	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

Safety Tier 2C

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
25 – 29	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
30 – 34	6	--	5	1	--	--	--	--	--	--
	\$126,164	--	\$128,505	\$114,459	--	--	--	--	--	--
35 – 39	4	--	3	1	--	--	--	--	--	--
	102,758	--	109,243	83,305	--	--	--	--	--	--
40 – 44	6	--	6	--	--	--	--	--	--	--
	128,936	--	128,936	--	--	--	--	--	--	--
45 – 49	4	--	2	1	--	--	1	--	--	--
	109,889	--	117,576	107,519	--	--	\$96,887	--	--	--
50 – 54	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
55 – 59	2	--	2	--	--	--	--	--	--	--
	159,810	--	159,810	--	--	--	--	--	--	--
60 – 64	3	1	2	--	--	--	--	--	--	--
	138,157	\$92,458	161,006	--	--	--	--	--	--	--
65 – 69	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
70 & over	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
Total	25	1	20	3	--	--	1	--	--	--
	\$124,611	\$92,458	\$131,033	\$101,761	--	--	\$96,887	--	--	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

Safety Tier 2D

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
25 – 29	1	--	1	--	--	--	--	--	--	--
	\$129,247	--	\$129,247	--	--	--	--	--	--	--
30 – 34	33	--	32	1	--	--	--	--	--	--
	126,705	--	126,517	\$132,729	--	--	--	--	--	--
35 – 39	31	3	14	13	1	--	--	--	--	--
	118,732	\$133,035	125,492	107,868	\$122,409	--	--	--	--	--
40 – 44	23	6	13	2	2	--	--	--	--	--
	132,833	150,675	125,407	131,316	129,096	--	--	--	--	--
45 – 49	20	2	9	3	6	--	--	--	--	--
	123,365	149,249	134,533	116,801	101,266	--	--	--	--	--
50 – 54	8	3	2	2	--	--	1	--	--	--
	119,198	120,667	137,763	93,702	--	--	\$128,651	--	--	--
55 – 59	7	1	5	1	--	--	--	--	--	--
	131,894	153,096	136,031	90,007	--	--	--	--	--	--
60 – 64	2	--	1	--	1	--	--	--	--	--
	137,830	--	164,039	--	111,621	--	--	--	--	--
65 – 69	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
70 & over	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
Total	125	15	77	22	10	--	1	--	--	--
	\$125,329	\$141,117	\$128,513	\$110,248	\$109,982	--	\$128,651	--	--	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit B: Members in Active Service as of December 31, 2019 by Age, Years of Service, and Average Projected Compensation (continued)

Safety Tier 4

Age	Years of Service									
	Total	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 & over
Under 25	13	13	--	--	--	--	--	--	--	--
	\$93,606	\$93,606	--	--	--	--	--	--	--	--
25 – 29	90	69	21	--	--	--	--	--	--	--
	103,108	98,867	\$117,042	--	--	--	--	--	--	--
30 – 34	118	64	54	--	--	--	--	--	--	--
	107,272	98,998	117,078	--	--	--	--	--	--	--
35 – 39	70	38	32	--	--	--	--	--	--	--
	112,852	105,683	121,365	--	--	--	--	--	--	--
40 – 44	27	14	13	--	--	--	--	--	--	--
	114,027	113,450	114,649	--	--	--	--	--	--	--
45 – 49	13	8	5	--	--	--	--	--	--	--
	119,725	116,978	124,122	--	--	--	--	--	--	--
50 – 54	22	19	3	--	--	--	--	--	--	--
	146,387	146,893	143,182	--	--	--	--	--	--	--
55 – 59	22	9	13	--	--	--	--	--	--	--
	138,692	141,052	137,058	--	--	--	--	--	--	--
60 – 64	4	1	3	--	--	--	--	--	--	--
	143,256	151,549	140,491	--	--	--	--	--	--	--
65 – 69	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
70 & over	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
Total	379	235	144	--	--	--	--	--	--	--
	\$112,228	\$106,922	\$120,886	--	--	--	--	--	--	--

Notes: Age and years of service were projected from November 30, 2019 to December 31, 2019.

Section 3: Supplemental Information

Exhibit C: Reconciliation of Member Data

	Active Members	Inactive Vested Members ¹	Retired Members	Disabled Members	Beneficiaries	Total
Number as of December 31, 2018	11,349	2,568	7,628	924	1,231	23,700
• New members	911	0	0	0	69	980
• Terminations – with vested rights	(394)	394	0	0	0	0
• Contribution refunds	(134)	(103)	0	0	0	(237)
• Retirements	(380)	(102)	482	0	0	0
• New disabilities	(25)	(6)	(21)	52	0	0
• Return to work	26	(25)	(1)	0	0	0
• Died with or without beneficiary	(16)	(4)	(202)	(25)	(58)	(305)
• Data adjustments ²	(1)	99	2	0	(3)	97
Number as of December 31, 2019	11,336	2,821	7,888	951	1,239	24,235

¹ Includes inactive members due a refund of member contributions.

² Out of the net 99 data adjustments for inactive vested members: 4 non-members from last year went to payment status this year; 66 members were hired and terminated employment after November 30, 2018 (i.e. the census data collection date for last year's valuation); 31 members were classified as contribution refunds in the December 31, 2018 valuation data and terminated vested in the December 31, 2019 data; 1 member was classified as retired in the December 31, 2018 valuation data and terminated vested in the December 31, 2019 data; and 1 member and 4 non-member records were added to the terminated vested file.

Section 3: Supplemental Information

Exhibit D: Summary Statement of Income and Expenses on a Market Value Basis

	Year Ended December 31, 2019	Year Ended December 31, 2018
Net assets at market value at the beginning of the year	\$7,592,586,569	\$8,112,099,556
Contribution income:		
• Employer contributions	\$298,526,950	\$269,684,809
• Member contributions	<u>103,117,022</u>	<u>94,735,673</u>
<i>Net contribution income</i>	<i>\$401,643,972</i>	<i>\$364,420,482</i>
Investment income:		
• Interest, dividends and other income	\$101,531,349	\$120,629,800
• Asset appreciation	1,307,646,904	(417,757,336)
• Less investment and administrative fees	<u>(66,383,453)</u>	<u>(73,984,083)</u>
<i>Net investment income</i>	<i>\$1,342,794,800</i>	<i>\$(371,111,618)</i>
Total income available for benefits	\$1,744,438,772	\$(6,691,137)
Less benefit payments:		
• Service retirement	\$(489,452,611)	\$(459,141,978)
• Death payments	(2,825,577)	(2,957,440)
• Supplemental cost of living	(1,181,244)	(1,134,613)
• Member refunds	(10,724,708)	(8,709,150)
• Health insurance subsidies	<u>(43,562,150)</u>	<u>(40,878,670)</u>
<i>Net benefit payments</i>	<i>\$(547,746,289)</i>	<i>\$(512,821,851)</i>
Change in net assets at market value	\$1,196,692,483	\$(519,512,988)
Net assets at market value at the end of the year	\$8,789,279,051	\$7,592,586,569

Note: Results may be slightly off due to rounding.

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Exhibit E: Summary Statement of Plan Assets

	December 31, 2019	December 31, 2018
Cash	\$4,151,369	\$1,573,133
Securities lending collateral	121,705,062	183,002,987
Accounts receivable:		
• Contributions	\$18,310,516	\$17,422,507
• Investment receivables	17,044,483	15,986,252
• Investments sold	3,361,020	1,202,614
• Futures contracts	307,397	0
• Foreign exchange contracts	5,129,347	100,999
• Others	<u>290,431</u>	<u>107,881</u>
Total accounts receivable	\$44,443,194	\$34,820,254
Prepaid expenses	762,811	1,292,997
Investments:		
• Short-term investments	\$231,758,980	\$159,672,681
• Equities	4,852,057,801	4,147,368,158
• Fixed income investments	1,241,764,327	1,203,445,404
• Real estate	585,368,670	561,242,142
• Capital assets	2,532,109	1,485,300
• Private equity and alternative investments	<u>1,854,346,819</u>	<u>1,512,465,825</u>
Total investments at market value	<u>\$8,767,828,706</u>	<u>\$7,585,679,510</u>
Total assets	\$8,938,891,142	\$7,806,368,882
Accounts payable:		
• Securities lending & investments purchased	\$(128,455,437)	\$(189,585,727)
• Investment-related payables	(11,866,889)	(12,363,273)
• Futures contracts & equity swaps	(2,631,699)	(1,392,567)
• Foreign exchange contracts	(2,383)	(3,651,400)
• Accrued administration expense	(2,357,945)	(2,275,696)
• Members benefits & refunds, and retirement payroll deductions payable	(4,297,739)	(4,513,650)
Total accounts payable	\$(149,612,091)	\$(213,782,313)
Net assets at market value	\$8,789,279,051	\$7,592,586,569
Net assets at actuarial value	\$8,528,590,602	\$8,161,706,068
Net assets at valuation value	\$7,599,976,117	\$7,239,327,157

Note: Results may be slightly off due to rounding.

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Exhibit F: Summary of Reported Reserve Information as of December 31, 2019

	Reserves
Used in Development of Valuation Value of Assets:	
• Members deposit-basic	\$1,292,363,820
• Members cost-of-living	288,958,431
• Employer advance (before transfer from SRBR to employer advance)	1,159,079,409
• Pension reserve-current	1,699,718,634
• Pension reserve-prior	5,444,221
• Annuity reserve	1,001,168,069
• Cost-of-living reserve	2,146,441,252
• Survivor death benefit	291,405
• SRBR transfer to employer advance ¹	6,510,876
• Reserve for interest fluctuations (contingency reserve), if negative	0
Subtotal	\$7,599,976,117²
Not Used in Development of Valuation Value of Assets:	
• 401(h) account	\$10,415,538
• Supplemental retirees benefit reserve (before transfer from SRBR to employer advance)	924,709,823
• Reserve for interest fluctuations (contingency reserve), if positive	0
• Market stabilization reserve	260,688,449
• SRBR transfer to employer advance ¹	<u>(6,510,876)</u>
Subtotal	\$1,189,302,934
Total	\$8,789,279,051

Note: Results may be slightly off due to rounding.

¹ Estimate provided by ACERA.

² A breakdown of this amount between the different cost groups is provided in Section 4, Exhibit VI.

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Exhibit G: Development of the Fund through December 31, 2019

Year Ended December 31	Employer Contributions	Member Contributions	Net Investment Return ¹	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2010	\$147,543,301	\$77,604,809	\$635,617,238	\$313,150,062	\$5,224,494,880	\$5,487,858,259	105.0%
2011	162,879,221	77,990,907	(53,810,166)	337,156,660	5,074,398,182	5,556,242,772	109.5%
2012	179,648,812	78,608,004	698,682,556	363,133,358	5,668,204,196	5,543,303,209	97.8%
2013	191,180,146	76,230,024	1,095,188,216	390,507,104	6,640,295,478	5,953,454,661	89.7%
2014	213,254,775	79,714,187	266,028,241	411,279,675	6,788,013,006	6,545,159,225	96.4%
2015	224,607,104	82,948,934	(19,960,005)	434,984,266	6,640,624,773	6,987,026,015	105.2%
2016	241,728,451	85,736,229	454,641,033	457,150,304	6,965,580,182	7,309,485,170	104.9%
2017	247,063,550	89,325,824	1,293,322,206	483,192,206	8,112,099,556	7,803,026,229	96.2%
2018	269,684,809	94,735,673	(371,111,618)	512,821,851	7,592,586,569	8,161,706,068	107.5%
2019	298,526,950	103,117,022	1,342,794,800	547,746,289	8,789,279,051	8,528,590,602	97.0%

¹ On a market basis, net of investment fees and administrative expenses.

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Exhibit H: Table of Amortization Bases

General (Excluding LARPD & Office of Education)

Type	Date Established	Initial Amount (\$ in '000s)	Initial Period	Outstanding Balance (\$ in '000s)	Years Remaining	Annual Payment ¹ (\$ in '000s)
Combined Bases	December 31, 2011	\$885,036	21	\$839,178	13	\$82,276
Experience Loss	December 31, 2012	165,501	20	155,955	13	15,290
Experience Gain	December 31, 2013	(75,003)	20	(71,989)	14	(6,662)
Experience Gain	December 31, 2014	(156,281)	20	(152,018)	15	(13,346)
Change in Assumptions	December 31, 2014	350,827	20	341,261	15	29,960
Experience Gain	December 31, 2015	(98,619)	20	(97,008)	16	(8,114)
Experience Loss	December 31, 2016	3,655	20	3,622	17	290
Experience Gain	December 31, 2017	(27,249)	20	(27,115)	18	(2,082)
Change in Assumptions	December 31, 2017	260,437	20	259,151	18	19,895
Experience Gain ²	December 31, 2018	(6,121)	20	(6,114)	19	(452)
Experience Loss	December 31, 2019	74,367	20	74,367	20	5,303
Subtotal				\$1,319,290		\$122,358

¹ Level percentage of payroll.

² Includes the impact of transferring the allocated UAAL for LARPD Tier 1 members to the LARPD cost group and the allocated UAAL for Office of Education Tier 1 members to the Office of Education cost group.

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Exhibit H: Table of Amortization Bases (continued)

General (LARPD)¹

Type	Date Established	Initial Amount (\$ in '000s)	Initial Period	Outstanding Balance (\$ in '000s)	Years Remaining	Annual Payment ² (\$ in '000s)
Combined Bases	December 31, 2011	\$7,060	21	\$6,694	13	\$656
Experience Loss	December 31, 2012	370	20	348	13	34
Experience Gain	December 31, 2013	(534)	20	(512)	14	(47)
Experience Gain	December 31, 2014	(1,562)	20	(1,520)	15	(133)
Change in Assumptions	December 31, 2014	1,303	20	1,268	15	111
Experience Gain ³	December 31, 2015	(1,506)	20	(1,483)	16	(124)
Experience Loss	December 31, 2016	139	20	138	17	11
Experience Gain ⁴	December 31, 2017	(622)	20	(620)	18	(48)
Change in Assumptions	December 31, 2017	1,418	20	1,411	18	108
Experience Loss ⁵	December 31, 2018	1,058	20	1,057	19	78
UAAL for Tier 1 members ⁶	December 31, 2018	6,576	20	6,569	19	486
Experience Loss ⁷	December 31, 2019	980	20	980	20	70
Subtotal				\$14,330		\$1,202

¹ When LARPD General Tier 3 was established in 2008, they were classified as a stand-alone group since they were the only employer with the higher 2.5% at 55 benefit (i.e., Section 31676.18), and the cost to upgrade the past service under that formula was only to be paid by LARPD. (reference: Segal's letter dated October 7, 2008). The initial UAAL rate for that group was based on an allocation of assets needed to maintain the total employer rate from the December 31, 2007 valuation before any benefit improvements for General Tier 3. The UAAL rate for LARPD General Tier 3 was then increased to reflect the benefit improvement. When LARPD General Tier 4 was later established in 2013, that tier was combined with LARPD General Tier 3 for purpose of determining their UAAL rate only (as normal cost for LARPD General Tier 4 has continued to be developed on a pooled basis with other General employers offering General Tier 4 benefits), in order to continue with the open-group level percentage of payroll approach for paying off the UAAL amount for General Tier 3 (that is now closed to new entrants because of CalPEPRA). Furthermore, the Board adopted the declining employer payroll policy in 2018 and determined that the policy applies to LARPD Tier 1. As a result, the UAAL (and associated assets) of LARPD Tier 1 was combined with the UAAL for LARPD Tiers 3 and 4.

² Level percentage of payroll.

³ There is a liability gain from the death of one of LARPD's Tier 3 retirees and the withdrawal of one of LARPD's Tier 3 actives.

⁴ There is a liability gain from the death of one of LARPD's Tier 3 retirees.

⁵ There is a liability loss mainly from retiree mortality experience for LARPD's Tier 1 and Tier 3 retirees as a result of no actual deaths.

⁶ The allocated UAAL for LARPD Tier 1 of \$6,167,000 determined as of December 31, 2017 is rolled forward to December 31, 2018 to be amortized starting with the December 31, 2018 valuation.

⁷ The loss is primarily due to (a) lower than expected return on investments (after smoothing), (b) actual contributions lower than expected, and (c) higher than expected salary increases for active members.

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Exhibit H: Table of Amortization Bases (continued)

General Combined (Excluding Office of Education)

Type	Date Established	Initial Amount (\$ in '000s)	Initial Period	Outstanding Balance (\$ in '000s)	Years Remaining	Annual Payment ¹ (\$ in '000s)
Combined Bases	December 31, 2011	\$892,096	21	\$845,872	13	\$82,932
Experience Loss	December 31, 2012	165,871	20	156,303	13	15,324
Experience Gain	December 31, 2013	(75,537)	20	(72,501)	14	(6,709)
Experience Gain	December 31, 2014	(157,843)	20	(153,538)	15	(13,479)
Change in Assumptions	December 31, 2014	352,130	20	342,529	15	30,071
Experience Gain	December 31, 2015	(100,125)	20	(98,491)	16	(8,238)
Experience Loss	December 31, 2016	3,794	20	3,760	17	301
Experience Gain	December 31, 2017	(27,871)	20	(27,735)	18	(2,130)
Change in Assumptions	December 31, 2017	261,855	20	260,562	18	20,003
Experience Loss	December 31, 2018	1,513	20	1,512	19	112
Experience Loss	December 31, 2019	75,347	20	75,347	20	5,373
Subtotal				\$1,333,620		\$123,560

¹ Level percentage of payroll.

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Exhibit H: Table of Amortization Bases (continued)

Safety

Type	Date Established	Initial Amount (\$ in '000s)	Initial Period	Outstanding Balance (\$ in '000s)	Years Remaining	Annual Payment ¹ (\$ in '000s)
Combined Bases	December 31, 2011	\$598,698	21	\$567,679	13	\$55,657
Experience Loss	December 31, 2012	63,130	20	59,490	13	5,833
Experience Gain	December 31, 2013	(9,350)	20	(8,976)	14	(831)
Experience Gain	December 31, 2014	(43,238)	20	(42,059)	15	(3,692)
Change in Assumptions	December 31, 2014	107,552	20	104,619	15	9,185
Experience Gain	December 31, 2015	(12,850)	20	(12,641)	16	(1,057)
Experience Loss	December 31, 2016	19,183	20	19,012	17	1,521
Experience Loss	December 31, 2017	6,354	20	6,323	18	485
Change in Assumptions	December 31, 2017	134,184	20	133,521	18	10,251
Experience Loss	December 31, 2018	9,377	20	9,366	19	692
Experience Loss	December 31, 2019	24,143	20	24,143	20	1,722
Subtotal				\$860,477		\$79,766

¹ Level percentage of payroll.

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Exhibit H: Table of Amortization Bases (continued)

Total (Excluding Office of Education)

Type	Date Established	Initial Amount (\$ in '000s)	Initial Period	Outstanding Balance (\$ in '000s)	Years Remaining	Annual Payment ¹ (\$ in '000s)
Combined Bases	December 31, 2011	\$1,490,794	21	\$1,413,551	13	\$138,589
Experience Loss	December 31, 2012	229,001	20	215,793	13	21,157
Experience Gain	December 31, 2013	(84,887)	20	(81,477)	14	(7,540)
Experience Gain	December 31, 2014	(201,081)	20	(195,597)	15	(17,171)
Change in Assumptions	December 31, 2014	459,682	20	447,148	15	39,256
Experience Gain	December 31, 2015	(112,975)	20	(111,132)	16	(9,295)
Experience Loss	December 31, 2016	22,977	20	22,772	17	1,822
Experience Gain	December 31, 2017	(21,517)	20	(21,412)	18	(1,645)
Change in Assumptions	December 31, 2017	396,039	20	394,083	18	30,254
Experience Loss	December 31, 2018	10,890	20	10,878	19	804
Experience Loss	December 31, 2019	99,490	20	99,490	20	7,095
Total				\$2,194,097		\$203,326

¹ Level percentage of payroll.

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Exhibit H: Table of Amortization Bases (continued)

General (Office of Education)

Type	Date Established	Initial Amount (\$ in '000s)	Initial Period	Outstanding Balance (\$ in '000s)	Years Remaining	Annual Payment ¹ (\$ in '000s)
UAAL for Tier 1 Members	December 31, 2017	\$1,357	20	\$699	18	\$72
Experience Loss	December 31, 2018	61	20	59	19	6
Experience Loss	December 31, 2019	110	20	110	20	11
Subtotal				\$868		\$89
Credit for Expected UAAL Contribution				77 ²		
Total				\$945		

Note: The equivalent amortization period for the entire Plan is about 14 years.

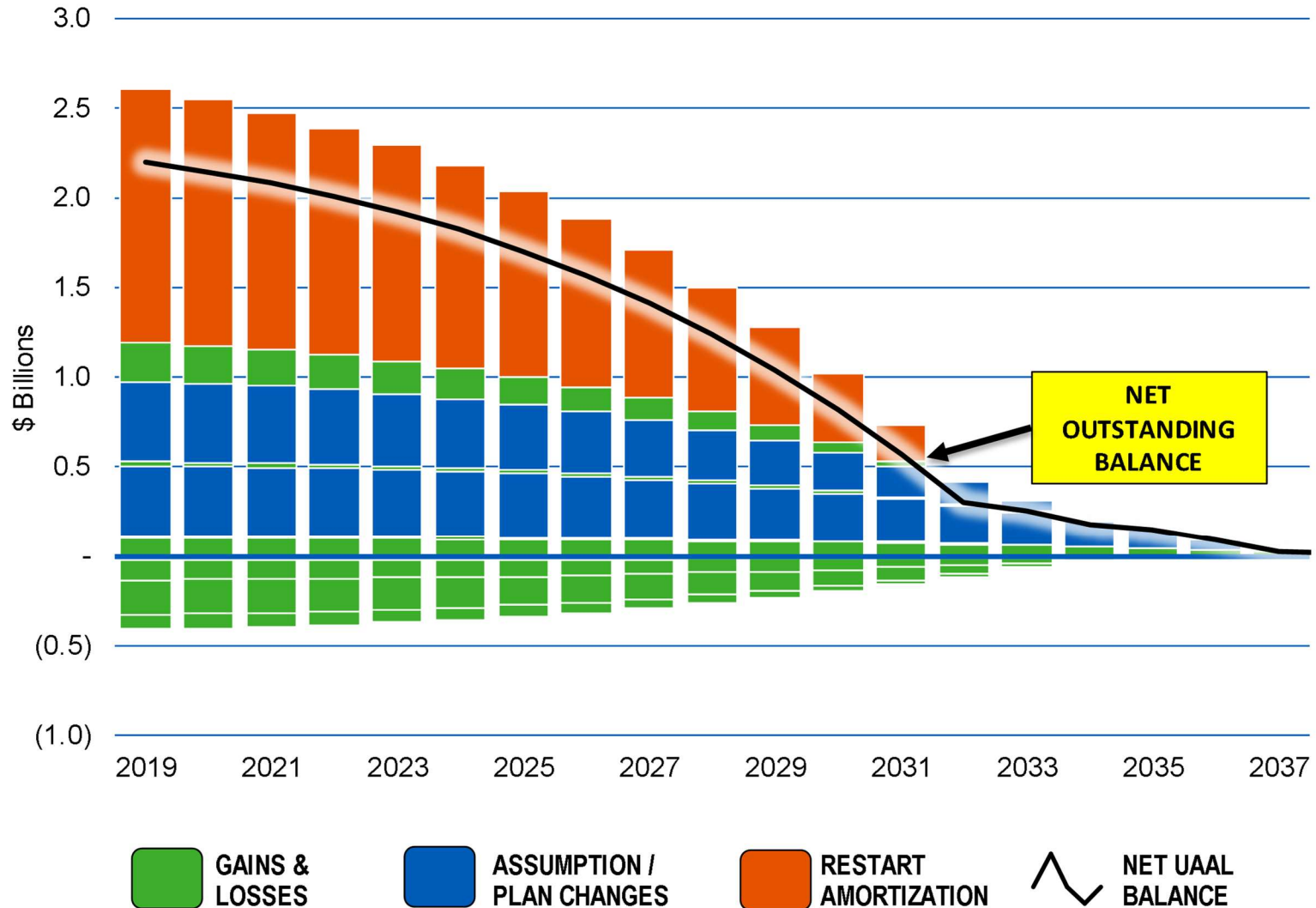
¹ Level dollar, and reflects timing of payment (i.e., next scheduled on April 1, 2021).

² \$78,000 (as determined in the December 31, 2018 valuation to be payable April 1, 2020), discounted at 7.25% to December 31, 2019.

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Exhibit I: Projection of UAAL Balances and Payments

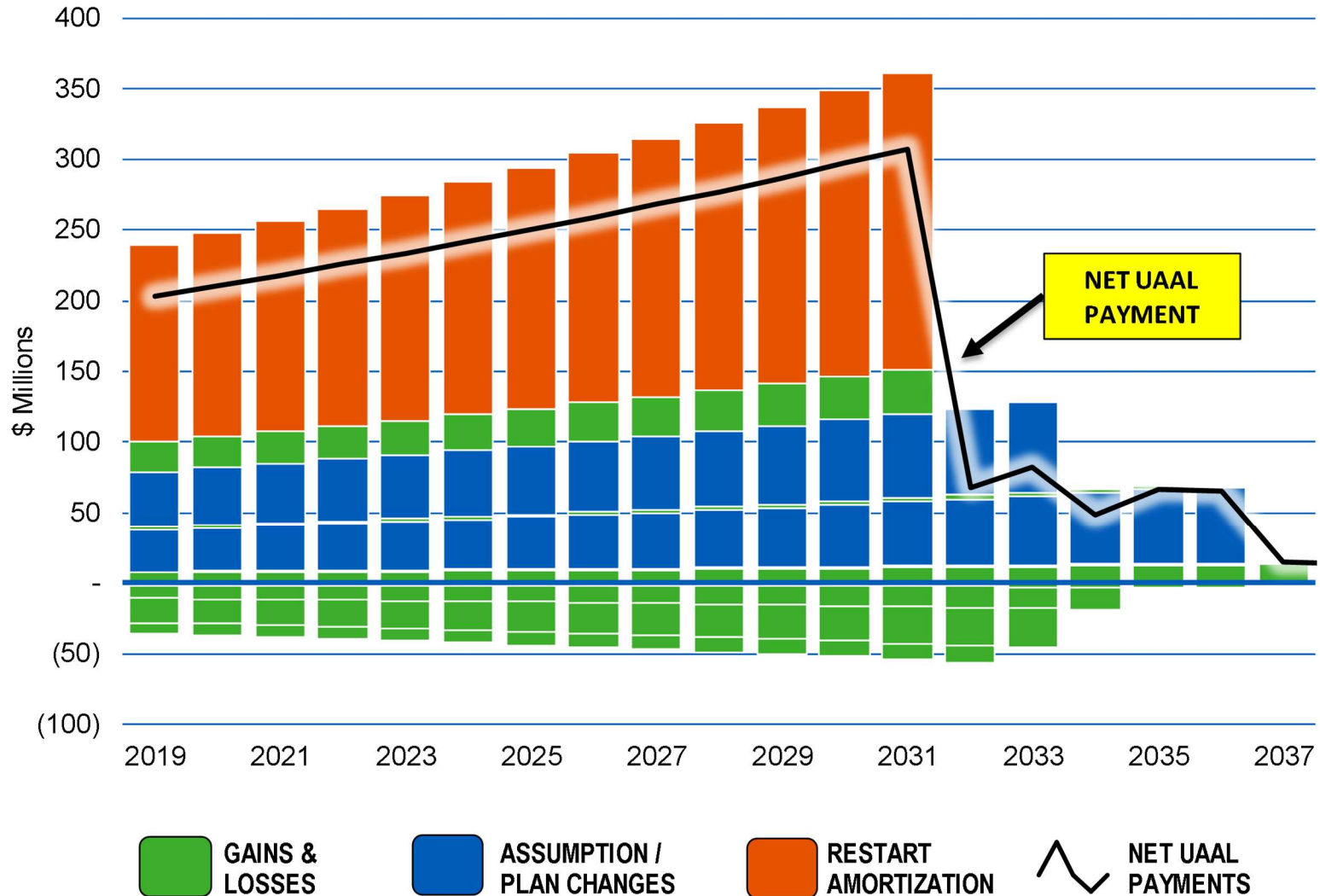
Outstanding Balance of \$2,195 Million in Net UAAL as of December 31, 2019



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Exhibit I: Projection of UAAL Balances and Payments

Annual Payments Required to Amortize \$2,195 Million in Net UAAL as of December 31, 2019



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Exhibit J: Definition of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability for Pensioners and Beneficiaries:	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. 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 Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than 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 yield in actuarial liabilities that 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.
Actuarially Equivalent:	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	<p>The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is:</p> <p>Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)</p> <p>Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and</p> <p>Discounted according to an assumed rate (or rates) of return to reflect the time value of money.</p>
Actuarial Present Value of Future Plan Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members,

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	beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
Actuarial Value of Assets (AVA):	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
Actuarially Determined:	Values that 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.
Actuarially Determined Contribution (ADC):	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Fund is calculated, including: <u>Investment return</u> - the rate of investment yield that the Fund will earn over the long-term future; <u>Mortality rates</u> - the death rates of employees and pensioners; life expectancy is based on these rates; <u>Retirement rates</u> - the rate or probability of retirement at a given age or service; <u>Disability rates</u> - the probability of disability retirement at a given age; <u>Withdrawal rates</u> - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; <u>Salary increase rates</u> - the rates of salary increase due to inflation and productivity growth.

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Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that 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.
Funded Ratio:	The ratio of the valuation value of assets (VVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the VVA.
Investment Return:	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

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Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.
Valuation Value of Assets:	The Actuarial Value of Assets reduced by the value of non-valuation reserves.

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial Assumptions and Methods

Rationale for Assumptions:	The information and analysis used in selecting each assumption that has a significant effect on this actuarial valuation is shown in the December 1, 2013 through November 30, 2016 Actuarial Experience Study report dated September 6, 2017. Unless otherwise noted, all actuarial assumptions and methods shown below apply to all tiers. These assumptions were adopted by the Board.
<u>Economic Assumptions</u>	
Net Investment Return:	7.25%; net of administrative and investment expenses. Based on the Actuarial Experience Study referenced above, expected administrative and investment expenses represent about 0.90% of the Market Value of Assets.
Employee Contribution Crediting Rate:	7.25%, compounded semi-annually.
Consumer Price Index:	Increase of 3.00% per year. Retiree COLA increases due to CPI are subject to a 3% maximum change per year for General Tier 1, General Tier 3, and Safety Tier 1, and 2% maximum change per year for General Tier 2, General Tier 4, Safety Tier 2, Safety Tier 2C, Safety Tier 2D, and Safety Tier 4.
Payroll Growth:	Inflation of 3.00% per year plus real “across the board” salary increases of 0.50% per year, used to amortize the Unfunded Actuarial Accrued Liability as a level percentage of payroll.
Increase in Internal Revenue Code Section 401(a)(17) Compensation Limit:	Increase of 3.00% per year from the valuation date.
Increase in Section 7522.10 Compensation Limit:	Increase of 3.00% per year from the valuation date.

Section 4: Actuarial Valuation Basis

Salary Increases:

The annual rate of compensation increase includes:

- Inflation at 3.00%, plus
- “Across the board” salary increases of 0.50% per year, plus
- The following merit and promotion increases:

Years of Service	Rate (%)	
	General	Safety
0-1	4.80	7.80
1-2	4.80	7.80
2-3	3.90	7.00
3-4	2.40	4.40
4-5	1.90	3.50
5-6	1.60	2.30
6-7	1.50	1.60
7-8	1.10	1.00
8-9	0.80	1.00
9-10	0.80	0.90
10-11	0.50	0.80
11 & Over	0.40	0.80

Terminal Pay Assumptions:

Additional pay elements are expected to be received during a member’s final average earnings period. The percentages, added to the final average salary, used in this valuation are:

	Service Retirement	Disability Retirement
General Tier 1	8.0%	6.5%
General Tier 2	3.0%	1.4%
General Tier 3	8.0%	6.5%
General Tier 4	N/A	N/A
Safety Tier 1	8.5%	6.4%
Safety Tier 2	3.5%	2.1%
Safety Tier 2C	3.5%	2.1%
Safety Tier 2D	3.5%	2.1%
Safety Tier 4	N/A	N/A

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Demographic Assumptions:

Post-Retirement Mortality Rates:

Healthy

- **General Members and All Beneficiaries:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected generationally with the two-dimensional MP-2016 projection scale.
- **Safety Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected generationally with the two-dimensional MP-2016 projection scale.

Disabled

- **General Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, set forward seven years for males and set forward four years for females, projected generationally with the two-dimensional MP-2016 projection scale.
- **Safety Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, set forward two years for males and with no set forward for females, projected generationally with the two-dimensional MP-2016 projection scale.

The RPH-2014 mortality tables and adjustments as shown above reasonably reflect the mortality experience as of the measurement date. These mortality tables were adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

Pre-Retirement Mortality Rates:

- **General and Safety Members:** Headcount-Weighted RP-2014 (RPH-2014) Employee Mortality Tables multiplied by 80%, projected generationally with the two-dimensional MP-2016 projection scale.

Age	Rate (%)			
	General ¹		Safety ¹	
	Male	Female	Male	Female
20	0.05	0.02	0.05	0.02
25	0.05	0.02	0.05	0.02
30	0.05	0.02	0.05	0.02
35	0.05	0.03	0.05	0.03
40	0.06	0.04	0.06	0.04
45	0.10	0.07	0.10	0.07
50	0.17	0.11	0.17	0.11
55	0.27	0.17	0.27	0.17
60	0.45	0.24	0.45	0.24
65	0.78	0.36	0.78	0.36

All pre-retirement deaths are assumed to be non-service connected.

¹ Generational projections beyond the base year (2014) are not reflected in the above mortality rates.

Section 4: Actuarial Valuation Basis

Mortality Rates for Member Contributions:

- **General Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 30% male and 70% female.
- **Safety Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 75% male and 25% female.

Optional Forms of Benefit:

Service Retirement and All Beneficiaries

- **General Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 30% male and 70% female.
- **General Beneficiaries:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 70% male and 30% female.
- **Safety Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 75% male and 25% female.
- **Safety Beneficiaries:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, with no setback for males and females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 25% male and 75% female.

Disability Retirement

- **General Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, set forward seven years for males and set forward four years for females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 30% male and 70% female.
- **Safety Members:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Tables, set forward two years for males and with no set forward for females, projected 20 years with the two-dimensional mortality improvement Scale MP-2016, weighted 75% male and 25% female.

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Disability Incidence:

Age	Rate (%)	
	General	Safety
20	0.00	0.00
25	0.01	0.03
30	0.03	0.26
35	0.05	0.58
40	0.08	0.73
45	0.19	0.78
50	0.31	1.52
55	0.38	2.00
60	0.43	2.60

60% of General disabilities are assumed to be service connected disabilities. The other 40% are assumed to be non-service connected disabilities.

100% of Safety disabilities are assumed to be service connected disabilities.

Section 4: Actuarial Valuation Basis

Termination:

Less Than Five Years of Service

Years of Service	Rate (%)	
	General	Safety
0-1	11.00	4.00
1-2	9.00	3.50
2-3	8.00	3.50
3-4	6.00	2.50
4-5	6.00	2.00

60% of all terminated members with less than 5 years of service are assumed to choose a refund of contributions. The other 40% are assumed to choose a deferred vested benefit.

Five or More Years of Service

Age	Rate (%)	
	General	Safety
20	6.00	2.00
25	6.00	2.00
30	5.40	2.00
35	4.40	1.70
40	3.40	1.20
45	3.00	1.00
50	3.00	1.00
55	3.00	1.00
60	3.00	0.40

35% of all terminated members with 5 or more years of service are assumed to choose a refund of contributions. The other 65% are assumed to choose a deferred vested benefit.

No termination is assumed after a member is eligible for retirement (as long as a retirement rate is present).

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Retirement Rates:

Age	Rate (%) ¹							
	General				Safety			
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 1 ²	Tier 2, 2D ²	Tier 2C ²	Tier 4
49	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
50	4.00	2.00	6.00	0.00	35.00	15.00	4.00	4.00
51	4.00	2.00	3.00	0.00	30.00	15.00	2.00	2.00
52	4.00	2.00	5.00	4.00	25.00	15.00	2.00	2.00
53	4.00	2.00	6.00	1.50	35.00	15.00	3.00	3.00
54	4.00	2.00	6.00	1.50	45.00	15.00	6.00	6.00
55	6.00	2.00	12.00	2.00	45.00	15.00	10.00	10.00
56	8.00	3.00	13.00	2.50	45.00	15.00	12.00	12.00
57	10.00	4.00	13.00	3.50	45.00	15.00	20.00	20.00
58	12.00	4.00	14.00	3.50	45.00	20.00	10.00	10.00
59	14.00	5.00	16.00	4.50	45.00	20.00	15.00	15.00
60	20.00	7.00	21.00	6.00	45.00	30.00	60.00	60.00
61	20.00	9.00	20.00	8.00	45.00	30.00	60.00	60.00
62	35.00	15.00	30.00	18.00	45.00	30.00	60.00	60.00
63	30.00	16.00	25.00	15.00	45.00	30.00	60.00	60.00
64	30.00	18.00	25.00	17.00	45.00	50.00	60.00	60.00
65	35.00	25.00	30.00	22.00	100.00	100.00	100.00	100.00
66	35.00	25.00	25.00	25.00	100.00	100.00	100.00	100.00
67	30.00	25.00	25.00	25.00	100.00	100.00	100.00	100.00
68	30.00	30.00	25.00	30.00	100.00	100.00	100.00	100.00
69	35.00	35.00	50.00	35.00	100.00	100.00	100.00	100.00
70	65.00	50.00	65.00	50.00	100.00	100.00	100.00	100.00
71	65.00	50.00	65.00	50.00	100.00	100.00	100.00	100.00
72	65.00	50.00	65.00	50.00	100.00	100.00	100.00	100.00
73	65.00	50.00	65.00	50.00	100.00	100.00	100.00	100.00
74	65.00	50.00	65.00	50.00	100.00	100.00	100.00	100.00
75	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

¹ The retirement rates only apply to members that are eligible to retire at the age shown.

² Retirement rate is 100% after a member accrues a benefit of 100% of final average earnings.

Retirement Age and Benefit for Deferred Vested Members:

General Retirement Age: 61

Safety Retirement Age: 56

Future deferred vested members who terminate with less than five years of service and are not vested are assumed to retire at age 70 for both General and Safety if they decide to leave their contributions on deposit.

Section 4: Actuarial Valuation Basis

	30% of future General and 60% of future Safety deferred vested members are assumed to continue to work for a reciprocal employer. For reciprocals, 3.90% and 4.30% compensation increases are assumed per annum for General and Safety, respectively.
Future Benefit Accruals:	1.0 year of service per year of employment, plus 0.003 years of additional service for General members and 0.006 years of additional service for Safety members, to anticipate conversion of unused sick leave for each year of employment.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Inclusion of Deferred Vested Members:	All deferred vested members are included in the valuation.
Data Adjustment:	Data as of November 30 has been adjusted to December 31 by adding one month of age and, for active members, one month of service.
Form of Payment:	All active and inactive vested members are assumed to elect the unmodified option at retirement.
Percent Married:	70% of male members; 50% of female members.
Age and Gender of Spouse:	For all active and inactive members, male members are assumed to have a female spouse who is 3 years younger than the member and female members are assumed to have a male spouse who is 2 years older than the member.
<u>Actuarial Funding Policy</u>	
Actuarial Cost Method:	Entry Age Actuarial Cost Method. Entry Age is the age on the valuation date minus years of service. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are based on costs allocated as a level percentage of compensation, as if the current benefit formula for each individual has always been in effect.
Actuarial Value of Assets:	Market value of assets (MVA) less unrecognized returns in each of the last ten six-month interest crediting periods. Unrecognized returns are equal to the difference between the actual market return and the expected return on the market value, and are recognized semi-annually over a five-year period. The actuarial value of assets (AVA) is limited by a 40% corridor; the AVA cannot be less than 60% of MVA, nor greater than 140% of MVA.
Valuation Value of Assets:	The Actuarial Value of Assets reduced by the value of the non-valuation reserves.
Amortization Policy:	Prior to January 1, 2012, the total UAAL was amortized on a 30-year decreasing period, with 21 years remaining as of December 31, 2011 (and 13 years remaining as of December 31, 2019). On or after January 1, 2012, any new UAAL resulting from plan amendments are amortized over separate decreasing 15-year periods; early retirement incentive programs (ERIPs) are amortized over separate

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decreasing 5-year periods; assumption and method changes are amortized over separate decreasing 20-year periods; and experience gains/losses are also amortized over separate decreasing 20-year periods. ACOE's UAAL amortization under the declining employer payroll policy is level dollar.

Other Actuarial Methods

Employer Contributions:

Employer contributions consist of two components:

Normal Cost

The annual contribution rate that, if paid annually from a member's first year of membership through the year of retirement, would accumulate to the amount necessary to fully fund the member's retirement-related benefits. Accumulation includes annual crediting of interest at the assumed investment earning rate. The contribution rate is expressed as a level percentage of the member's compensation.

Contribution to the Unfunded Actuarial Accrued Liability (UAAL)

The annual contribution rate that, if paid annually over the UAAL amortization period, would accumulate to the amount necessary to fully fund the UAAL. Accumulation includes annual crediting of interest at the assumed investment earning rate. The contribution (or rate credit in the case of a negative UAAL) is calculated to remain as a level percentage of future active member payroll (including payroll for new members as they enter the Association) assuming a constant number of active members. In order to remain as a level percentage of payroll, amortization payments (credits) are scheduled to increase at the annual rate of 3.50% (i.e., 3.00% inflation plus 0.50% across-the-board salary increase).

The amortization policy is described on the previous page.

Alameda County previously issued pension obligation bonds (POB) and the net bond proceeds were contributed to ACERA. When the POBs were issued, AHS, Court and First 5 were part of the County and, consequently, they share in the proceeds. The net bond proceeds contributed to ACERA allow the Association to provide a "Pension Obligation Bond Credit" to these employers, thereby reducing their employer contribution rate. As of December 31, 2019, the outstanding balances of the POBs were \$500.6 million for the General employers (County, AHS, Court, and First 5) and \$93.8 million for the Safety employers (County).

For several years, the Board of Retirement has approved transfers from the SRBR to the Employer Advance Reserve to reimburse the County for their payment of the implicit retiree health benefit subsidy. The amortization credits resulting from these transfers have served to reduce the County's employer contribution rates.

The recommended employer contributions are provided in *Section 2, Subsection F*. These rates reflect the POB credits for the County, AHS, Court, and First 5, and the retiree health benefit subsidy credits for the County, noted above.

Section 4: Actuarial Valuation Basis

Member Contributions:

Non-Tier 4 Members

Articles 6 and 6.8 of the 1937 Act define the methodology to be used in the calculation of member basic contribution rates for non-Tier 4 General and Safety members, respectively. The basic contribution rate is determined so that the accumulation of a member's basic contributions made in a given year until a certain age will be sufficient to fund an annuity at that age that is equal to 1/100 of Final Average Salary for General Tier 1, General Tier 3, and all Safety non-Tier 4 members and 1/120 of Final Average Salary for General Tier 2 members. That age is 60 for General Tier 1 and Tier 2, 55 for General Tier 3, and 50 for all Safety non-Tier 4 members. It is assumed that contributions are made annually at the same rate, starting at entry age. In addition to the basic contributions, members pay one-half of the total normal cost necessary to fund cost-of-living benefits. As instructed by ACERA, we have also included a 3% cost-sharing contribution that we understand will be paid by Safety Tier 1 and Tier 2 members. For Safety Tier 2C members, there are no cost-sharing contributions. For Safety Tier 2D members, the cost-sharing contribution rate is 5% of salary for the first 5 years of vesting service and 3% of salary for each subsequent year of vesting service. (The 3% cost-sharing contribution for Safety Tiers 1, 2, and 2D (after 5 years of service) will continue even after the member attains 30 years of service.)

Accumulation includes semi-annual crediting of interest at the assumed investment earnings rate. Following the procedure established by the Board, basic member rates have been adjusted to anticipate conversion of terminal pay at retirement.

Tier 4 Members

Pursuant to Section 7522.30(a) of the Government Code, Tier 4 members are required to contribute at least 50% of the Normal Cost rate.

When previously calculating member rates, there were certain additional requirements that had to be met such as requiring the employee rates be rounded to the nearest one quarter of one percent and requiring the new employees to pay the contribution rate of "similarly situated employees", if it is greater. (reference: Section 7522.30(c)). Furthermore, Section 7522.30(d) indicated that "once established, the employee contribution rate described in subdivision (c) shall not be adjusted on account of a change to the normal cost rate unless the normal cost rate increases or decreases by more than 1 percent of payroll above or below the normal cost rate in effect at the time the employee contribution rate is first established or, if later, the normal cost rate in effect at the time of the last adjustment to the employee contribution rate under this section."

However, as we referenced in our letter dated February 26, 2014, Assembly Bill 1380 (AB 1380) was approved by the Governor on September 6, 2013. In particular, Section 31620.5(a) was added to the Government Code to provide the Board with the discretion to not apply the rounding previously required under Section 7522.30(c). We understand that our recommendation in that letter to no longer apply the rounding rule effective with the December 31, 2013 valuation was adopted by the Board, and the results in this valuation reflect that action taken by the Board.

Section 31620.5(b) of AB 1380 also stipulates that the "one percent rule" under Section 7522.30(d) "shall not apply to the contribution rates of members of retirement systems established pursuant to this chapter."

Therefore, in preparing the Normal Cost rates in this report, we have assumed that exactly 50% of the Normal Cost would be paid by the Tier 4 members.

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The member contribution rates for all members are provided in *Section 4, Exhibit III*.

Internal Revenue Code Section 415:

Section 415 of the Internal Revenue Code (IRC) specifies the maximum benefits that may be paid to an individual from a defined benefit plan and the maximum amounts that may be allocated each year to an individual's account in a defined contribution plan.

A qualified pension plan may not pay benefits in excess of the Section 415 limits. The ultimate penalty for non-compliance is disqualification: active participants could be taxed on their vested benefits and the IRS may seek to tax the income earned on the plan's assets.

In particular, Section 415(b) of the IRC limits the maximum annual benefit payable at the Normal Retirement Age to a dollar limit of \$160,000 indexed for inflation. That limit is \$225,000 for 2019 and \$230,000 for 2020. Normal Retirement Age for these purposes is age 62. These are the limits in simplified terms. They must be adjusted based on each participant's circumstances, for such things as age at retirement, form of benefits chosen and after tax contributions.

Non-Tier 4 benefits in excess of the limits may be paid through a qualified governmental excess plan that meets the requirements of Section 415(m).

Legal Counsel's review and interpretation of the law and regulations should be sought on any questions in this regard.

Non-Tier 4 contribution rates determined in this valuation have not been reduced for the Section 415 limitations. Actual limitations will result in gains as they occur.

Justification for Change in Actuarial Assumptions:

There have been no changes in actuarial assumptions since the last valuation.

Section 4: Actuarial Valuation Basis

Exhibit II: Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year:	January 1 through December 31
Membership Eligibility:	Membership with ACERA usually begins with the second pay period following appointment to a full time County or member District position. For Housing Authority and LARPD, membership with ACERA begins on the first day of hire. ACERA members who change from full time to part time will continue to participate at ACERA.
<i>General and Safety Tier 1</i>	All General and Safety members hired on or before June 30, 1983. For Housing Authority General members, the hire date is on or before September 30, 2011 (instead of June 30, 1983). For LARPD General members, the hire date is on or before September 30, 2008 (instead of June 30, 1983).
<i>General and Safety Tier 2</i>	All General and Safety members hired after June 30, 1983, and not in any of the other Tiers listed below. For Housing Authority General members, the hire date is after September 30, 2011 (instead of June 30, 1983).
<i>General Tier 3</i>	Only General LARPD members hired before October 1, 2008 who elected the 2.5% at 55 formula and all General LARPD members hired after that date.
<i>General and Safety Tier 4</i>	All General and Safety members with membership dates on or after January 1, 2013.
<i>Safety Tier 2C</i>	All Safety members in the Sheriff's Department (excluding Probation Officers) hired on or after October 17, 2010 who elected the 2% at 50 formula.
<i>Safety Tier 2D</i>	All Safety members in the Sheriff's Department (excluding Probation Officers) hired on or after October 17, 2010 who elected the 3% at 55 formula.
Final Compensation for Benefit Determination:	
<i>General Tier 1, General Tier 3 and Safety Tier 1</i>	Highest consecutive 12 months of compensation earnable (\$31462.1) (FAS1).
<i>General Tier 2, General Tier 4, Safety Tier 2, Safety Tier 2C, Safety Tier 2D, and Safety Tier 4</i>	For non-Tier 4 members, highest consecutive 36 months of compensation earnable (\$31462), and for Tier 4 members, highest consecutive 36 months of pensionable compensation (\$7522.10(c), \$7522.32 and \$7522.34) (FAS3).
Compensation Limit:	
<i>Non-Tier 4</i>	For members with membership dates on or after July 1, 1996, compensation earnable is limited by Internal Revenue Code Section 401(a)(17). The limit for 2020 is \$285,000. The limit is indexed for inflation on an annual basis.

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<i>Tier 4</i>	Pensionable compensation is limited to \$126,291 for 2020 for an employer that is enrolled in Social Security. For an employer that is not enrolled in Social Security, the maximum amount for 2020 is 120% of \$126,291, or \$151,549. (reference: Section 7522.10). These amounts should be adjusted for changes to the Consumer Price Index for All Urban Consumers after 2020. (reference: Section 7522.10(d)).
Service:	Years of service (Yrs) are generally based on a member's employment during a period of time for which deductions are made from their compensation.
Service Retirement Eligibility:	
<i>General</i>	
<i>Non-Tier 4</i>	Age 50 with 5 years of service and a total of 10 years of qualifying membership, or age 70 regardless of service, or after 30 years of service regardless of age (§31672).
<i>Tier 4</i>	Age 52 with 5 years of service (§7522.20(a)) or age 70 regardless of service (§31672.3).
<i>Safety</i>	
<i>Non-Tier 4</i>	Age 50 with 5 years of service and a total of 10 years of qualifying membership, or age 70 regardless of service, or after 20 years of service regardless of age (§31663.25).
<i>Tier 4</i>	Age 50 with 5 years of service (§7522.25(d)) or age 70 regardless of service (§31672.3).

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Benefit Formula:		
<i>General Tier 1 (§31676.12)</i>	Retirement Age	Benefit Formula
	50	1.34% x (FAS1 – \$1,400) x Yrs
	55	1.77% x (FAS1 – \$1,400) x Yrs
	60	2.34% x (FAS1 – \$1,400) x Yrs
	62 and over	2.62% x (FAS1 – \$1,400) x Yrs
<i>General Tier 2 (§31676.1)</i>	Retirement Age	Benefit Formula
	50	1.18% x (FAS3 – \$1,400) x Yrs
	55	1.49% x (FAS3 – \$1,400) x Yrs
	60	1.92% x (FAS3 – \$1,400) x Yrs
	62	2.09% x (FAS3 – \$1,400) x Yrs
65 and over	2.43% x (FAS3 – \$1,400) x Yrs	
<i>General Tier 3 (§31676.18)</i>	Retirement Age	Benefit Formula
	50	2.00% x FAS1 x Yrs
	55 and over	2.50% x FAS1 x Yrs
<i>General Tier 4 (§7522.20(a))</i>	Retirement Age	Benefit Formula
	52	1.00% x FAS3 x Yrs
	55	1.30% x FAS3 x Yrs
	60	1.80% x FAS3 x Yrs
	62	2.00% x FAS3 x Yrs
	65	2.30% x FAS3 x Yrs
67 and over	2.50% x FAS3 x Yrs	
<i>Safety Tier 1 (Non-Integrated) (§31664.1)</i>	Retirement Age	Benefit Formula
	50 and over	3.00% x FAS1 x Yrs
<i>Safety Tier 2 (Non-Integrated) (§31664.1)</i>	Retirement Age	Benefit Formula
	50 and over	3.00% x FAS3 x Yrs
<i>Safety Tier 2C (Non-Integrated) (§31664)</i>	Retirement Age	Benefit Formula

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	50	2.00% x FAS3 x Yrs
	55 and over	2.62% x FAS3 x Yrs
Safety Tier 2D (Non-Integrated) (§31664.2)	Retirement Age	Benefit Formula
	50	2.29% x FAS3 x Yrs
	55 and over	3.00% x FAS3 x Yrs
Safety Tier 4 (Non-Integrated) (§7522.25(d))	Retirement Age	Benefit Formula
	50	2.00% x FAS3 x Yrs
	55	2.50% x FAS3 x Yrs
	57 and over	2.70% x FAS3 x Yrs
Maximum Benefit:		
<i>Non-Tier 4</i>	100% of Highest Average Compensation (§31676.1, §31676.12, §31676.18, §31664, §31664.1, and §31664.2).	
<i>Tier 4</i>	None.	
Non-Service Connected Disability:		
<i>General Tier 1, Tier 2, Tier 3, and Tier 4</i>		
<i>Eligibility</i>	Five years of service (§31720).	
<i>Benefit Formula</i>	1.8% of Final Compensation per year of service for General Tier 1 and Tier 3 and 1.5% of Final Compensation per year of service for General Tier 2 and Tier 4. If the benefit does not exceed one-third of Final Compensation, the service is projected to 62 for General Tier 1 and Tier 3, and to age 65 for General Tier 2 and Tier 4, but the total benefit cannot be more than one-third of Final Compensation (§31727.1 and §31727).	
<i>Safety Tier 1, Tier 2, Tier 2C, Tier 2D and Tier 4</i>		
<i>Eligibility</i>	Five years of service (§31720).	
<i>Benefit Formula</i>	1.8% of Final Compensation per year of service. If the benefit does not exceed one-third of Final Compensation, the service is projected to 55, but the total benefit cannot be more than one-third of Final Compensation (§31727.2).	

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Service Connected Disability:	
<i>All Members</i>	
<i>Eligibility</i>	No age or service requirements (§31720).
<i>Benefit Formula</i>	50% of the Final Compensation or 100% of Service Retirement benefit, if greater (§31727.4).
Pre-Retirement Death:	
<i>All Members</i>	
<i>Eligibility</i>	None.
<i>Basic lump sum benefit</i>	Refund of employee contributions with interest, plus one month's compensation for each year of service, to a maximum of six month's compensation (§31781).
<i>Service Connected Death</i>	50% of Final Compensation or 100% of Service Retirement benefit, if greater, payable to spouse or minor children (§31787).
	OR
<i>Vested Members</i>	
<i>Eligibility</i>	Five years of service.
<i>Basic benefit</i>	60% of the greater of Service or Non-Service Connected Disability Retirement benefit payable to surviving eligible spouse (§31765.1, §31781.1), in lieu of the basic lump sum benefit above.
<i>Service Connected Death</i>	50% of Final Compensation or 100% of Service Retirement benefit, if greater, payable to spouse or minor children (§31787).
Death After Retirement:	
<i>All Members</i>	
<i>Service Retirement or Non-Service Connected Disability Retirement</i>	Unless another option was selected at retirement, 60% of member's unmodified allowance continues to eligible spouse (§31760.1) and lump sum death burial benefit payable to member's beneficiary (§31789.3). An eligible spouse is a surviving spouse who was married to the member at least one year prior to the date of retirement (§31760.1). Based on action taken by the Board in February 2014, we are continuing to exclude the death burial benefit from the pension valuation.
<i>Service Connected Disability</i>	Unless another option was selected at retirement, 100% of member's allowance continued to eligible spouse (§31786).

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Withdrawal Benefits:	
<i>Less than Five Years of Service</i>	Refund of accumulated employee contributions with interest, or benefit at age 70 (\$31628). Effective January 1, 2003, a member may also elect to leave contributions on deposit in the retirement fund (\$31629.5).
<i>Five or More Years of Service</i>	If contributions left on deposit, entitled to earned benefits commencing at any time after eligible to retire (\$31700).
Post-retirement Cost-of-Living Benefits:	
<i>General Tier 1, General Tier 3 and Safety Tier 1</i>	Annual adjustment based on Consumer Price Index to a maximum of 3% per year; excess “banked” (\$31870.1).
<i>General Tier 2, General Tier 4 Safety Tier 2, Safety Tier 2C, Safety Tier 2D, and Safety Tier 4</i>	Annual adjustment based on Consumer Price Index to a maximum of 2% per year; excess “banked” (\$31870).
Supplemental Benefit:	Non-vested supplemental COLA and medical benefits are also paid from the Supplemental Retirees Benefit Reserve to eligible retirees and survivors. These benefits have been excluded from this valuation.
Member Contributions:	Please refer to <i>Section 4, Exhibit III</i> for specific rates.
<i>General Tier 1</i>	
<i>Basic</i>	Entry-age based rates that provide for an average annuity at age 60 equal to 1/100 of FAS1 (\$31621.2).
<i>Cost-of-Living</i>	Entry-age based rates that provide for one-half of future Cost-of-Living costs.
<i>General Tier 2</i>	
<i>Basic</i>	Entry-age based rates that provide for an average annuity at age 60 equal to 1/120 of FAS3 (\$31621).
<i>Cost-of-Living</i>	Entry-age based rates that provide for one-half of future Cost-of-Living costs.
<i>General Tier 3</i>	
<i>Basic</i>	Entry-age based rates that provide for an average annuity at age 55 equal to 1/100 of FAS1 (\$31621.8).
<i>Cost-of-Living</i>	Entry-age based rates that provide for one-half of future Cost-of-Living costs.
<i>General Tier 4</i>	
	50% of the total Normal Cost rate.
<i>Safety Non-Tier 4</i>	
<i>Basic</i>	Entry-age based rates that provide for an average annuity at age 50 equal to 1/100 of FAS1 (FAS3 for Tier 2, Tier 2C, and Tier 2D) (\$31639.25). As instructed by ACERA, we have also included a 3% cost-sharing

Section 4: Actuarial Valuation Basis

	contribution that we understand will be paid by Safety Tier 1 and Tier 2 members. For Safety Tier 2C members, there are no cost-sharing contributions. For Safety Tier 2D members, the cost-sharing contribution rate is 5% of salary for the first 5 years of vesting service and 3% of salary for each subsequent year of vesting service. (The 3% cost-sharing contribution for Safety Tiers 1, 2, and 2D (after 5 years of service) will continue even after the member attains 30 years of service.)
<i>Cost-of-Living</i>	Entry-age based rates that provide for one-half of future Cost-of-Living costs.
<i>Safety Tier 4</i>	50% of the total Normal Cost rate.
Other Information:	Except for the 3% cost-sharing contribution described above, non-Tier 4 Safety members are exempt from paying member contributions after 30 or more years of service. This exemption also applies for General members hired on or before March 7, 1973.
Changes in Plan Provisions:	There have been no changes in plan provisions since the last valuation.

Note: The summary of major plan provisions is designed to outline principal plan benefits as interpreted for purposes of the actuarial valuation. If the Association should find the plan summary not in accordance with the actual provisions, the Association should alert the actuary so they can both be sure the proper provisions are valued.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates

Comparison of Total Member Rate¹ from December 31, 2019 (New) and December 31, 2018 (Current) Valuations:

General Tier 1			
Entry Age	Current	New	Change
25	9.36%	9.31%	-0.05%
35	11.31%	11.26%	-0.05%
45	13.65%	13.59%	-0.06%
General Tier 3			
Entry Age	Current	New	Change
25	10.97%	11.20%	0.23%
35	13.24%	13.51%	0.27%
45	16.04%	16.37%	0.33%
Safety Tier 1			
Entry Age	Current	New	Change
25	17.99%	17.68%	-0.31%
30	19.29%	18.95%	-0.34%
35	20.75%	20.39%	-0.36%
Safety Tier 2C			
Entry Age	Current	New	Change
25	11.60%	11.57%	-0.03%
30	12.61%	12.58%	-0.03%
35	13.73%	13.69%	-0.04%
Safety Tier 2D (with 5 or more years of vesting service)			
Entry Age	Current	New	Change
25	14.97%	14.99%	0.02%
30	16.02%	16.04%	0.02%
35	17.17%	17.20%	0.03%

General Tier 2			
Entry Age	Current	New	Change
25	6.45%	6.44%	-0.01%
35	7.78%	7.78%	0.00%
45	9.38%	9.38%	0.00%
General Tier 4			
Entry Age ²	Current	New	Change
Any	8.80%	8.85%	0.05%
Safety Tier 2			
Entry Age	Current	New	Change
25	15.14%	15.14%	0.00%
30	16.20%	16.20%	0.00%
35	17.37%	17.37%	0.00%
Safety Tier 2D (with less than 5 years of vesting service)			
Entry Age	Current	New	Change
25	16.97%	16.99%	0.02%
30	18.02%	18.04%	0.02%
35	19.17%	19.20%	0.03%
Safety Tier 4			
Entry Age ²	Current	New	Change
Any	15.58%	15.42%	-0.16%

¹ For the non-CalPEPRA tiers, contributions for the first \$161 of biweekly payroll are based on 2/3 of the above rates for integrated members.

² Tier 4 member rates are independent of entry age.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Breakdown of member rate between basic and COLA calculated
in the December 31, 2019 and December 31, 2018 valuations:

	December 31, 2019 Actuarial Valuation							December 31, 2018 Actuarial Valuation ¹								
	BASIC		COLA		COST SHARING CONTRIBUTIONS ²		TOTAL	BASIC		COLA		COST SHARING CONTRIBUTIONS ²		TOTAL		
	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³	Rate	Estimated Annual Amount ³
General Tier 1	6.84%	\$866	2.59%	\$327			9.43%	\$1,193	6.84%	\$866	2.63%	\$332			9.47%	\$1,198
General Tier 2	6.19%	36,228	1.51%	8,837			7.70%	45,065	6.19%	36,228	1.51%	8,837			7.70%	45,065
General Tier 3	10.10%	183	4.31%	78			14.41%	261	10.10%	183	4.03%	73			14.13%	256
General Tier 4	7.22%	25,446	1.63%	5,745			8.85%	31,191	7.18%	25,305	1.62%	5,710			8.80%	31,015
Safety Tier 1	4.47%	34	2.49%	19	3.00%	\$23	9.96%	76	4.47%	34	2.65%	20	3.00%	\$23	10.12%	77
Safety Tier 2	9.08%	10,436	3.73%	4,286	3.00%	3,448	15.81%	18,170	9.08%	10,436	3.74%	4,298	3.00%	3,448	15.82%	18,182
Safety Tier 2C	10.02%	312	3.46%	108	0.00%	0	13.48%	420	10.02%	312	3.50%	109	0.00%	0	13.52%	421
Safety Tier 2D	9.35%	1,465	3.69%	578	3.05%	478	16.09%	2,521	9.35%	1,465	3.67%	575	3.05%	478	16.07%	2,518
Safety Tier 4	12.16%	5,172	3.26%	1,387	0.00%	0	15.42%	6,559	12.29%	5,227	3.29%	1,400	0.00%	0	15.58%	6,627
All Tiers Combined	7.10%	\$80,142	1.89%	\$21,365	0.35%	\$3,949	9.34%	\$105,456	7.09%	\$80,056	1.89%	\$21,354	0.35%	\$3,949	9.33%	\$105,359

¹ These rates have been re-calculated by applying the individual entry age based member rates determined in December 31, 2018 valuation to the Association membership as of December 31, 2019.

² Cost sharing contributions for Safety Tier 2D members are determined based on proportion of members contributing 5.00% (with less than 5 years of vesting service) and 3.00% (with 5 or more years of vesting service).

³ Amounts are in thousands and are based on December 31, 2019 annual payroll (also in thousands):

	<u>County</u>	<u>AHS, Court & First 5</u>	<u>Housing Authority</u>	<u>LARPD</u>	<u>Total</u>
General Tier 1	\$7,586	\$1,566	\$2,879	\$623	\$12,654
General Tier 2	390,655	194,387	224		585,266
General Tier 3				1,811	1,811
General Tier 4	215,208	133,904	1,430	1,897	352,439
Safety Tier 1	761				761
Safety Tier 2	114,929				114,929
Safety Tier 2C	3,115				3,115
Safety Tier 2D	15,666				15,666
Safety Tier 4	42,534				42,534
Total	\$790,454	\$329,857	\$4,533	\$4,331	\$1,129,175

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 1 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly payroll)

Entry Age	General Tier 1					
	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	3.79%	5.68%	1.43%	2.15%	5.22%	7.83%
17	3.86%	5.79%	1.46%	2.19%	5.32%	7.98%
18	3.94%	5.91%	1.49%	2.23%	5.43%	8.14%
19	4.02%	6.03%	1.52%	2.28%	5.54%	8.31%
20	4.10%	6.14%	1.55%	2.32%	5.65%	8.46%
21	4.18%	6.26%	1.58%	2.37%	5.76%	8.63%
22	4.26%	6.39%	1.61%	2.41%	5.87%	8.80%
23	4.34%	6.51%	1.64%	2.46%	5.98%	8.97%
24	4.42%	6.64%	1.67%	2.51%	6.09%	9.15%
25	4.51%	6.76%	1.70%	2.55%	6.21%	9.31%
26	4.60%	6.89%	1.73%	2.60%	6.33%	9.49%
27	4.68%	7.03%	1.77%	2.65%	6.45%	9.68%
28	4.77%	7.16%	1.81%	2.71%	6.58%	9.87%
29	4.87%	7.30%	1.84%	2.76%	6.71%	10.06%
30	4.96%	7.44%	1.87%	2.81%	6.83%	10.25%
31	5.05%	7.58%	1.91%	2.86%	6.96%	10.44%
32	5.15%	7.72%	1.95%	2.92%	7.10%	10.64%
33	5.25%	7.87%	1.98%	2.97%	7.23%	10.84%
34	5.35%	8.02%	2.02%	3.03%	7.37%	11.05%
35	5.45%	8.17%	2.06%	3.09%	7.51%	11.26%
36	5.55%	8.32%	2.09%	3.14%	7.64%	11.46%
37	5.65%	8.48%	2.13%	3.20%	7.78%	11.68%
38	5.76%	8.64%	2.17%	3.26%	7.93%	11.90%
39	5.87%	8.80%	2.22%	3.33%	8.09%	12.13%

¹ Use these rates for non-integrated members .

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 1						
Entry Age	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	5.98%	8.97%	2.26%	3.39%	8.24%	12.36%
41	6.09%	9.14%	2.30%	3.45%	8.39%	12.59%
42	6.21%	9.31%	2.35%	3.52%	8.56%	12.83%
43	6.33%	9.49%	2.39%	3.59%	8.72%	13.08%
44	6.45%	9.68%	2.43%	3.65%	8.88%	13.33%
45	6.58%	9.86%	2.49%	3.73%	9.07%	13.59%
46	6.70%	10.06%	2.53%	3.80%	9.23%	13.86%
47	6.84%	10.26%	2.58%	3.87%	9.42%	14.13%
48	6.98%	10.47%	2.63%	3.95%	9.61%	14.42%
49	7.12%	10.67%	2.69%	4.03%	9.81%	14.70%
50	7.24%	10.86%	2.73%	4.10%	9.97%	14.96%
51	7.37%	11.06%	2.79%	4.18%	10.16%	15.24%
52	7.49%	11.24%	2.83%	4.25%	10.32%	15.49%
53	7.59%	11.39%	2.87%	4.30%	10.46%	15.69%
54	7.69%	11.54%	2.91%	4.36%	10.60%	15.90%
55	7.78%	11.67%	2.94%	4.41%	10.72%	16.08%
56	7.84%	11.76%	2.96%	4.44%	10.80%	16.20%
57	7.80%	11.70%	2.95%	4.42%	10.75%	16.12%
58	7.66%	11.49%	2.89%	4.34%	10.55%	15.83%
59 & Over	7.34%	11.01%	2.77%	4.16%	10.11%	15.17%

Interest: 7.25% per annum
 COLA: 3.00%
 Mortality: See Section 4, Exhibit I
 Salary Increase: Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
 COLA Loading Factor: 37.77%
 Terminal Pay: 8.0%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 2 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly payroll)

Entry Age	General Tier 2					
	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	2.90%	4.35%	0.71%	1.06%	3.61%	5.41%
17	2.96%	4.43%	0.72%	1.08%	3.68%	5.51%
18	3.01%	4.52%	0.73%	1.10%	3.74%	5.62%
19	3.07%	4.61%	0.75%	1.13%	3.82%	5.74%
20	3.13%	4.70%	0.77%	1.15%	3.90%	5.85%
21	3.20%	4.79%	0.78%	1.17%	3.98%	5.96%
22	3.26%	4.89%	0.79%	1.19%	4.05%	6.08%
23	3.32%	4.98%	0.81%	1.22%	4.13%	6.20%
24	3.39%	5.08%	0.83%	1.24%	4.22%	6.32%
25	3.45%	5.18%	0.84%	1.26%	4.29%	6.44%
26	3.52%	5.28%	0.86%	1.29%	4.38%	6.57%
27	3.58%	5.38%	0.87%	1.31%	4.45%	6.69%
28	3.65%	5.48%	0.89%	1.34%	4.54%	6.82%
29	3.72%	5.58%	0.91%	1.36%	4.63%	6.94%
30	3.79%	5.69%	0.93%	1.39%	4.72%	7.08%
31	3.87%	5.80%	0.95%	1.42%	4.82%	7.22%
32	3.94%	5.91%	0.96%	1.44%	4.90%	7.35%
33	4.01%	6.02%	0.98%	1.47%	4.99%	7.49%
34	4.09%	6.13%	1.00%	1.50%	5.09%	7.63%
35	4.17%	6.25%	1.02%	1.53%	5.19%	7.78%
36	4.25%	6.37%	1.04%	1.56%	5.29%	7.93%
37	4.33%	6.49%	1.05%	1.58%	5.38%	8.07%
38	4.41%	6.61%	1.07%	1.61%	5.48%	8.22%
39	4.49%	6.73%	1.10%	1.65%	5.59%	8.38%

¹ Use these rates for non-integrated members .

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 2						
Entry Age	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	4.57%	6.86%	1.12%	1.68%	5.69%	8.54%
41	4.66%	6.99%	1.14%	1.71%	5.80%	8.70%
42	4.75%	7.12%	1.16%	1.74%	5.91%	8.86%
43	4.84%	7.26%	1.18%	1.77%	6.02%	9.03%
44	4.93%	7.40%	1.21%	1.81%	6.14%	9.21%
45	5.03%	7.54%	1.23%	1.84%	6.26%	9.38%
46	5.13%	7.69%	1.25%	1.88%	6.38%	9.57%
47	5.23%	7.84%	1.28%	1.92%	6.51%	9.76%
48	5.33%	7.99%	1.30%	1.95%	6.63%	9.94%
49	5.42%	8.13%	1.33%	1.99%	6.75%	10.12%
50	5.51%	8.27%	1.35%	2.02%	6.86%	10.29%
51	5.59%	8.39%	1.37%	2.05%	6.96%	10.44%
52	5.67%	8.50%	1.39%	2.08%	7.06%	10.58%
53	5.73%	8.60%	1.40%	2.10%	7.13%	10.70%
54	5.79%	8.68%	1.41%	2.12%	7.20%	10.80%
55	5.81%	8.71%	1.42%	2.13%	7.23%	10.84%
56	5.78%	8.67%	1.41%	2.12%	7.19%	10.79%
57	5.72%	8.58%	1.39%	2.09%	7.11%	10.67%
58	5.91%	8.87%	1.45%	2.17%	7.36%	11.04%
59 & Over	6.12%	9.18%	1.49%	2.24%	7.61%	11.42%

Interest: 7.25% per annum
 COLA: 2.00%
 Mortality: See Section 4, Exhibit I
 Salary Increase: Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
 COLA Loading Factor: 24.43%
 Terminal Pay: 3.0%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 3 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly payroll)

Entry Age	General Tier 3					
	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	4.40%	6.60%	1.89%	2.83%	6.29%	9.43%
17	4.49%	6.73%	1.93%	2.89%	6.42%	9.62%
18	4.58%	6.86%	1.96%	2.94%	6.54%	9.80%
19	4.67%	7.00%	2.00%	3.00%	6.67%	10.00%
20	4.76%	7.13%	2.04%	3.06%	6.80%	10.19%
21	4.85%	7.27%	2.08%	3.12%	6.93%	10.39%
22	4.94%	7.41%	2.12%	3.18%	7.06%	10.59%
23	5.03%	7.55%	2.16%	3.24%	7.19%	10.79%
24	5.13%	7.70%	2.20%	3.30%	7.33%	11.00%
25	5.23%	7.84%	2.24%	3.36%	7.47%	11.20%
26	5.33%	7.99%	2.29%	3.43%	7.62%	11.42%
27	5.43%	8.14%	2.33%	3.49%	7.76%	11.63%
28	5.53%	8.30%	2.37%	3.56%	7.90%	11.86%
29	5.64%	8.46%	2.41%	3.62%	8.05%	12.08%
30	5.74%	8.62%	2.46%	3.69%	8.20%	12.31%
31	5.85%	8.78%	2.51%	3.76%	8.36%	12.54%
32	5.96%	8.94%	2.55%	3.83%	8.51%	12.77%
33	6.07%	9.11%	2.61%	3.91%	8.68%	13.02%
34	6.19%	9.28%	2.65%	3.98%	8.84%	13.26%
35	6.31%	9.46%	2.70%	4.05%	9.01%	13.51%
36	6.43%	9.64%	2.75%	4.13%	9.18%	13.77%
37	6.55%	9.82%	2.81%	4.21%	9.36%	14.03%
38	6.67%	10.01%	2.86%	4.29%	9.53%	14.30%
39	6.80%	10.20%	2.91%	4.37%	9.71%	14.57%

¹ Use these rates for non-integrated members .

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 3						
Entry Age	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	6.93%	10.40%	2.97%	4.46%	9.90%	14.86%
41	7.07%	10.61%	3.03%	4.55%	10.10%	15.16%
42	7.21%	10.82%	3.09%	4.64%	10.30%	15.46%
43	7.36%	11.04%	3.15%	4.73%	10.51%	15.77%
44	7.50%	11.26%	3.21%	4.82%	10.71%	16.08%
45	7.64%	11.46%	3.27%	4.91%	10.91%	16.37%
46	7.78%	11.66%	3.33%	5.00%	11.11%	16.66%
47	7.90%	11.85%	3.39%	5.08%	11.29%	16.93%
48	8.01%	12.01%	3.43%	5.15%	11.44%	17.16%
49	8.11%	12.17%	3.47%	5.21%	11.58%	17.38%
50	8.20%	12.30%	3.51%	5.27%	11.71%	17.57%
51	8.27%	12.40%	3.54%	5.31%	11.81%	17.71%
52	8.22%	12.33%	3.53%	5.29%	11.75%	17.62%
53	8.08%	12.12%	3.46%	5.19%	11.54%	17.31%
54 & Over	7.74%	11.61%	3.32%	4.98%	11.06%	16.59%

Interest:	7.25% per annum
COLA:	3.00%
Mortality:	See Section 4, Exhibit I
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
COLA Loading Factor:	42.86%
Terminal Pay:	8.0%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

General Tier 4 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly eligible payroll)¹

General Tier 4			
Entry Age	Basic	COLA	Total
	Eligible Pay	Eligible Pay	Eligible Pay
All Ages	7.22%	1.63%	8.85%

Interest:	7.25% per annum
COLA:	2.00%
Mortality:	See <i>Section 4, Exhibit I</i>
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See <i>Section 4, Exhibit I</i>)
COLA Loading Factor:	22.58%
Terminal Pay:	0.0%

¹ It is our understanding that in the determination of pension benefits under the CalPEPRA formulas, the compensation that can be taken into account for 2020 is equal to \$126,291. (For an employer that is not enrolled in Social Security, the maximum amount is 120% of \$126,291, or \$151,549). (reference: Section 7522.10). These amounts should be adjusted for changes to the Consumer Price Index for All Urban Consumers after 2020. (reference: Section 7522.10(d))

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 1 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly payroll)

Safety Tier 1								
Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	5.40%	8.11%	3.00%	3.00%	3.03%	4.54%	11.43%	15.65%
17	5.49%	8.24%	3.00%	3.00%	3.08%	4.62%	11.57%	15.86%
18	5.59%	8.38%	3.00%	3.00%	3.13%	4.70%	11.72%	16.08%
19	5.68%	8.52%	3.00%	3.00%	3.19%	4.78%	11.87%	16.30%
20	5.77%	8.66%	3.00%	3.00%	3.24%	4.86%	12.01%	16.52%
21	5.87%	8.81%	3.00%	3.00%	3.29%	4.94%	12.16%	16.75%
22	5.97%	8.95%	3.00%	3.00%	3.35%	5.02%	12.32%	16.97%
23	6.07%	9.10%	3.00%	3.00%	3.40%	5.10%	12.47%	17.20%
24	6.17%	9.25%	3.00%	3.00%	3.46%	5.19%	12.63%	17.44%
25	6.27%	9.41%	3.00%	3.00%	3.51%	5.27%	12.78%	17.68%
26	6.38%	9.57%	3.00%	3.00%	3.57%	5.36%	12.95%	17.93%
27	6.48%	9.73%	3.00%	3.00%	3.63%	5.45%	13.11%	18.18%
28	6.59%	9.89%	3.00%	3.00%	3.69%	5.54%	13.28%	18.43%
29	6.70%	10.05%	3.00%	3.00%	3.76%	5.64%	13.46%	18.69%
30	6.82%	10.22%	3.00%	3.00%	3.82%	5.73%	13.64%	18.95%
31	6.93%	10.40%	3.00%	3.00%	3.89%	5.83%	13.82%	19.23%
32	7.05%	10.58%	3.00%	3.00%	3.95%	5.93%	14.00%	19.51%
33	7.17%	10.76%	3.00%	3.00%	4.02%	6.03%	14.19%	19.79%
34	7.30%	10.95%	3.00%	3.00%	4.09%	6.14%	14.39%	20.09%
35	7.43%	11.14%	3.00%	3.00%	4.17%	6.25%	14.60%	20.39%
36	7.56%	11.34%	3.00%	3.00%	4.24%	6.36%	14.80%	20.70%
37	7.70%	11.55%	3.00%	3.00%	4.32%	6.48%	15.02%	21.03%
38	7.85%	11.77%	3.00%	3.00%	4.40%	6.60%	15.25%	21.37%
39	8.01%	12.01%	3.00%	3.00%	4.49%	6.73%	15.50%	21.74%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 1								
Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	8.16%	12.25%	3.00%	3.00%	4.58%	6.87%	15.74%	22.12%
41	8.33%	12.49%	3.00%	3.00%	4.67%	7.00%	16.00%	22.49%
42	8.51%	12.76%	3.00%	3.00%	4.77%	7.16%	16.28%	22.92%
43	8.67%	13.00%	3.00%	3.00%	4.86%	7.29%	16.53%	23.29%
44	8.79%	13.19%	3.00%	3.00%	4.93%	7.39%	16.72%	23.58%
45	8.85%	13.27%	3.00%	3.00%	4.96%	7.44%	16.81%	23.71%
46	8.86%	13.28%	3.00%	3.00%	4.97%	7.45%	16.83%	23.73%
47	8.68%	13.02%	3.00%	3.00%	4.87%	7.30%	16.55%	23.32%
48	8.41%	12.62%	3.00%	3.00%	4.71%	7.07%	16.12%	22.69%
49 & Over	7.94%	11.91%	3.00%	3.00%	4.45%	6.68%	15.39%	21.59%

Interest:	7.25% per annum
COLA:	3.00%
Mortality:	See Section 4, Exhibit I
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
COLA Loading Factor:	56.06%
Terminal Pay:	8.5%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly payroll)

Safety Tier 2								
Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	4.94%	7.42%	3.00%	3.00%	2.03%	3.05%	9.97%	13.47%
17	5.03%	7.54%	3.00%	3.00%	2.07%	3.10%	10.10%	13.64%
18	5.11%	7.67%	3.00%	3.00%	2.10%	3.15%	10.21%	13.82%
19	5.20%	7.79%	3.00%	3.00%	2.14%	3.21%	10.34%	14.00%
20	5.28%	7.92%	3.00%	3.00%	2.17%	3.26%	10.45%	14.18%
21	5.37%	8.05%	3.00%	3.00%	2.21%	3.31%	10.58%	14.36%
22	5.46%	8.19%	3.00%	3.00%	2.25%	3.37%	10.71%	14.56%
23	5.55%	8.32%	3.00%	3.00%	2.28%	3.42%	10.83%	14.74%
24	5.64%	8.46%	3.00%	3.00%	2.32%	3.48%	10.96%	14.94%
25	5.74%	8.60%	3.00%	3.00%	2.36%	3.54%	11.10%	15.14%
26	5.83%	8.75%	3.00%	3.00%	2.40%	3.60%	11.23%	15.35%
27	5.93%	8.89%	3.00%	3.00%	2.44%	3.66%	11.37%	15.55%
28	6.03%	9.04%	3.00%	3.00%	2.48%	3.72%	11.51%	15.76%
29	6.13%	9.19%	3.00%	3.00%	2.52%	3.78%	11.65%	15.97%
30	6.23%	9.35%	3.00%	3.00%	2.57%	3.85%	11.80%	16.20%
31	6.34%	9.51%	3.00%	3.00%	2.61%	3.91%	11.95%	16.42%
32	6.45%	9.67%	3.00%	3.00%	2.65%	3.98%	12.10%	16.65%
33	6.56%	9.83%	3.00%	3.00%	2.70%	4.05%	12.26%	16.88%
34	6.67%	10.01%	3.00%	3.00%	2.75%	4.12%	12.42%	17.13%
35	6.79%	10.18%	3.00%	3.00%	2.79%	4.19%	12.58%	17.37%
36	6.91%	10.37%	3.00%	3.00%	2.84%	4.26%	12.75%	17.63%
37	7.04%	10.56%	3.00%	3.00%	2.89%	4.34%	12.93%	17.90%
38	7.17%	10.75%	3.00%	3.00%	2.95%	4.42%	13.12%	18.17%
39	7.30%	10.95%	3.00%	3.00%	3.01%	4.51%	13.31%	18.46%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2								
Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	7.44%	11.16%	3.00%	3.00%	3.06%	4.59%	13.50%	18.75%
41	7.58%	11.36%	3.00%	3.00%	3.11%	4.67%	13.69%	19.03%
42	7.69%	11.54%	3.00%	3.00%	3.17%	4.75%	13.86%	19.29%
43	7.77%	11.66%	3.00%	3.00%	3.20%	4.80%	13.97%	19.46%
44	7.80%	11.70%	3.00%	3.00%	3.21%	4.82%	14.01%	19.52%
45	7.75%	11.63%	3.00%	3.00%	3.19%	4.78%	13.94%	19.41%
46	7.62%	11.43%	3.00%	3.00%	3.13%	4.70%	13.75%	19.13%
47	7.43%	11.14%	3.00%	3.00%	3.05%	4.58%	13.48%	18.72%
48	7.68%	11.52%	3.00%	3.00%	3.16%	4.74%	13.84%	19.26%
49 & Over	7.94%	11.91%	3.00%	3.00%	3.27%	4.90%	14.21%	19.81%

Interest:	7.25% per annum
COLA:	2.00%
Mortality:	See Section 4, Exhibit I
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
COLA Loading Factor:	41.14%
Terminal Pay:	3.5%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2C Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly payroll)

Safety Tier 2C						
Entry Age	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	4.94%	7.42%	1.71%	2.56%	6.65%	9.98%
17	5.03%	7.54%	1.73%	2.60%	6.76%	10.14%
18	5.11%	7.67%	1.76%	2.64%	6.87%	10.31%
19	5.20%	7.79%	1.79%	2.69%	6.99%	10.48%
20	5.28%	7.92%	1.82%	2.73%	7.10%	10.65%
21	5.37%	8.05%	1.85%	2.78%	7.22%	10.83%
22	5.46%	8.19%	1.89%	2.83%	7.35%	11.02%
23	5.55%	8.32%	1.91%	2.87%	7.46%	11.19%
24	5.64%	8.46%	1.95%	2.92%	7.59%	11.38%
25	5.74%	8.60%	1.98%	2.97%	7.72%	11.57%
26	5.83%	8.75%	2.01%	3.02%	7.84%	11.77%
27	5.93%	8.89%	2.05%	3.07%	7.98%	11.96%
28	6.03%	9.04%	2.08%	3.12%	8.11%	12.16%
29	6.13%	9.19%	2.11%	3.17%	8.24%	12.36%
30	6.23%	9.35%	2.15%	3.23%	8.38%	12.58%
31	6.34%	9.51%	2.19%	3.28%	8.53%	12.79%
32	6.45%	9.67%	2.23%	3.34%	8.68%	13.01%
33	6.56%	9.83%	2.26%	3.39%	8.82%	13.22%
34	6.67%	10.01%	2.30%	3.45%	8.97%	13.46%
35	6.79%	10.18%	2.34%	3.51%	9.13%	13.69%
36	6.91%	10.37%	2.39%	3.58%	9.30%	13.95%
37	7.04%	10.56%	2.43%	3.64%	9.47%	14.20%
38	7.17%	10.75%	2.47%	3.71%	9.64%	14.46%
39	7.30%	10.95%	2.52%	3.78%	9.82%	14.73%

¹ Use these rates for non-integrated members .

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2C						
Entry Age	Basic		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	7.44%	11.16%	2.57%	3.85%	10.01%	15.01%
41	7.58%	11.36%	2.61%	3.92%	10.19%	15.28%
42	7.69%	11.54%	2.65%	3.98%	10.34%	15.52%
43	7.77%	11.66%	2.68%	4.02%	10.45%	15.68%
44	7.80%	11.70%	2.69%	4.04%	10.49%	15.74%
45	7.75%	11.63%	2.67%	4.01%	10.42%	15.64%
46	7.62%	11.43%	2.63%	3.94%	10.25%	15.37%
47	7.43%	11.14%	2.56%	3.84%	9.99%	14.98%
48	7.68%	11.52%	2.65%	3.97%	10.33%	15.49%
49 & Over	7.94%	11.91%	2.74%	4.11%	10.68%	16.02%

Interest:	7.25% per annum
COLA:	2.00%
Mortality:	See Section 4, Exhibit I
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
COLA Loading Factor:	34.50%
Terminal Pay:	3.5%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2D Members' Contribution Rates for Members with Less than 5 Years of Vesting Service
Based on the December 31, 2019 Actuarial Valuation (as a % of biweekly payroll)

Safety Tier 2D Members with Less than 5 Years of Vesting Service

Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	4.94%	7.42%	5.00%	5.00%	1.95%	2.92%	11.89%	15.34%
17	5.03%	7.54%	5.00%	5.00%	1.98%	2.97%	12.01%	15.51%
18	5.11%	7.67%	5.00%	5.00%	2.01%	3.02%	12.12%	15.69%
19	5.20%	7.79%	5.00%	5.00%	2.05%	3.07%	12.25%	15.86%
20	5.28%	7.92%	5.00%	5.00%	2.08%	3.12%	12.36%	16.04%
21	5.37%	8.05%	5.00%	5.00%	2.12%	3.18%	12.49%	16.23%
22	5.46%	8.19%	5.00%	5.00%	2.15%	3.23%	12.61%	16.42%
23	5.55%	8.32%	5.00%	5.00%	2.19%	3.28%	12.74%	16.60%
24	5.64%	8.46%	5.00%	5.00%	2.23%	3.34%	12.87%	16.80%
25	5.74%	8.60%	5.00%	5.00%	2.26%	3.39%	13.00%	16.99%
26	5.83%	8.75%	5.00%	5.00%	2.30%	3.45%	13.13%	17.20%
27	5.93%	8.89%	5.00%	5.00%	2.34%	3.51%	13.27%	17.40%
28	6.03%	9.04%	5.00%	5.00%	2.38%	3.57%	13.41%	17.61%
29	6.13%	9.19%	5.00%	5.00%	2.42%	3.63%	13.55%	17.82%
30	6.23%	9.35%	5.00%	5.00%	2.46%	3.69%	13.69%	18.04%
31	6.34%	9.51%	5.00%	5.00%	2.50%	3.75%	13.84%	18.26%
32	6.45%	9.67%	5.00%	5.00%	2.54%	3.81%	13.99%	18.48%
33	6.56%	9.83%	5.00%	5.00%	2.59%	3.88%	14.15%	18.71%
34	6.67%	10.01%	5.00%	5.00%	2.63%	3.95%	14.30%	18.96%
35	6.79%	10.18%	5.00%	5.00%	2.68%	4.02%	14.47%	19.20%
36	6.91%	10.37%	5.00%	5.00%	2.73%	4.09%	14.64%	19.46%
37	7.04%	10.56%	5.00%	5.00%	2.77%	4.16%	14.81%	19.72%
38	7.17%	10.75%	5.00%	5.00%	2.83%	4.24%	15.00%	19.99%
39	7.30%	10.95%	5.00%	5.00%	2.88%	4.32%	15.18%	20.27%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2D Members with Less than 5 Years of Vesting Service

Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	7.44%	11.16%	5.00%	5.00%	2.93%	4.40%	15.37%	20.56%
41	7.58%	11.36%	5.00%	5.00%	2.99%	4.48%	15.57%	20.84%
42	7.69%	11.54%	5.00%	5.00%	3.03%	4.55%	15.72%	21.09%
43	7.77%	11.66%	5.00%	5.00%	3.07%	4.60%	15.84%	21.26%
44	7.80%	11.70%	5.00%	5.00%	3.08%	4.62%	15.88%	21.32%
45	7.75%	11.63%	5.00%	5.00%	3.06%	4.59%	15.81%	21.22%
46	7.62%	11.43%	5.00%	5.00%	3.01%	4.51%	15.63%	20.94%
47	7.43%	11.14%	5.00%	5.00%	2.93%	4.40%	15.36%	20.54%
48	7.68%	11.52%	5.00%	5.00%	3.03%	4.54%	15.71%	21.06%
49 & Over	7.94%	11.91%	5.00%	5.00%	3.13%	4.70%	16.07%	21.61%

Interest:	7.25% per annum
COLA:	2.00%
Mortality:	See Section 4, Exhibit I
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
COLA Loading Factor:	39.44%
Terminal Pay:	3.5%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2D Members with 5 or More Years of Vesting Service
Based on the December 31, 2019 Actuarial Valuation (as a % of biweekly payroll)

Safety Tier 2D Members with 5 or More Years of Vesting Service								
Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
16 & Under	4.94%	7.42%	3.00%	3.00%	1.95%	2.92%	9.89%	13.34%
17	5.03%	7.54%	3.00%	3.00%	1.98%	2.97%	10.01%	13.51%
18	5.11%	7.67%	3.00%	3.00%	2.01%	3.02%	10.12%	13.69%
19	5.20%	7.79%	3.00%	3.00%	2.05%	3.07%	10.25%	13.86%
20	5.28%	7.92%	3.00%	3.00%	2.08%	3.12%	10.36%	14.04%
21	5.37%	8.05%	3.00%	3.00%	2.12%	3.18%	10.49%	14.23%
22	5.46%	8.19%	3.00%	3.00%	2.15%	3.23%	10.61%	14.42%
23	5.55%	8.32%	3.00%	3.00%	2.19%	3.28%	10.74%	14.60%
24	5.64%	8.46%	3.00%	3.00%	2.23%	3.34%	10.87%	14.80%
25	5.74%	8.60%	3.00%	3.00%	2.26%	3.39%	11.00%	14.99%
26	5.83%	8.75%	3.00%	3.00%	2.30%	3.45%	11.13%	15.20%
27	5.93%	8.89%	3.00%	3.00%	2.34%	3.51%	11.27%	15.40%
28	6.03%	9.04%	3.00%	3.00%	2.38%	3.57%	11.41%	15.61%
29	6.13%	9.19%	3.00%	3.00%	2.42%	3.63%	11.55%	15.82%
30	6.23%	9.35%	3.00%	3.00%	2.46%	3.69%	11.69%	16.04%
31	6.34%	9.51%	3.00%	3.00%	2.50%	3.75%	11.84%	16.26%
32	6.45%	9.67%	3.00%	3.00%	2.54%	3.81%	11.99%	16.48%
33	6.56%	9.83%	3.00%	3.00%	2.59%	3.88%	12.15%	16.71%
34	6.67%	10.01%	3.00%	3.00%	2.63%	3.95%	12.30%	16.96%
35	6.79%	10.18%	3.00%	3.00%	2.68%	4.02%	12.47%	17.20%
36	6.91%	10.37%	3.00%	3.00%	2.73%	4.09%	12.64%	17.46%
37	7.04%	10.56%	3.00%	3.00%	2.77%	4.16%	12.81%	17.72%
38	7.17%	10.75%	3.00%	3.00%	2.83%	4.24%	13.00%	17.99%
39	7.30%	10.95%	3.00%	3.00%	2.88%	4.32%	13.18%	18.27%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 2D Members with 5 or More Years of Vesting Service								
Entry Age	Basic		Cost Sharing Contributions		COLA		Total	
	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹	First \$161	Over \$161 ¹
40	7.44%	11.16%	3.00%	3.00%	2.93%	4.40%	13.37%	18.56%
41	7.58%	11.36%	3.00%	3.00%	2.99%	4.48%	13.57%	18.84%
42	7.69%	11.54%	3.00%	3.00%	3.03%	4.55%	13.72%	19.09%
43	7.77%	11.66%	3.00%	3.00%	3.07%	4.60%	13.84%	19.26%
44	7.80%	11.70%	3.00%	3.00%	3.08%	4.62%	13.88%	19.32%
45	7.75%	11.63%	3.00%	3.00%	3.06%	4.59%	13.81%	19.22%
46	7.62%	11.43%	3.00%	3.00%	3.01%	4.51%	13.63%	18.94%
47	7.43%	11.14%	3.00%	3.00%	2.93%	4.40%	13.36%	18.54%
48	7.68%	11.52%	3.00%	3.00%	3.03%	4.54%	13.71%	19.06%
49 & Over	7.94%	11.91%	3.00%	3.00%	3.13%	4.70%	14.07%	19.61%

Interest:	7.25% per annum
COLA:	2.00%
Mortality:	See Section 4, Exhibit I
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See Section 4, Exhibit I)
COLA Loading Factor:	39.44%
Terminal Pay:	3.5%

¹ Use these rates for non-integrated members.

Section 4: Actuarial Valuation Basis

Exhibit III: Member Contribution Rates (continued)

Safety Tier 4 Members' Contribution Rates Based on the December 31, 2019 Actuarial Valuation
(as a % of biweekly eligible payroll)¹

Safety Tier 4			
Entry Age	Basic	COLA	Total
	Eligible Pay	Eligible Pay	Eligible Pay
All Ages	12.16%	3.26%	15.42%

Interest:	7.25% per annum
COLA:	2.00%
Mortality:	See <i>Section 4, Exhibit I</i>
Salary Increase:	Inflation (3.00%) + Across-the-Board Increase (0.50%) + Merit (See <i>Section 4, Exhibit I</i>)
COLA Loading Factor:	26.81%
Terminal Pay:	0.0%

¹ It is our understanding that in the determination of pension benefits under the CalPEPRA formulas, the compensation that can be taken into account for 2020 is equal to \$126,291. (For an employer that is not enrolled in Social Security, the maximum amount is 120% of \$126,291, or \$151,549). (reference: Section 7522.10). These amounts should be adjusted for changes to the Consumer Price Index for All Urban Consumers after 2020. (reference: Section 7522.10(d))

Section 4: Actuarial Valuation Basis

Exhibit IV: Projected Employer Contributions by Each Participating Employer

Estimated Employer Contribution Requirement for Each Participating Employer in ACERA (\$000s)
Calculated Based on Projected Employer Compensation Used in the December 31, 2019 Actuarial Valuation

Dollar Contribution ^{1,3} – Based on December 31, 2019 Valuation										
Employer Name (Code)	General				Safety					Total
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 1	Tier 2	Tier 2C	Tier 2D	Tier 4	
Alameda County (101)	\$1,738	\$85,631		\$46,119	\$632	\$73,163	\$2,023	\$9,918	\$25,729	\$244,953
Health System (106)	163	35,585		24,582						60,330
Superior Court (632)	210	8,051		4,539						12,800
First 5 (714)		665		740						1,405
Housing Authority (103)	834	63		394						1,291
LARPD (104)	237		\$794	694						1,725
Total	\$3,182	\$129,995	\$794	\$77,068	\$632	\$73,163	\$2,023	\$9,918	\$25,729	\$322,504

Dollar Contribution ^{2,3} – Based on December 31, 2018 Valuation										
Employer Name (Code)	General				Safety					Total
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 1	Tier 2	Tier 2C	Tier 2D	Tier 4	
Alameda County (101)	\$1,693	\$83,600		\$44,828	\$613	\$71,648	\$1,981	\$9,651	\$25,180	\$239,194
Health System (106)	158	34,693		23,866						58,717
Superior Court (632)	204	7,850		4,407						12,461
First 5 (714)		649		718						1,367
Housing Authority (103)	816	61		384						1,261
LARPD (104)	209		\$696	610						1,515
Total	\$3,080	\$126,853	\$696	\$74,813	\$613	\$71,648	\$1,981	\$9,651	\$25,180	\$314,515

¹ Includes contributions only for those employers with active member payroll. The UAAL contribution for ACOE, expressed as a level dollar amount, is \$89 K when made on April 1, 2021.

² Includes contributions only for those employers with active member payroll. The UAAL contribution for ACOE, expressed as a level dollar amount, is \$78 K when made on April 1, 2020.

³ Contribution calculated using projected compensation provided on the next page for the December 31, 2019 valuation:

Section 4: Actuarial Valuation Basis

Exhibit IV: Projected Employer Contributions by Each Participating Employer (continued)

December 31, 2019 Projected Total Compensation (\$000s)										
Employer Name (Code)	General				Safety					Total
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 1	Tier 2	Tier 2C	Tier 2D	Tier 4	
Alameda County (101)	\$7,586	\$390,655		\$215,208	\$761	\$114,929	\$3,115	\$15,666	\$42,534	\$790,454
Health System (106)	682	156,139		110,231						267,052
Superior Court (632)	884	35,328		20,356						56,568
First 5 (714)		2,920		3,317						6,237
Housing Authority (103)	2,879	224		1,430						4,533
LARPD (104)	623		1,811	1,897						4,331
Total	\$12,654	\$585,266	\$1,811	\$352,439	\$761	\$114,929	\$3,115	\$15,666	\$42,534	\$1,129,175

Section 4: Actuarial Valuation Basis

Exhibit V: Schedule of Outstanding Balances of Prior Implicit Retiree Health Benefit Subsidy Transfers

For Year(s)	Initial Years	Initial Amount ¹	Outstanding Balance	Years Remaining	Annual Payment ²
Prior to 2013	³	³	\$33,706	13	\$3,301
2013	20	\$6,993	6,583	14	608
2014	20	5,215	4,889	15	429
2015	20	5,325	5,144	16	430
2016	20	8,865	8,730	17	697
2017	20	5,830	5,727	18	440
2018	20	6,940	6,881	19	508
2019	20	6,511	6,511	20	464
Total			\$78,171		\$6,877

¹ For years 2013 and later, these amounts are estimates provided by ACERA.

² Level percentage of payroll.

³ Various initial years and amounts prior to 2013.

Section 4: Actuarial Valuation Basis

Exhibit VI: Allocation of the Valuation Value of Assets as of December 31, 2019

The allocation of the Valuation Value of Assets is determined based on a roll-forward of the prior year allocation using employer contributions, member contributions, benefit payments, and calculated interest credits as provided by ACERA.

	General (Excluding LARPD and Office of Education)	General (Office of Education)	General (LARPD)	Safety	Total
A. Valuation Value of Assets at Beginning-of-Year					
Basic Only	\$3,791,787,232	\$1,770,669	\$29,941,755	\$1,088,871,342	\$4,912,370,998
COLA Only	1,634,005,352	1,362,547	15,240,109	676,348,151	2,326,956,159
Total	\$5,425,792,584	\$3,133,216	\$45,181,864	\$1,765,219,493	\$7,239,327,157
B. Adjustment for the difference between the Actual SRBR Transfer and the Estimated SRBR Transfer used in Prior Valuation					
Basic Only	\$(31,418)	\$0	\$0	\$(9,251)	\$(40,669)
C. Employer Contributions					
Basic Only	\$151,617,916	\$750,000	\$933,947	\$81,391,348	\$234,693,211
COLA Only	40,930,929	0	372,627	22,530,183	63,833,739
Total	\$192,548,845	\$750,000	\$1,306,574	\$103,921,531	\$298,526,950
D. Employee Contributions					
Basic Only	\$61,119,825	\$0	\$396,671	\$21,226,902	\$82,743,398
COLA Only	13,919,030	0	129,743	6,324,851	20,373,624
Total	\$75,038,855	\$0	\$526,414	\$27,551,753	\$103,117,022
E. Benefit Payments					
Basic Only	\$275,660,989	\$274,991	\$2,441,488	\$102,352,798	\$380,730,266
COLA Only	86,583,844	110,259	586,782	34,774,911	122,055,796
Total	\$362,244,833	\$385,250	\$3,028,270	\$137,127,709	\$502,786,062
F. Average Valuation Value of Assets: (A) + (B) + 1/2 x [(C) + (D) - (E)]					
Basic Only	\$3,760,294,190	\$2,008,174	\$29,386,320	\$1,088,994,817	\$4,880,683,500
COLA Only	1,618,138,410	1,307,418	15,197,903	673,388,213	2,308,031,943
Total	\$5,378,432,599	\$3,315,591	\$44,584,223	\$1,762,383,030	\$7,188,715,443
G. Return on Valuation Value of Assets: Total Column (G) / Total Column (F) x Cost Group Column (F)					
Basic Only	\$238,069,898	\$127,140	\$1,860,492	\$68,945,905	\$309,003,436
COLA Only	102,581,690	82,884	963,469	42,689,365	146,317,407
Total	\$340,651,588	\$210,024	\$2,823,961	\$111,635,269	\$455,320,843
H. Preliminary Valuation Value of Assets Provided by ACERA: (A) + (B) + (C) + (D) - (E) + (G)					
Basic Only	\$3,966,902,464	\$2,372,818	\$30,691,377	\$1,158,073,448	\$5,158,040,107
COLA Only	1,704,853,157	1,335,172	16,119,166	713,117,639	2,435,425,134
Total	\$5,671,755,621	\$3,707,990	\$46,810,543	\$1,871,191,087	\$7,599,465,241
I. Estimated SRBR Transfer and other Asset Transfer					
Basic Only	\$5,052,907	\$0	\$0	\$1,457,969	\$6,510,876
COLA Only	0	0	0	0	0
Total	\$5,052,907	\$0	\$0	\$1,457,969	\$6,510,876
J. Valuation Value of Assets at End of Year: (H) + (I)					
Basic Only	\$3,971,955,371	\$2,372,818	\$30,691,377	\$1,159,531,417	\$5,164,550,983
COLA Only	1,704,853,157	1,335,172	16,119,166	713,117,639	2,435,425,134
Total	\$5,676,808,528	\$3,707,990	\$46,810,543	\$1,872,649,056	\$7,599,976,117

Note: Results may be slightly off due to rounding.