Segal Consulting

Alameda County Employees' Retirement Association

Governmental Accounting Standards Board (GASB) Statement 67
Actuarial Valuation as of December 31, 2018

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May 20, 2019

Board of Retirement
Alameda County Employees' Retirement Association
475 14th Street, Suite 1000
Oakland, CA 94612

Dear Board Members:

We are pleased to submit this Governmental Accounting Standards Board (GASB) Statement 67 Actuarial Valuation as of December 31, 2018. It contains various information that will need to be disclosed in order to comply with GASB Statement 67.

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

The measurements shown in this actuarial valuation may not be applicable for other purposes. 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; and changes in plan provisions or applicable law.

The actuarial calculations were completed 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 the 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 expectations for the Association.

We look forward to reviewing this report with you and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: Andy Yeung　　　Eva Yum

Andy Yeung, ASA, MAAA, FCA, EA	*Eva Yum, FSA, MAAA, EA*
Vice President and Actuary	*Senior Actuary*

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SECTION 1

VALUATION SUMMARY

SECTION 2

GASB 67 INFORMATION

Purpose

This report has been prepared by Segal Consulting ("Segal") to present certain disclosure information required by Governmental Accounting Standards Board (GASB) Statement 67 as of December 31, 2018. This valuation is based on:

- The benefit provisions of the Retirement Association, 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, 2017, provided by the Retirement Association;
- The assets of the Plan as of December 31, 2018, provided by the Retirement Association;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

General Observations on GASB 67 Valuation

The following points should be considered when reviewing this GASB 67 report:

- The Governmental Accounting Standards Board (GASB) rules only define pension liability and expense for financial reporting purposes, and do not apply to contribution amounts for pension funding purposes. Employers and plans develop and adopt funding policies under current practices.
- When measuring pension liability, GASB uses the same actuarial cost method (Entry Age) and the same type of discount rate (expected return on assets) as ACERA uses for funding. This means that the Total Pension Liability (TPL) measure for financial reporting shown in this report is determined on generally the same basis as ACERA's Actuarial Accrued Liability (AAL) measure for funding. We note that the same is generally true for the Normal Cost component of the annual plan cost for funding and financial reporting.
- The Net Pension Liability (NPL) is equal to the difference between the TPL and the Plan's Fiduciary Net Position. The Plan's Fiduciary Net Position is equal to the market value of assets and therefore, the NPL measure is very similar to an Unfunded Actuarial Accrued Liability (UAAL) calculated on a market value basis.

Significant Issues in Valuation Year

The following key findings were the result of this actuarial valuation:

- As we disclosed in our December 31, 2018 funding 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 employee contribution rates 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 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 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 the determination of the TPL) that would average approximately 0.60% of assets over time. This approximated outflow was incorporated into our GASB crossover test[1] (Exhibit 5), along with the additional future employer contributions that would result from those future allocations of excess earnings to the SRBR under ACERA's funding policy.

- The NPL measured as of December 31, 2018 was determined by rolling forward the TPL for the funded benefits as of December 31, 2017. Similar to last year, we have included in the TPL as of December 31, 2018 the non-OPEB *unlimited* Actuarial Accrued Liability (AAL) of $164.1 million, which was calculated by rolling forward the total unlimited non-OPEB AAL as of December 31, 2017.

- We have also continued the practice of adjusting the Plan's Fiduciary Net Position as of December 31, 2018 to include the $39.3 million set aside by the Retirement Board in the SRBR reserve to pay non-vested Supplemental COLA and retired member death benefits[2] as of December 31, 2018. It should be noted that as of December 31, 2018, the deferred investment loss for the entire Plan was $569.1 million and the Contingency Reserve was $0. Consequently, we have subtracted from the Plan's Fiduciary Net Position the proportionate share of the deferred investment loss that is commensurate with the size of the non-OPEB SRBR reserve, or $2.7 million (which will cause the future interest crediting rate to the SRBR reserve to drop below 7.25% per year). The net effect of the adjustments to the Plan's Fiduciary Net Position as of December 31, 2018 for non-OPEB SRBR benefits was an addition of $36.6 million.

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[1] *The purpose of the GASB crossover test is to determine if the full expected return (or 7.25% in this case) can be used as the discount rate to determine the TPL and the NPL. That is, if there is no crossover point where the projected benefit payments would exceed the Plan's Fiduciary Net Position, then the full expected return assumption can be used. As detailed later in this report, ACERA does pass the crossover test, which means that the full 7.25% investment rate of return assumption can be used as the discount rate to determine the TPL and the resulting NPL.*

[2] *We have excluded the liability and the assets associated with the OPEB component of the SRBR reserve account because it is our understanding that those amounts are reportable under GASB 74/75.*

Note that the proportionate share of the deferred market loss as of December 31, 2018 for the Pension Plan was equal to $504.8 million, and in calculating the Plan's Fiduciary Net Position we have adjusted the Pension Plan's valuation value of assets in the funding valuation to reflect that amount.

- The $127.5 million difference between the $164.1 million added to the TPL and the net $36.6 million added to the Plan's Fiduciary Net Position as of December 31, 2018 represents the NPL attributable to non-OPEB SRBR benefits.
- The NPL increased from $2,014 million as of December 31, 2017 to $2,764 million as of December 31, 2018, primarily as a result of the unfavorable investment return during calendar year 2018 of about $727 million. Changes in these values during the last two fiscal years ending December 31, 2017 and December 31, 2018 can be found in Exhibit 3.
- The discount rate used to determine the TPL and NPL as of December 31, 2018 and 2017 was 7.25%, based on the assumption that was used by the Association in the pension funding valuations as of those dates. The detailed calculations used in the derivation of the discount rate of 7.25% used in the calculation of the TPL and NPL as of December 31, 2018 can be found in Exhibit 5 of Section 2. Various other information that is required to be disclosed can be found throughout Exhibits 1-4 in Section 2.

Summary of Key Valuation Results

	2018	2017
Disclosure elements for plan year ending December 31:		
Service cost(1)	$209,890,150	$187,408,672
Total Pension Liability	9,535,148,109	9,123,899,264
Plan's Fiduciary Net Position(2)	6,771,146,134	7,110,223,325
Net Pension Liability	2,764,001,975	2,013,675,939
Schedule of contributions for plan year ending December 31:		
Actuarially determined contributions	$269,684,809	$247,063,550
Actual contributions(3)	269,684,809	247,063,550
Contribution deficiency (excess)	0	0
Demographic data for plan year ending December 31:(4)		
Number of retired members and beneficiaries	9,783	9,479
Number of vested terminated members(5)	2,568	2,447
Number of active members	11,349	11,323
Key assumptions as of December 31:		
Investment rate of return	7.25%	7.25%
Inflation rate	3.00%	3.00%
Projected salary increases(6)	General: 8.30% to 3.90% and Safety: 11.30% to 4.30%	General: 8.30% to 3.90% and Safety: 11.30% to 4.30%

(1) *Service cost is based on the previous year's valuation, meaning the 2018 and 2017 values are based on the valuations as of December 31, 2017 and December 31, 2016, respectively. The 2018 service cost has been calculated using the assumptions shown in the 2017 column, and the 2017 service cost has been calculated using the following assumptions:*

Key assumptions as of December 31, 2016:	
Investment rate of return	*7.60%*
Inflation rate	*3.25%*
*Projected salary increases**	*General: 7.45% to 4.15% and Safety: 10.45% to 4.45%*

** Includes inflation of 3.25% plus real across-the-board salary increases of 0.50% plus merit and promotional increases.*

(2) *For 2018, the Plan's Fiduciary Net Position amount shown ($6,771,146,134) includes the net market value of assets ($7,592,586,569) less OPEB-related SRBR assets ($821,440,435). The OPEB-related SRBR assets include $873,183,258 in the SRBR-OPEB reserve (after reducing the reserve by the $6,939,808 SRBR implicit subsidy transfer), and $9,830,102 in the 401(h) reserve, less a proportionate share of the deferred market losses (after adjustment to include the balance in the Contingency Reserve) commensurate with the size of the OPEB reserves ($61,572,926). For 2017, the Plan's Fiduciary Net Position amount shown ($7,110,223,325) includes the net market value of assets ($8,112,099,556) less OPEB-related SRBR assets ($1,001,876,232). The OPEB-related SRBR assets include $850,423,696 in the SRBR-OPEB reserve (after reducing the reserve by the $5,830,283 SRBR implicit subsidy transfer), and $7,582,098 in the 401(h) reserve, plus a proportionate share of one half of the deferred market gains (after adjustment to include the balance in the Contingency Reserve) commensurate with the size of the OPEB and non-OPEB reserves ($143,870,438). Note that amounts may not total properly due to rounding.*

(3) *Employer contributions are on a net basis after (i) considering the total cash contributions made by the employers, (ii) reducing by the employer contributions made to the 401(h) account, and (iii) increasing by the amount of transfer from the SRBR to the Employers Advance Reserve for employer contributions made to the 401(h) account in (ii).*

(4) *Data as of December 31, 2017 is used in the measurement of the TPL as of December 31, 2018.*

(5) *Includes members who left their contributions on deposit even though they have less than five years of service.*

(6) *Includes inflation at 3.00% plus real across-the-board salary increases of 0.50% plus merit and promotional increases.*

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 an actuarial 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 in this report (as well as the plan summary included in our funding valuation 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 ACERA. 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** This valuation is based on the market value of assets as of the valuation date, as provided by ACERA. The Association uses an "actuarial value of assets" that differs from market value to gradually reflect six-month changes in the market value of assets in determining 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, termination, 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.

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

- The valuation is prepared at the request of the Board to assist the sponsors of the Fund in preparing items related to the pension plan in their financial reports. 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.
- If ACERA 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 Board 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 ACERA, it is not a fiduciary in its capacity as actuaries and consultants with respect to ACERA.

EXHIBIT 1

General Information – "Financial Statements", Note Disclosures and Required Supplementary Information for a Cost-Sharing Pension Plan

Plan Description

Plan administration. The Alameda County Employees' Retirement Association (ACERA) was established by the Alameda County Board of Supervisors in 1947. ACERA is administered by the Board of Retirement and governed by the County Employees' Retirement Law of 1937 (California Government Code Section 31450 et. seq.). ACERA is a cost-sharing, multiple employer, defined benefit, public employee retirement system whose main function is to provide service retirement, disability, death, and survivor benefits to the General and Safety members employed by the County of Alameda. ACERA also provides retirement benefits to the employee members of First 5 Alameda County, Housing Authority of the County of Alameda, Alameda Health System, Livermore Area Recreation and Park District (LARPD), and Superior Court of California—County of Alameda, and Alameda County Office of Education.

The management of ACERA is vested with the ACERA Board of Retirement. The Board consists of nine members and two alternates. The County Treasurer is a member of the Board of Retirement by law and is elected by the general public. Four members are appointed by the Board of Supervisors, one of whom may be a County Supervisor. Two active members are elected by the General members; one active member and one alternate are elected by the Safety members; one retired member and one alternate are elected by the retired members. All members of the Board of Retirement serve terms of three years except for the County Treasurer whose term runs concurrent with his term as County Treasurer.

Plan membership. At December 31, 2018, pension plan membership consisted of the following:

Retired members or beneficiaries currently receiving benefits	9,783
Vested terminated members entitled to, but not yet receiving benefits(1)	2,568
Active members	11,349
Total	23,700

(1) *Includes terminated members due a refund of member contributions.*

Note: Data as of December 31, 2018 is not used in the measurement of the TPL as of December 31, 2018.

Benefits provided. ACERA provides service retirement, disability, death, and survivor benefits to eligible employees. The first date of ACERA membership varies by employer, as follows:

- Alameda County, Alameda Health System and Alameda Superior Court Employees: Membership for these employees is effective on the first day of the second pay period following the employee's hire date in an ACERA covered position. This is the date of entry into ACERA membership. As of the date of entry, payroll deductions for retirement contributions begin and service credit for each hour worked is earned. During the short period between the beginning of employment and the ACERA plan date of entry, the employee does not pay contributions or earn service credit. A member may purchase this service credit (referred to as "days prior to entry") any time before retirement without changing the membership, but date of entry does not change.
- Housing Authority and Livermore Area Recreation and Park District Employees: Membership for these employees is effective on the first day of employee's hire in an ACERA covered position. The first date of employment is the date of entry into ACERA membership. As of this date of entry, payroll deductions for retirement contributions begin and service credit for each hour work is earned.
- First 5 Employees: Membership for these employees is effective on the first day of the second pay period following the employee's hire date.
- Office of Education Employees: This is a closed plan with no more active employees (i.e., there is no new ACERA membership. However, the employer does retain retired members and beneficiaries in the Retirement Association as of the December 31, 2018 valuation date).

There are separate retirement benefits for General and Safety members. Safety membership is extended to those involved in active law enforcement, deferred firefighters, or positions that have been designated as Safety by the Board of Retirement (e.g. Juvenile Hall Group Counselor, Probation Officer, etc.). All other employees are classified as General members.

Any new member who becomes a member on or after January 1, 2013 is placed into Tier 4 and is subject to the provisions of California Public Employees' Pension Reform Act of 2013 (PEPRA), California Government Code 7522 et seq. and Assembly Bill (AB) 197.

General members enrolled in Tiers 1, 2, or 3 are eligible to retire once they attain the age of 70 regardless of service or at age 50 with five or more years of retirement service credit and a total of 10 years of qualifying membership. A non-Tier 4 General member with 30 years of service is eligible to retire regardless of age. General members enrolled in Tier 4 are eligible to retire once they have attained the age of 52 and have acquired five years of retirement service credit, or at age 70 regardless of service.

Safety members enrolled in Tiers 1, 2, 2C, or 2D are eligible to retire once they attain the age of 70 regardless of service or at age 50 with five or more years of retirement service credit and a total of 10 years of qualifying membership. A non-Tier 4 Safety member with 20 years of service is eligible to retire regardless of age. Safety members enrolled in Tier 4 are eligible to retire once they have attained the age of 50 and have acquired five years of retirement service credit, or at age 70 regardless of service.

The retirement benefit the member will receive is based upon age at retirement, final average compensation, years of retirement service credit and retirement plan and tier.

The tiers and their basic provisions are listed below:

Tier Name	Service Retirement Governing Code Section	Effective Date	Basic Provisions	Final Average Salary Period	Plan Sponsors
General Tier 1	§31676.12	Various	2.0% at 57; maximum 3% COLA	Highest 1-year	All
General Tier 2	§31676.1	June 30, 1983*	2.0% at 61; maximum 2% COLA	Highest 3-years	All except LARPD
General Tier 3	§31676.18	October 1, 2008	2.5% at 55; maximum 3% COLA	Highest 1-year	LARPD
General Tier 4	§7522.20(a)	January 1, 2013	2.5% at 67; maximum 2% COLA	Highest 3-years	All
Safety Tier 1	§31664.1	Various	3.0% at 50; maximum 3% COLA	Highest 1-year	County
Safety Tier 2	§31664.1	June 30, 1983	3.0% at 50; maximum 2% COLA	Highest 3-years	County
Safety Tier 2C	§31664	October 17, 2010	2.6% at 55; maximum 2% COLA	Highest 3-years	County
Safety Tier 2D	§31664.2	October 17, 2010	3.0% at 55; maximum 2% COLA	Highest 3-years	County
Safety Tier 4	§7522.25(d)	January 1, 2013	2.7% at 57; maximum 2% COLA	Highest 3-years	County

** For Housing Authority members, the effective date is September 30, 2011.*

For members enrolled in Tiers 1, 2, 2C, 2D, or 3, the maximum monthly retirement allowance is 100% of final compensation. There is no maximum for members enrolled in Tier 4.

The member may elect an unmodified retirement allowance, or choose an optional retirement allowance. The unmodified retirement allowance provides the highest monthly benefit and a 60% continuance to an eligible surviving spouse or domestic partner. An eligible surviving spouse or domestic partner is one married to or registered with the member one year prior to the effective retirement date. There are four optional retirement allowances the member may choose. Each of the optional retirement allowances requires a reduction in the unmodified retirement allowance in order to allow the member the ability to provide certain benefits to a surviving spouse, domestic partner, or named beneficiary having an insurable interest in the life of the member.

ACERA provides an annual cost-of-living benefit to all retirees. The cost-of-living adjustment, based upon the Consumer Price Index for the San Francisco-Oakland-Hayward Area[3] (with 1982-84 as the base period), is capped at 3.0% for General Tiers 1 and 3 and Safety Tier 1, and at 2.0% for General Tiers 2 and 4 and Safety Tiers 2, 2C, 2D, and 4.

The County of Alameda and the other participating agencies contribute to the retirement plan based upon actuarially determined contribution rates adopted by the Board of Retirement. Employer contribution rates are adopted annually based upon recommendations received from ACERA's actuary after the completion of the annual actuarial valuation. The average employer contribution rate as of December 31, 2018 for 2018 (based on the December 31, 2016 valuation for the second half of 2017/2018 and on the December 31, 2017 valuation for the first half of 2018/2019) was 25.78% of compensation.

Members are required to make contributions to ACERA regardless of the retirement plan or tier in which they are included. The average member contribution rate as of December 31, 2018 for 2018 (based on the December 31, 2016 valuation for the second half of 2017/2018 and on the December 31, 2017 valuation for the first half of 2018/2019) was 9.06% of compensation.

[3] *Formerly the San Francisco-Oakland-San Jose Area.*

EXHIBIT 2

Net Pension Liability

The components of the Net Pension Liability are as follows:

	December 31, 2018	December 31, 2017
Total Pension Liability	$9,535,148,109	$9,123,899,264
Plan's Fiduciary Net Position	6,771,146,134	7,110,223,325
Net Pension Liability	$2,764,001,975	$2,013,675,939
Plan's Fiduciary Net Position as a percentage of the Total Pension Liability	71.01%	77.93%

The Net Pension Liability was measured as of December 31, 2018 and 2017. The Plan's Fiduciary Net Position (plan assets) was valued as of the measurement date while the Total Pension Liability was determined based upon rolling forward the Total Pension Liability from actuarial valuations as of December 31, 2017 and 2016, respectively.

Plan provisions. The plan provisions used in the measurement of the Net Pension Liability as of December 31, 2018 and December 31, 2017 are the same as those used in ACERA's funding valuations as of December 31, 2017 and December 31, 2016, respectively.

Actuarial assumptions. The Total Pension Liabilities as of December 31, 2018 and December 31, 2017 were determined by actuarial valuations as of December 31, 2017 and December 31, 2016, respectively. The actuarial assumptions used to develop the December 31, 2018 and December 31, 2017 TPLs are the same assumptions used in the December 31, 2018 and December 31, 2017 funding valuations for ACERA, respectively. In particular, the following actuarial assumptions were applied to all periods included in the measurement:

Inflation	3.00%
Salary increases	General: 8.30% to 3.90% and Safety: 11.30% to 4.30%, vary by service, including inflation
Investment rate of return	7.25%, net of pension plan investment expense, including inflation
Other assumptions	See analysis of actuarial experience during the period December 1, 2013 through November 30, 2016

The long-term expected rate of return on pension plan investments[4] was determined in 2017 using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation and subtracting expected investment expenses and a risk margin. The target allocation and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before deducting investment expenses are summarized in the following table. These values were used in the derivation of the long-term expected investment rate of return assumption for the December 31, 2018 valuation. This information is subject to change every three years based on the actuarial experience study.

Asset Class	Target Allocation	Long-Term (Arithmetic) Expected Real Rate of Return
Domestic Large Cap Equity	22.40%	5.75%
Domestic Small Cap Equity	5.60%	6.37%
Developed International Equity	19.50%	6.89%
Emerging Markets Equity	6.50%	9.54%
U.S. Core Fixed Income	11.25%	1.03%
High Yield Bonds	1.50%	3.99%
International Bonds	2.25%	0.19%
TIPS	2.00%	0.98%
Real Estate	8.00%	4.47%
Commodities	3.00%	3.78%
Hedge Funds	9.00%	4.30%
Private Equity	9.00%	7.60%
Total	100.00%	

[4] *Note that the investment return assumption for funding purposes was developed net of both investment and administrative expenses; however, the same investment return assumption was used for financial reporting purposes, and it was considered gross of administrative expenses for financial reporting purposes. (This resulted in an increase in the margin for adverse deviation when using that investment return assumption for financial reporting.)*

Discount rate: The discount rate used to measure the Total Pension Liability was 7.25% as of December 31, 2018 and December 31, 2017. Our understanding is 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 assumption for funding than is used for interest crediting. In order to reflect the provisions of Article 5.5, we have treated future allocations to the SRBR as an additional outflow against the Plan's Fiduciary Net Position in the GASB crossover test, as mentioned earlier in Section 1. Again, we are estimating that the additional outflow would average approximately 0.60% of assets over time, based on the results of our stochastic modeling of the 50% allocation of future excess earnings to the SRBR.

The projection of cash flows used to determine the discount rate assumes plan member contributions will be made at the current member contribution rates, and that employer contributions will be made at rates equal to the actuarially determined contribution rates[5] plus additional future contributions that would follow from the future allocation of excess earnings to the SRBR. Projected employer contributions that are intended to fund the service costs for future plan members and their beneficiaries, as well as projected contributions from future plan members, are not included. Based on those assumptions, the pension plan's Fiduciary Net Position was projected to be available to make all projected future benefit payments for current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the Total Pension Liability as of both December 31, 2018 and December 31, 2017.

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability as of December 31, 2018, calculated using the discount rate of 7.25%, as well as what the Net Pension Liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.25%) or 1-percentage-point higher (8.25%) than the current rate:

	1% Decrease (6.25%)	Current Discount Rate (7.25%)	1% Increase (8.25%)
Net Pension Liability as of December 31, 2018	$4,006,839,721	$2,764,001,975	$1,739,578,825

[5] *For this purpose, only employer contributions that are intended to fund benefits of current plan members and their beneficiaries are included.*

EXHIBIT 3

Schedule of Changes in Net Pension Liability – Last Two Fiscal Years

	2018	2017
Total Pension Liability		
Service cost	$209,890,150	$187,408,672
Interest	659,591,792	636,556,488
Change of benefit terms	0	0
Differences between expected and actual experience	13,710,084	17,516,316
Changes of assumptions	0	316,727,508
Benefit payments, including refunds of employee contributions	-471,943,181	-445,288,615
Net change in Total Pension Liability	$411,248,845	$712,920,369
Total Pension Liability – beginning	9,123,899,264	8,410,978,895
Total Pension Liability – ending (a)	$9,535,148,109	$9,123,899,264
Plan's Fiduciary Net Position		
Contributions – employer[(1)]	$269,684,809	$247,063,550
Contributions – employee	94,735,673	89,325,824
Net investment income	-216,308,362	1,065,909,076
Benefit payments, including refunds of employee contributions	-471,943,181	-445,288,615
Administrative expense	-15,246,130	-14,571,178
Other	0	0
Net change in Plan's Fiduciary Net Position	-$339,077,191	$942,438,657
Plan's Fiduciary Net Position[(2)] – beginning	7,110,223,325	6,167,784,668
Plan's Fiduciary Net Position[(2)] – ending (b)	$6,771,146,134	$7,110,223,325
Net Pension Liability – ending (a) – (b)	$2,764,001,975	$2,013,675,939
Plan's Fiduciary Net Position as a percentage of the Total Pension Liability	71.01%	77.93%
Covered payroll[(3)]	$1,046,033,851	$995,178,209
Plan Net Pension Liability as percentage of covered payroll	264.24%	202.34%

(1) *Employer contributions are on a net basis after (i) considering the total cash contributions made by the employers, (ii) reducing by the employer contributions made to the 401(h) account, and (iii) increasing by the amount of transfer from the SRBR to the Employers Advance Reserve for employer contributions made to the 401(h) account in (ii).*

(2) *See footnote (2) on page iv for a discussion on the development of the 2018 "Plan's Fiduciary Net Position – beginning" amount of $7,110,223,325 and the 2018 "Plan's Fiduciary Net Position – ending" amount of $6,771,146,134.*

(3) *Covered payroll represents Compensation Earnable and Pensionable Compensation and is defined as the payroll on which contributions to the pension plan are based.*

EXHIBIT 4

Schedule of Contributions – Last Ten Fiscal Years

Year Ended December 31	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency (Excess)	Covered Payroll[1]	Contributions as a Percentage of Covered Payroll
2009	$132,198,602	$132,198,602	$0	$838,141,323	15.77%
2010	147,543,301	147,543,301	0	839,617,361	17.57%
2011	162,879,221	162,879,221	0	837,482,162	19.45%
2012	179,648,812	179,648,812	0	845,932,592	21.24%
2013	191,180,146	191,180,146	0	853,349,657	22.40%
2014	213,254,775	213,254,775	0	886,924,862	24.04%
2015	224,607,104	224,607,104	0	945,858,017[2]	23.75%
2016	241,728,451	241,728,451	0	947,567,631	25.51%
2017	247,063,550	247,063,550	0	995,178,209	24.83%
2018	269,684,809	269,684,809	0	1,046,033,851	25.78%

(1) *For years ended December 31, 2017 and later, covered payroll represents Compensation Earnable and Pensionable Compensation and is defined as the payroll on which contributions to the pension plan are based. For the years ended before December 31, 2017, covered payroll was referred to as covered-employee payroll and only Compensation Earnable and Pensionable Compensation that would go into the determination of retirement benefits was included.*

(2) *ACERA indicated that this amount is based on 27 pay periods for 2015.*

Notes to Exhibit 4

Methods and assumptions used to establish "actuarially determined contribution" rates:	
Valuation date	Actuarially determined contribution rates for the first six months of calendar year 2018 (or the second half of fiscal year 2017/2018) are calculated based on the December 31, 2016 valuation. Actuarially determined contribution rates for the last six months of calendar year 2018 (or the first half of fiscal year 2018/2019) are calculated based on the December 31, 2017 valuation.
Actuarial cost method	Entry Age Actuarial Cost Method
Amortization method	Level percent of payroll (3.50% payroll growth assumed in the December 31, 2017 valuation and 3.75% payroll growth assumed in the December 31, 2016 valuation)
Remaining amortization period	
December 31, 2016 valuation	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 16 years remaining as of December 31, 2016). 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 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.
December 31, 2017 valuation	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 15 years remaining as of December 31, 2017). 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 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.
Asset valuation method	The actuarial value of assets is determined by recognizing any difference between the actual and the expected market return over 10 six-month interest crediting periods. The actuarial value of assets is further adjusted, if necessary, to be within 40% of the market value of assets. The valuation value of assets is the actuarial value of assets reduced by the value of the non-valuation reserves.

Notes to Exhibit 4 - continued

Actuarial assumptions:	**December 31, 2016 Valuation**	**December 31, 2017 Valuation**
Investment rate of return	7.60%, net of pension plan investment expense, including inflation	7.25%, net of pension plan investment expense, including inflation
Inflation rate	3.25%	3.00%
Real across-the-board salary increases	0.50%	0.50%
Projected salary increases	General: 7.45% and 4.15% and Safety: 10.45% to 4.45%, vary by service, including inflation	General: 8.30% and 3.90% and Safety: 11.30% to 4.30%, vary by service, including inflation
Cost of living adjustments	3.00% of retirement income for General Tiers 1 and 3, and Safety Tier 1; 2.00% for General Tiers 2 and 4, and Safety Tiers 2, 2C, 2D, and 4	3.00% of retirement income for General Tiers 1 and 3, and Safety Tier 1; 2.00% for General Tiers 2 and 4, and Safety Tiers 2, 2C, 2D, and 4
Other assumptions	Same as those used in the December 31, 2016 funding actuarial valuation	Same as those used in the December 31, 2017 funding actuarial valuation

EXHIBIT 5

Projection of Pension Plan's Fiduciary Net Position for Use in Calculation of Discount Rate as of December 31, 2018

($ in millions)

Year Beginning January 1,	Projected Beginning Plan Fiduciary Net Position (a)	Projected Total Contributions (b)	Projected Benefit Payments (c)	Projected Administrative Expenses (d)	Projected Investment Earnings (e)	Projected Ending Plan Fiduciary Net Position (f) = (a) + (b) - (c) - (d) + (e)
2018	7,110	364	472	15	-216	6,771
2019	6,771	374	546	14	481	7,066
2020	7,066	393	573	15	502	7,372
2021	7,372	406	601	15	524	7,685
2022	7,685	414	630	16	546	7,998
2023	7,998	431	660	17	568	8,321
2024	8,321	443	690	17	590	8,647
2025	8,647	451	720	18	613	8,973
2026	8,973	460	750	19	636	9,300
2042	11,506	242	1,126	24	795	11,393
2043	11,393	220	1,134	24	786	11,242
2044	11,242	210	1,140	24	775	11,063
2045	11,063	209	1,146	23	761	10,864
2046	10,864	208	1,149	23	747	10,646
2087	291	37	116	1	18	229
2088	229	33	99	0 *	14	176
2089	176	30	83	0 *	10	134
2090	134	27	69	0 *	8	99
2091	99	24	57	0 *	6	71
2092	71	21	46	0 *	4	49
2093	49	18	37	0 *	3	33
2094	33	16	30	0 *	2	21
2095	21	14	23	0 *	1	12
2096	12	12	18	0 *	1	6
2097	6	10	14	0 *	0 *	3
2107	1	1	1	0 *	0 *	1
2108	1	1	1	0 *	0 *	0 *
2109	0 *	1	1	0 *	0 *	0 *
2110	0 *	0 *	1	0 *	0 *	0 *
2111	0 *	0 *	0 *	0 *	0 *	0 *
2132	0 *	0 *	0	0 *	0 *	0 *
2133	0 *	0 *	0	0 *	0 *	0 *
2133	Discounted Value: 0 *					

* *Less than $1M, when rounded.*

EXHIBIT 5

Projection of Pension Plan's Fiduciary Net Position for Use in Calculation of Discount Rate as of December 31, 2018

($ in millions) - continued

Notes:

(1) Amounts may not total exactly due to rounding.

(2) Amounts shown in the year beginning January 1, 2018 row are actual amounts, based on the financial statements provided by ACERA.

(3) Years 2027-2041, 2047-2086, 2098-2106, and 2112-2131 have been omitted from this table.

(4) Column (a): Except for the "discounted value" shown for 2133, all of the projected beginning plan fiduciary net position amounts shown have not been adjusted for the time value of money.

(5) Column (b): Projected total contributions include employee and employer normal cost contributions based on closed group projections (based on covered active members as of November 30, 2017); plus employer contributions to the unfunded actuarial accrued liability; plus employer contributions to fund each year's annual administrative expenses as well as future allocations of excess earnings to the SRBR under ACERA's funding policy, both reflecting a 20-year amortization schedule. Contributions are assumed to occur halfway through the year, on average.

(6) Column (c): Projected benefit payments have been determined in accordance with paragraph 39 of GASB Statement No. 67, and are based on the closed group of active, inactive vested, retired members, and beneficiaries as of November 30, 2017. The projected benefit payments reflect the cost of living increase assumption of 3.00% per annum for Tiers 1 and 3, and 2.00% per annum for Tiers 2 and 4. The projected benefit payments include the Non-OPEB Supplemental Retiree Benefits Reserve (SRBR) benefits to the extent the current Non-OPEB SRBR supports those benefits. Benefit payments are assumed to occur halfway through the year, on average. In accordance with paragraph 31.b.(1)(e) of GASB Statement No. 67, the long-term expected rate of return on Plan investments of 7.25% per annum was applied to all periods of projected benefit payments to determine the discount rate.

In addition, the projected benefit payments in column (c) include an amount equal to 0.60% of the beginning-of-year market value to reflect the approximated outflow of future allocations to the SRBR. This outflow has an estimated present value of $0.77 billion. This present value of outflow is expected to be sufficient to pay for the remaining present value of the non-OPEB SRBR benefits of $0.16 billion as well as the remaining present value of the OPEB SRBR benefits of $0.46 billion.

(7) Column (d): Projected administrative expenses are calculated as approximately 0.21% of the beginning plan fiduciary net position amount. The 0.21% portion was based on the actual fiscal year 2018 administrative expenses as a percentage of the beginning plan fiduciary net position amount as of January 1, 2018. Administrative expenses are assumed to occur halfway through the year, on average.

(8) Column (e): Projected investment earnings are based on the assumed investment rate of return of 7.25% per annum.

(9) As illustrated in this Exhibit, the Plan's fiduciary net position was projected to be available to make all projected future benefit payments for current Plan members. In other words, there is no projected "cross-over date" when projected benefits are not covered by projected assets. Therefore, the long-term expected rate of return on Plan investments of 7.25% per annum was applied to all periods of projected benefit payments to determine the total pension liability as of December 31, 2018 shown earlier in this report, pursuant to paragraph 44 of GASB Statement No. 67.

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