Orange County Employees Retirement System (OCERS)

Governmental Accounting Standards Board Statement 67 (GASB 67) Actuarial Valuation

As of December 31, 2020

Segal

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May 7, 2021

Board of Retirement
Orange County Employees Retirement System
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Dear Board Members:

We are pleased to submit this Governmental Accounting Standards Board (GASB) Statement 67 Actuarial Valuation as of December 31, 2020. 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 Orange County Employees Retirement System (OCERS) in preparing items related to the pension plan in their financial report. The census and financial information on which our calculations were based were prepared by OCERS. 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 Andy Yeung, ASA, MAAA, FCA, 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 System.

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

Sincerely,

Segal

Paul Angelo, FSA, MAAA, FCA, EA
Senior Vice President and Actuary

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

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Section 1: Actuarial Valuation Summary

Purpose and basis

This report has been prepared by Segal to present certain disclosure information required by Governmental Accounting Standards Board (GASB) Statement 67 as of December 31, 2020. This valuation is based on:

- The benefit provisions of OCERS, as administered by the Board of Retirement;
- The characteristics of covered active members, inactive vested members, and retired members and beneficiaries as of December 31, 2019, provided by OCERS;
- The assets of the Plan as of December 31, 2020, provided by OCERS;
- Economic assumptions regarding future salary increases and investment earnings adopted by the Board of Retirement for the December 31, 2020 valuation; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc. adopted by the Board of Retirement for the December 31, 2020 valuation.

General observations on GASB 67 actuarial valuation

1. It is important to note that 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 should develop and adopt funding policies under current practices.
2. When measuring pension liability, GASB uses the same actuarial cost method (Entry Age method) and the same type of discount rate (expected return on assets) as OCERS uses for funding. This means that the Total Pension Liability (TPL) measure for financial reporting shown in this report is generally determined on the same basis as OCERS' 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.
3. 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) on a market value basis.

Highlights of the valuation

1. For this report, the reporting dates for the Plan are December 31, 2020 and 2019. The NPLs measured as of December 31, 2020 and 2019 have been determined by rolling forward the TPLs as of December 31, 2019 and 2018, respectively. The Plan's Fiduciary Net Positions were valued as of the measurement dates. In addition, any changes in actuarial assumptions or plan provisions that occurred between the valuation date and the measurement date have been reflected.

2. The NPL decreased from $5,075.7 million as of December 31, 2019 to $4,213.2 million as of December 31, 2020 primarily as a result a 12.79%[1] return on the market value of assets during 2020 that was higher than the assumed return of 7.00% of approximately $1,008.0 million. The gain was offset to some extent by an experience loss of $162.3 million and a loss of $19.0 million from changes in actuarial assumptions. Changes in these values during the last two calendar years ending December 31, 2020 and December 31, 2019 can be found in *Section 2, Schedule of changes in Net Pension Liability* on page 18.

3. The discount rate used to determine the TPL and NPL as of both December 31, 2020 and 2019 was 7.00% following the same assumption used by the System in the pension funding valuations as of the December 31, 2019 and December 31, 2018. However, as the Board has approved a new set of actuarial assumptions for use in the next pension funding valuation as of December 31, 2020, we have estimated the impact of these assumption changes by (1) revaluing the TPL as of December 31, 2019 (before the roll forward) and (2) using this revalued TPL in rolling forward the results from December 31, 2019 to December 31, 2020. The detailed calculation of the discount rate of 7.00% used in the calculation of the TPL and NPL as of December 31, 2020 can be found in *Section 3, Appendix A*. Various other information that is required to be disclosed can be found throughout *Section 2*.

4. The Plan's Fiduciary Net Position of $16,678,581,000 as of December 31, 2019 is equal to the final market value of assets in the Pension Trust Fund as of December 31, 2019. This differs from the $16,516,108,000 market value of assets used in our December 31, 2019 funding valuation because the funding valuation excludes $150,416,000 in the County Investment Account and $12,057,000 in O.C. Sanitation District UAAL Deferred Account (after transfer of $18,631,000 to offset the District's entire UAAL as of December 31, 2019).

   The Plan's Fiduciary Net Position of $18,797,203,000 as of December 31, 2020 is equal to the final market value of assets in the Pension Trust Fund as of December 31, 2020. This differs from the $18,494,462,000 market value of assets used in our December 31, 2020 funding valuation because (1) our valuation was based on the preliminary market value of assets provided in

[1] As documented in the funding valuation report, return on market value was calculated using a modified dollar-weighted approach based on pension plan assets net of accounting liabilities. Actual investment gain on net pension plan assets was $2,111,687,000 during 2020 after including both the administrative expenses and discount for prepaid contributions while excluding the gains credited to County Investment Account and O.C. Sanitation District UAAL Deferred Account. Without these adjustments, the actual investment gain was $2,173,184,000.

the unaudited financial statements[2] and (2) the market value of assets in the funding valuation excludes $160,378,000 in the County Investment Account and $13,433,000 in O.C. Sanitation District UAAL Deferred Account.

5. On July 30, 2020, the California Supreme Court issued a decision in the case of Alameda County Deputy Sheriffs' Association et al. v. Alameda County Employees' Retirement Association (ACERA) and Board of Retirement of ACERA. That decision has important implications for OCERS and its members. In particular, the decision requires pension systems like OCERS to exclude certain pay items from a legacy member's compensation earnable. It should be noted that neither the December 31, 2020 assets provided by OCERS nor the liabilities we calculated using the membership data provided by OCERS reflect the financial impact of the California Supreme Court decision.
6. It is important to note that this actuarial valuation is based on plan assets as of December 31, 2020. Due to the COVID-19 pandemic, market conditions have changed significantly since the onset of the Public Health Emergency. The plan's funded 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. Moreover, this actuarial valuation does not include any possible short-term or long-term impacts on mortality of the covered population that may emerge after December 31, 2020. While it is impossible to determine how the pandemic will affect market conditions and other demographic experience of the plan in future valuations, Segal is available to prepare projections of potential outcomes upon request.

[2] The final market value of assets provided in the December 31, 2020 financial statements was higher than the preliminary market value of assets provided in the unaudited financial statements by approximately $129 million.

Summary of key valuation results

Measurement Date		December 31, 2020	December 31, 2019
Disclosure elements for calendar year ending December 31:	• Service cost[1]	$512,255,298	$499,255,591
	• Total Pension Liability	23,010,449,650	21,754,263,463
	• Plan's Fiduciary Net Position	18,797,203,000	16,678,581,000
	• Net Pension Liability	4,213,246,650	5,075,682,463
Schedule of contributions for calendar year ending December 31:	• Actuarially determined contributions	$638,215,000	$583,057,000
	• Actual contributions[2]	659,807,000	653,793,000
	• Contribution deficiency / (excess)[3]	(21,592,000)	(70,736,000)
Demographic data for calendar year ending December 31:	• Number of retired members and beneficiaries	19,419	18,420
	• Number of inactive vested members	6,818	6,520
	• Number of active members	21,559	22,257
Key assumptions as of December 31:	• Investment rate of return	7.00%	7.00%
	• Inflation rate	2.50%	2.75%
	• Projected salary increases[4]	General: 4.00% to 11.00% and Safety: 4.60% to 15.00%	General: 4.25% to 12.25% and Safety: 4.75% to 17.25%
	• Cost of living adjustments	2.75% of retirement income	2.75% of retirement income

1 The Service Cost is based on the previous year's valuation, meaning the December 31, 2020 and December 31, 2019 measurement date values are based on the valuations as of December 31, 2019 and December 31, 2018, respectively. Both service costs have been calculated using the assumptions shown in the December 31, 2019 measurement date column, as there had been no changes in the actuarial assumptions between the December 31, 2018 and December 31, 2019 valuations.

2 Reduced by discount for prepaid contributions and transfer from County Investment Account, if any.

3 Includes additional contributions made by employers toward the reduction of their UAAL. Details are shown in *Section 2, Schedule of Contributions* on page 19.

4 For December 31, 2020 and December 31, 2019, includes inflation at 2.50% and 2.75% respectively, plus real across-the-board salary increases of 0.50% plus merit and promotion 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 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. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan description 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 OCERS. 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 measurement date, as provided by OCERS.
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 forecasted benefits are then discounted to a present value, typically based on an estimate of the rate of return that will be achieved on the plan's assets or, if there are no assets, a rate of return based on a yield or index rate of 20-year, tax-exempt general obligation municipal bonds with an average rating of AA/Aa or higher (or equivalent quality on another rating scale). 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.
Models	Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.

Section 1: Actuarial Valuation Summary

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 OCERS 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 OCERS 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 OCERS, it is not a fiduciary in its capacity as actuaries and consultants with respect to OCERS.

Section 2: GASB 67 Information

General information about the pension plan

Plan Description

Plan administration. The Orange County Employees Retirement System (OCERS) was established by the County of Orange in 1945. OCERS is administered by the Board of Retirement and governed by the County Employees' Retirement Law of 1937 (California Government Code Section 31450 et. seq.). OCERS is a cost-sharing multiple employer public employee retirement system whose main function is to provide service retirement, disability, death and survivor benefits to the Safety and General members employed by the County of Orange. OCERS also provides retirement benefits to the employee members of the Orange County Courts, the Orange County Retirement System, two cities and thirteen special districts.

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

Plan membership. At December 31, 2020, pension plan membership consisted of the following:

Retired members or beneficiaries currently receiving benefits	19,419
Inactive vested members entitled to but not yet receiving benefits	6,818
Active members	21,559
Total	**47,796**

Note: Data as of December 31, 2020 is not used in the measurement of the TPL as of December 31, 2020.

Section 2: GASB 67 Information

Benefits provided. OCERS provides service retirement, disability, death and survivor benefits to eligible employees. All regular full-time employees of the County of Orange or contracting agencies who work a minimum of 20 hours per week become members of OCERS effective on the first day of employment in an eligible position. There are separate retirement plans for General and Safety member employees. Safety membership is extended to those involved in active law enforcement, fire suppression, and certain probation officers. Any new Safety member who becomes a member on or after January 1, 2013 is designated PEPRA Safety and is subject to the provisions of California Public Employees' Pension Reform Act of 2013 (PEPRA), California Government Code 7522 et seq. All other employees are classified as General members. New General members employed on or after January 1, 2013 are designated as PEPRA General subject to the provisions of California Government Code 7522 et. seq.

General members hired prior to January 1, 2013, including all members of Plan T and Plan W hired on or after January 1, 2013, are eligible to retire once they attain the age of 50 and have acquired ten or more years of retirement service credit. A member with thirty years of service is eligible to retire regardless of age. General members who are first hired on or after January 1, 2013, excluding members of Plan T and Plan W, are eligible to retire once they have attained the age of 52, and have acquired five years of retirement service credit.

Safety members hired prior to January 1, 2013, are eligible to retire once they attain the age of 50 and have acquired ten or more years of retirement service credit. A member with twenty years of service is eligible to retire regardless of age. Safety members who are first hired on or after January 1, 2013, are eligible to retire once they have attained the age of 50, and have acquired five years of retirement service credit.

All General and Safety members can also retire at the age of 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.

General member benefits are calculated pursuant to the provisions of Sections 31676.01, 31676.1, 31676.12, 31676.16, 31676.18 or 31676.19. For Section 31676.01, the monthly allowance is equal to 1/90th of final compensation times years of accrued retirement service credit times age factor from that Section. For Section 31676.1, the monthly allowance is equal to 1/60th of final compensation times years of accrued retirement service credit times age factor from that Section. For Sections 31676.12, 31676.16, 31676.18 or 31676.19, the monthly allowance is equal to 1/50th of final compensation times years of accrued retirement service credit times age factor from the corresponding Section. General member benefits for those who are first hired on or after January 1, 2013, excluding members of Plan T and Plan W, are calculated pursuant to the provision of California Government Code Section 7522.20(a). The monthly allowance is equal to the final compensation multiplied by years of accrued retirement credit multiplied by the age factor from Section 7522.20(a).

Safety member benefits are calculated pursuant to the provisions of California Government Code Sections 31664.1 and 31664.2. The monthly allowance is equal to 3% of final compensation times years of accrued retirement service credit times age factor from the corresponding Section. Safety member benefits for those who are first hired on or after January 1, 2013, are calculated pursuant to the provision of California Government Code Section 7522.25(d). The monthly allowance is equal to the final compensation multiplied by years of accrued retirement credit multiplied by the age factor from Section 7522.25(d).

For members with membership dates before January 1, 2013, including all members of Plan T and Plan W hired on or after January 1, 2013, the maximum monthly retirement allowance is 100% of final compensation. There is no maximum for members with membership dates on or after January 1, 2013, excluding members of Plan T and Plan W.

Final average compensation consists of the highest 12 consecutive months for a General Tier 1 or Safety Tier 1 member and the highest 36 consecutive months for a General Tier 2, General PEPRA, Safety Tier 2 or Safety PEPRA member.

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. Certain surviving spouses or domestic partners may also be eligible if marriage or domestic partnership was at least two years prior to the date of death and the surviving spouse or domestic partner has attained age 55. 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.

OCERS provides an annual cost-of-living benefit to all retirees. The cost-of-living adjustment, based upon the Consumer Price Index for All Urban Consumers for the Los Angeles-Long Beach-Anaheim Area, is capped at 3.0%.

The County of Orange and contracting 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 OCERS' actuary after the completion of the annual actuarial valuation. The average employer contribution rate for the first six months of calendar year 2020 or the second half of fiscal year 2019-2020 (based on the December 31, 2017 valuation) was 37.97%[3] of compensation. The average employer contribution rate for the last six months of calendar year 2020 or the first half of fiscal year 2020-2021 (based on the December 31, 2018 valuation) was 40.02%[2] of compensation.

All members are required to make contributions to OCERS regardless of the retirement plan or tier in which they are included. The average member contribution rate for the first six months of calendar year 2020 or the second half of fiscal year 2019-2020 (based on the December 31, 2017 valuation) was 12.63%[4] of compensation. The average member contribution rate for the last six months of calendar year 2020 or the first half of fiscal year 2020-2021 (based on the December 31, 2018 valuation) was 12.47%[4] of compensation.

[3] These employer contribution rates may be higher or lower than the composite rate for 2020 as shown on page 19 of this report because these rates have not been adjusted to reflect any pick-ups or reverse pick-ups. These employer contribution rates also do not reflect the shift in payroll to the lower cost plans from the valuation date to the date of rate implementation.

[4] It should be noted that these member contribution rates provided above have not been adjusted to reflect any pick-ups or reverse pick-ups.

Net Pension Liability

Measurement Date	December 31, 2020	December 31, 2019
Components of the Net Pension Liability		
Total Pension Liability	$23,010,449,650	$21,754,263,463
Plan's Fiduciary Net Position	(18,797,203,000)	(16,678,581,000)
Net Pension Liability	**$4,213,246,650**	**$5,075,682,463**
Plan's Fiduciary Net Position as a percentage of the Total Pension Liability	81.69%	76.67%

The Net Pension Liability (NPL) was measured as of December 31, 2020 and 2019. The Plan's Fiduciary Net Position (plan assets) was valued as of the measurement date while the Total Pension Liability (TPL) was determined based upon rolling forward the TPL from actuarial valuations as of December 31, 2019 and 2018, respectively.

Plan provisions. The plan provisions used in the measurement of the NPL as of December 31, 2020 and 2019 are the same as those used in the OCERS actuarial valuations as of December 31, 2020 and 2019, respectively.

Actuarial assumptions. The TPL as of December 31, 2020 was remeasured by (1) revaluing the TPL as of December 31, 2019 (before the roll forward) to include the following actuarial assumptions that the Retirement Board has adopted for use in the pension funding valuation as of December 31, 2020 and (2) using this revalued TPL in rolling forward the results from December 31, 2019 to December 31, 2020:

Inflation:	2.50%
Salary increases:	General: 4.00% to 11.00% and Safety: 4.60% to 15.00%, vary by service, including inflation
Cost of living adjustments:	2.75% of retirement income
Investment rate of return:	7.00%, net of pension plan investment expense, including inflation
Other assumptions:	See analysis of actuarial experience during the period January 1, 2017 through December 31, 2019

Section 2: GASB 67 Information

The TPL as of December 31, 2019 was determined by actuarial valuations as of December 31, 2018. The actuarial assumptions used were based on the results of an experience study for the period from January 1, 2014 through December 31, 2016 and they are the same assumptions used in the December 31, 2019 funding valuation for OCERS.

Inflation:	2.75%
Salary increases:	General: 4.25% to 12.25% and Safety: 4.75% to 17.25%, vary by service, including inflation
Cost of living adjustments:	2.75% of retirement income
Investment rate of return:	7.00%, net of pension plan investment expense, including inflation
Other assumptions:	See analysis of actuarial experience during the period January 1, 2014 through December 31, 2016

Determination of discount rate and investment rates of return

The long-term expected rate of return on pension plan investments[5] was determined in 2020 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, 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 investment expenses are shown in the following table. This information was used in the derivation of the long-term expected investment rate of return assumption for the December 31, 2020 actuarial valuation. This information will change every three years based on the actuarial experience study.

Asset Class	Target Allocation	Long-Term Expected Arithmetic Real Rate of Return
Large Cap Equity	23.10%	5.43%
Small Cap Equity	1.90%	6.21%
International Developed Equity	13.00%	6.67%
Emerging Markets Equity	9.00%	8.58%
Core Bonds	9.00%	1.10%
High Yield Bonds	1.50%	2.91%
TIPS	2.00%	0.65%
Emerging Market Debt	2.00%	3.25%
Corporate Credit	1.00%	0.53%
Long Duration Fixed Income	2.50%	1.44%
Real Estate	3.01%	4.42%
Private Equity	13.00%	9.41%
Value Added Real Estate	3.01%	7.42%
Opportunistic Real Estate	0.98%	10.18%
Energy	2.00%	9.68%
Infrastructure (Core Private)	1.50%	5.08%
Infrastructure (Non-Core Private)	1.50%	8.92%
CTA - Trend Following	2.50%	2.38%
Global Macro	2.50%	2.13%
Private Credit	2.50%	5.47%
Alternative Risk Premia	2.50%	2.50%
Total	**100.00%**	

[5] Note that the investment return assumption for funding purposes is developed net of both investment and administrative expenses; however, the same investment return assumption is used for financial reporting purposes, where it is considered gross of administrative expenses.

Section 2: GASB 67 Information

Discount rate. The discount rate used to measure the TPL was 7.00% as of December 31, 2020 and 2019. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the actuarially determined contribution rates. For this purpose, only employer contributions that are intended to fund benefits for current plan members and their beneficiaries are included. 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 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 TPL as of both December 31, 2020 and 2019.

Discount rate sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the NPL as of December 31, 2020, calculated using the discount rate of 7.00%, as well as what the NPL would be if it were calculated using a discount rate that is 1-percentage-point lower (6.00%) or 1-percentage-point higher (8.00%) than the current rate:

	1% Decrease (6.00%)	**Current Discount Rate (7.00%)**	**1% Increase (8.00%)**
Net Pension Liability as of December 31, 2020	$7,460,868,132	$4,213,246,650	$1,565,936,725

Schedule of changes in Net Pension Liability – Last two calendar years

Measurement Date	December 31, 2020	December 31, 2019
Total Pension Liability		
• Service cost	$512,255,298	$499,255,591
• Interest	1,535,953,426	1,452,644,872
• Change of benefit terms	0	0
• Differences between expected and actual experience	162,335,537	24,382,911
• Changes of assumptions	18,966,926	0
• Benefit payments, including refunds of member contributions	(973,325,000)	(900,902,000)
• Transfer of members among Rate Groups	0	0
• Other	0	0
Net change in Total Pension Liability	**$1,256,186,187**	**$1,075,381,374**
Total Pension Liability – beginning	**21,754,263,463**	**20,678,882,089**
Total Pension Liability – ending	**$23,010,449,650**	**$21,754,263,463**
Plan's Fiduciary Net Position		
• Contributions – employer[1]	$659,807,000	$653,793,000
• Contributions – member	279,384,000	279,373,000
• Net investment income	2,173,184,000	2,183,808,000
• Benefit payments, including refunds of member contributions	(973,325,000)	(900,902,000)
• Transfer of members among Rate Groups	0	0
• Administrative expense	(20,428,000)	(19,171,000)
• Other	0	0
Net change in Plan's Fiduciary Net Position	**$2,118,622,000**	**$2,196,901,000**
Plan's Fiduciary Net Position – beginning	**$16,678,581,000**	**14,481,680,000**
Plan's Fiduciary Net Position – ending	**$18,797,203,000**	**$16,678,581,000**
Net Pension Liability – ending	**$4,213,246,650**	**$5,075,682,463**
Plan's Fiduciary Net Position as a percentage of the Total Pension Liability	**81.69%**	**76.67%**
Covered payroll[2]	**$1,909,268,000**	**$1,783,054,000**
Plan Net Pension Liability as percentage of covered payroll	**220.67%**	**284.66%**

1 Reduced by discount for prepaid contributions and transfer from County Investment Account, if any.

2 Covered payroll represents payroll on which contributions to the pension plan are based.

Schedule of contributions – Last ten calendar years

Year Ended December 31	Actuarially Determined Contributions[1,2]	Contributions in Relation to the Actuarially Determined Contributions[1,2]	Contribution Deficiency / (Excess)	Covered Payroll[3]	Contributions as a Percentage of Covered Payroll[1,2]
2011	$387,585,000	$387,585,000	$0	$1,498,914,000	25.86%
2012	406,521,000	406,521,000	0	1,497,475,000	27.15%
2013	426,020,000	427,095,000[4]	(1,075,000)	1,494,745,000	28.57%
2014	476,320,000	625,520,000[6]	(149,200,000)	1,513,206,000	41.34%
2015	502,886,000	571,298,000[7]	(68,412,000)	1,521,036,000	37.56%
2016	521,447,000	567,196,000[8]	(45,749,000)	1,602,675,000	35.40%
2017	536,726,000[9]	572,104,000[8, 10]	(35,378,000)	1,678,322,000	34.09%
2018	556,728,000[11]	580,905,000[10, 12]	(24,177,000)	1,718,798,000	33.80%
2019	583,057,000	653,793,000[13]	(70,736,000)	1,783,054,000	36.67%
2020	638,215,000	659,807,000[14]	(21,592,000)	1,909,268,000	34.56%

1 Reduced by transfers from County Investment Account (funded by pension obligation proceeds held by OCERS). Those transfers are as follows:

Calendar Year Ended December 31	Transfers from County Investment Account	Calendar Year Ended December 31	Transfers from County Investment Account
2011	$11,000,000	2016	$0
2012	5,500,000	2017	0
2013	5,000,000	2018	0
2014	5,000,000	2019	0
2015	0	2020	5,000,000

2 Reduced by discount for prepaid contributions.

3 Covered payroll represents payroll on which contributions to the pension plan are based.

4 Includes additional contributions of $1,075,000 made by O.C. Fire Authority towards the reduction of their UAAL.

6 Includes additional contributions of $1,663,000 made by O.C. Cemetery District, $22,537,000 made by O.C. Fire Authority and $125,000,000 made by O.C. Sanitation District towards the reduction of their UAAL.

7 Includes additional contributions of $18,412,000 made by O.C. Fire Authority and $50,000,000 made by O.C. Sanitation District towards the reduction of their UAAL.

8 Includes additional contributions of $5,133,000 made by O.C. Fire Authority, $1,500,000 made by Law Library and $5,587,000 made by O.C. Sanitation District towards the reduction of their UAAL as well as $33,529,000 made by O.C. Sanitation District to their UAAL Deferred Account.

9 $24,042,000 transfer from O.C. Sanitation District Deferred UAAL Account required to offset UAAL increase for the assumption changes has been excluded from both these amounts.

10 Includes additional contributions of $32,096,000 made by O.C. Fire Authority, $1,538,000 made by Law Library and $1,744,000 made by O.C. Children and Families Commission towards the reduction of their UAAL.

11 $14,589,000 transfer from O.C. Sanitation District Deferred UAAL Account required to offset UAAL increase for the actuarial losses as of December 31, 2018 has been excluded from both these amounts.

12 Includes additional contributions of $23,437,000 made by O.C. Fire Authority and $740,000 made by Cypress Recreation and Parks District towards the reduction of their UAAL.

13 Includes additional contributions of $19,043,000 made by O.C. Fire Authority, $878,000 made by O.C. Vector Control, $12,815,000 Transportation Corridor and $8,116,000 made by O.C. Sanitation District towards the reduction of their UAAL as well as $29,884,000 made by O.C. Sanitation District to their UAAL Deferred Account.

14 Includes additional contributions of $21,592,000 made by O.C. Fire Authority towards the reduction of their UAAL.

Notes to Schedule:

Methods and assumptions used to establish "actuarially determined contribution" rates:

Valuation date:	Actuarially determined contribution rates for the first six months of calendar year 2020 or the second half of fiscal year 2019-2020 are calculated based on the December 31, 2017 valuation. Actuarially determined contribution rates for the last six months of calendar year 2020 or the first half of fiscal year 2020-2021 are calculated based on the December 31, 2018 valuation.
Actuarial cost method:	Entry Age Actuarial Cost Method
Amortization method:	Level percent of payroll for total unfunded actuarial accrued liability
Remaining amortization period:	Effective December 31, 2013, the outstanding balance of the UAAL from the December 31, 2012 valuation was combined and re-amortized over a declining 20-year period. Any changes in UAAL due to actuarial gains or losses or due to changes in assumptions or methods will be amortized over separate 20-year periods. Any changes in UAAL due to plan amendments will be amortized over separate 15-year periods and any change in UAAL due to early retirement incentive programs will be amortized over a separate period of up to 5 years.
Asset valuation method:	The Actuarial Value of Assets is determined by recognizing any difference between the actual and the expected market return over a five-year period. The Valuation Value of Assets is the Actuarial Value of Assets reduced by the value of the non-valuation reserves.

Section 2: GASB 67 Information

Actuarial assumptions:

Valuation Date:	December 31, 2017 valuation	December 31, 2018 Valuation
Investment rate of return:	7.00%, net of pension plan investment expense, including inflation	7.00%, net of pension plan investment expense, including inflation
Inflation rate:	2.75%	2.75%
Real across-the-board salary increase:	0.50%	0.50%
Projected salary increases:	General: 4.25% to 12.25% and Safety: 4.75% to 17.25%, vary by service, including inflation	General: 4.25% to 12.25% and Safety: 4.75% to 17.25%, vary by service, including inflation
Cost of living adjustments:	2.75% of retirement income	2.75% of retirement income
Other assumptions:	Same as those used in the December 31, 2017 funding actuarial valuation	Same as those used in the December 31, 2018 funding actuarial valuation

Appendix A: Projection of Pension Plan's Fiduciary Net Position ($ in millions) for use in the Calculation of Discount Rate as of December 31, 2020

Year Beginning January 1	Projected Beginning Plan's Fiduciary Net Position (a)	Projected Total Contributions * (b)	Projected Benefit Payments (c)	Projected Administrative Expenses (d)	Projected Investment Earnings (e)	Projected Ending Plan's Fiduciary Net Position (f) = (a) + (b) - (c) - (d) + (e)
2020	$16,679	$939	$973	$20	$2,173	$18,797
2021	18,797	1,004	1,054	23	1,313	20,038
2022	20,038	983	1,123	25	1,397	21,270
2023	21,270	971	1,194	26	1,480	22,502
2024	22,502	938	1,264	28	1,563	23,711
2025	23,711	921	1,335	29	1,645	24,912
2026	24,912	923	1,410	31	1,726	26,121
2027	26,121	926	1,485	32	1,808	27,339
2028	27,339	929	1,561	33	1,891	28,564
2029	28,564	932	1,640	35	1,974	29,795
2045	37,237	175	2,793	46	2,515	37,088
2046	37,088	165	2,832	45	2,503	36,878
2047	36,878	156	2,866	45	2,487	36,610
2048	36,610	148	2,894	45	2,467	36,286
2049	36,286	140	2,917	44	2,443	35,907
2094	38,962	61	189	48	2,721	41,507
2095	41,507	63	154	51	2,901	44,265
2096	44,265	65	124	54	3,095	47,246
2097	47,246	67	98	58	3,304	50,462
2098	50,462	70	76	62	3,530	53,924
2133	536,612	657	0 **	657	37,563	574,174
2134	574,174					
2134 Discounted Value:	275 ***					

* Of all the projected total contributions, only the first year's (i.e., 2020) contribution has been reduced by discount for prepaid contributions and transfers from County Investment Account, if any.

** Less than $1 million, when rounded.

*** $574,174 million when discounted with interest at the rate of 7.00% per annum has a value of $275 million as of December 31, 2020. Of this amount, about $160 million is the balance available in the County Investment Account and $13 million is the O.C. Sanitation District UAAL Deferred Acount as of December 31, 2020.

Note: We have not utilized the balance in the County Investment Account to reduce the projected total contributions in column (b) even though those amounts have been used to reduce the NPL for the County as of December 31, 2020.

Notes:

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

(2) Amounts shown in the year beginning January 1, 2020 row are actual amounts, based on the final audited financial statements provided by OCERS.

(3) Certain years have been omitted from the table.

(4) Column (a): Except for the "discounted value" shown for 2134, all of the projected beginning Plan's Fiduciary Net Position amounts shown have not been adjusted for the time value of money.

(5) Column (b): Projected total contributions include member and employer normal cost rates applied to closed group projected payroll (based on covered active members as of December 31, 2019), plus employer contributions to the Unfunded Actuarial Accrued Liability. 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 December 31, 2019. The projected benefit payments reflect the cost of living increase assumptions used in the December 31, 2020 valuation report. The 2020 benefit payments have been increased by the balance of the Medicare Insurance Reserve as of December 31, 2020.

(7) Column (d): Projected administrative expenses are calculated as approximately 0.12% of the projected beginning Plan's Fiduciary Net Position amount. The 0.12% portion was based on the actual calendar year 2020 administrative expenses (unaudited) as a percentage of the actual beginning Plan's Fiduciary Net Position as of January 1, 2020. 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 7.00% per annum.

(9) As illustrated in this Appendix, 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 7.00% per annum was applied to all periods of projected benefit payments to determine the total pension liability as of December 31, 2020 shown earlier in this report, pursuant to paragraph 44 of GASB Statement No. 67.

(10) This projection is based on a model developed by our Actuarial Technology and Systems unit, comprised of both actuaries and programmers. The model allows the client team, under the supervision of the responsible actuary, control over the entry of future expected contribution income, benefit payments and administrative expenses. The projection of fiduciary net position and the discounting of benefits is part of the model.

Appendix B: Definition of Terms

Definitions of certain terms as they are used in Statement 67. The terms may have different meanings in other contexts.

Actuarial Present Value of Projected Benefit Payments:	Projected benefit payments discounted to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial Valuation:	The determination, as of a point in time (the actuarial valuation date), of the service cost, Total Pension Liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial Valuation Date:	The date as of which an actuarial valuation is performed.
Actuarially Determined Contribution:	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.
Ad Hoc Cost-of-Living Adjustments (Ad Hoc COLAs):	Cost-of-living adjustments that require a decision to grant by the authority responsible for making such decisions.
Ad Hoc Postemployment Benefit Changes:	Postemployment benefit changes that require a decision to grant by the authority responsible for making such decisions.
Automatic Cost-of-Living Adjustments (Automatic COLAs):	Cost-of-living adjustments that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).
Automatic Postemployment Benefit Changes:	Postemployment benefit changes that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).
Cost-of-Living Adjustments:	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (Cost-Sharing Pension Plan):	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered Payroll:	Payroll on which contributions to a pension plan are based.
Defined Benefit Pension Plans:	Pension plans that are used to provide defined benefit pensions.

Defined Benefit Pensions:	Pensions for which the income or other benefits that the employee will receive at or after separation from employment are defined by the benefit terms. The pensions may be stated as a specified dollar amount or as an amount that is calculated based on one or more factors such as age, years of service, and compensation. (A pension that does not meet the criteria of a defined contribution pension is classified as a defined benefit pension for purposes of Statement 67.)
Defined Contribution Pension Plans:	Pension plans that are used to provide defined contribution pensions.
Defined Contribution Pensions:	Pensions having terms that (1) provide an individual account for each employee; (2) define the contributions that an employer is required to make (or the credits that it is required to provide) to an active employee's account for periods in which that employee renders service; and (3) provide that the pensions an employee will receive will depend only on the contributions (or credits) to the employee's account, actual earnings on investments of those contributions (or credits), and the effects of forfeitures of contributions (or credits) made for other employees, as well as pension plan administrative costs, that are allocated to the employee's account.
Discount Rate:	The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following: 1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension Plan's Fiduciary Net Position is projected (under the requirements of Statement 67) to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments. 2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.
Entry Age Actuarial Cost Method:	A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the actuarial accrued liability.
Inactive Employees:	Terminated individuals that have accumulated benefits but are not yet receiving them, and retirees or their beneficiaries currently receiving benefits.
Multiple-Employer Defined Benefit Pension Plan:	A defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Net Pension Liability (NPL):	The liability of employers and nonemployer contributing entities to employees for benefits provided through a defined benefit pension plan.

Section 3: Appendices

Other Postemployment Benefits:	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits, regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
Pension Plans:	Arrangements through which pensions are determined, assets dedicated for pensions are accumulated and managed and benefits are paid as they come due.
Pensions:	Retirement income and, if provided through a pension plan, postemployment benefits other than retirement income (such as death benefits, life insurance, and disability benefits). Pensions do not include postemployment healthcare benefits and termination benefits.
Plan Members:	Individuals that are covered under the terms of a pension plan. Plan members generally include (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).
Postemployment	The period after employment.
Postemployment Benefit Changes:	Adjustments to the pension of an inactive employee.
Postemployment Healthcare Benefits:	Medical, dental, vision, and other health-related benefits paid subsequent to the termination of employment.
Projected Benefit Payments:	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and their expected future service.
Public Employee Retirement System:	A special-purpose government that administers one or more pension plans; also may administer other types of employee benefit plans, including postemployment healthcare plans and deferred compensation plans.
Real Rate of Return:	The rate of return on an investment after adjustment to eliminate inflation.
Service Costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Single-Employer Defined Benefit Pension Plan (Single-Employer Pension Plan):	A defined benefit pension plan that is used to provide pensions to employees of only one employer.
Termination Benefits:	Inducements offered by employers to active employees to hasten the termination of services, or payments made in consequence of the early termination of services. Termination benefits include early-retirement incentives, severance benefits, and other termination-related benefits.
Total Pension Liability (TPL):	The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of Statement 67.

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