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Report on the Annual Basic Benefits Valuation of the School Employees Retirement System of Ohio

Prepared as of June 30, 2019

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October 31, 2019

Board of Trustees
School Employees Retirement System of Ohio
300 East Broad Street, Suite 100
Columbus, OH 43215-3746

Dear Members of the Board:

Presented in this report are the results of the annual actuarial valuation of the basic benefits provided under the School Employees Retirement System of Ohio (SERS) as of June 30, 2019. The purpose of the valuation was to measure the System's funding progress and to determine the actuarially determined employer contribution rates for the fiscal year beginning July 1, 2019.

The valuation is based upon data, furnished by the SERS staff, concerning active, inactive and retiree members along with pertinent financial information. The complete cooperation of the SERS staff in furnishing materials requested is hereby acknowledged with appreciation.

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

The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

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REPORT ON THE ANNUAL VALUATION OF THE
SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO

PREPARED AS OF JUNE 30, 2019

EXECUTIVE SUMMARY

The School Employees Retirement System of Ohio (SERS or System) is a defined benefit public pension fund that provides pensions and access to health care coverage for retired school employees who are covered in nonteaching positions. This includes bus drivers, custodians, treasurers, business officials, administrative assistants, food service providers, and educational aides. This report presents the results of the June 30, 2019, actuarial funding valuation of the System. The primary purposes of performing the actuarial funding valuation are to:

- determine the sufficiency of the Statutory Contribution Rate as set forth in the Ohio statutes;
- determine the experience of the System since the last valuation date;
- disclose asset and liability measures as of the valuation date; and
- analyze and report on trends in System contributions, assets, and liabilities over the past several years.

Since the previous valuation, Senate Bill 8 (SB 8) was enacted, granting the Board authority to decide how many anniversaries a new benefit recipient must achieve before they become eligible to receive a COLA. The Board exercised its authority and set forth a rule that benefits that begin on and after April 1, 2018 must wait until the fourth anniversary to become eligible for a COLA.

The actuarial valuation results provide a “snapshot” view of the System’s financial condition on June 30, 2019. Actuarial gains and losses result when the actual experience of the plan (such as asset return, pay increases, turnover, deaths, etc.) is different from that expected by the actuarial assumptions. The System’s unfunded actuarial accrued liability (UAAL) was expected to be $5,949.5 million as of June 30, 2019, taking into account contributions from the employers and members of $809.9 million. The actual UAAL is $6,054.2 million. The net increase of $104.7 million is attributable to liability and investment gains and losses which are detailed in Section V. The remaining amortization period of the UAAL is 25 years as of June 30, 2019.

The valuation is based on a set of actuarial assumptions which were adopted by the Board based on the five-year experience study for the period ending June 30, 2015. These assumptions are presented in Schedule C.

A summary of the key results from the June 30, 2019 actuarial valuation is shown below. Further detail on the valuation results can be found in the following sections of this Executive Summary.

	June 30, 2019 Valuation Results	June 30, 2018 Valuation Results
Actuarially Determined Contribution Rate	10.68%	10.71%
Employer Contribution Rate	14.00%	13.50%
Sufficiency/(Deficiency)	3.32%	2.79%
Remaining Amortization Period	25	26
Unfunded Actuarial Accrued Liability ($M)	$6,054.2	$5,985.5
Basic Benefit Funded Ratio (Actuarial Assets)	70.51%	70.07%

The funded ratio of the basic benefits is 70.51%. Since this is greater than 70%, per the Board-adopted funding policy, the basic benefits may receive an employer contribution of 14.00% of compensation for FY2020. The Health Care Fund may receive an employer contribution of 0.50%. Based on a Board Resolution dated October 17, 2019, the valuation assumes an allocation of the entire 14.00% to the basic benefits and 0.00% allocated to health care consistent with SERS' funding policy. The funding policy requires at least 13.50% of the employers' contributions be allocated to SERS' basic benefits when the funded ratio is 70% but less than 80%, with the remainder allocated to health care.

EXPERIENCE FOR THE LAST PLAN YEAR

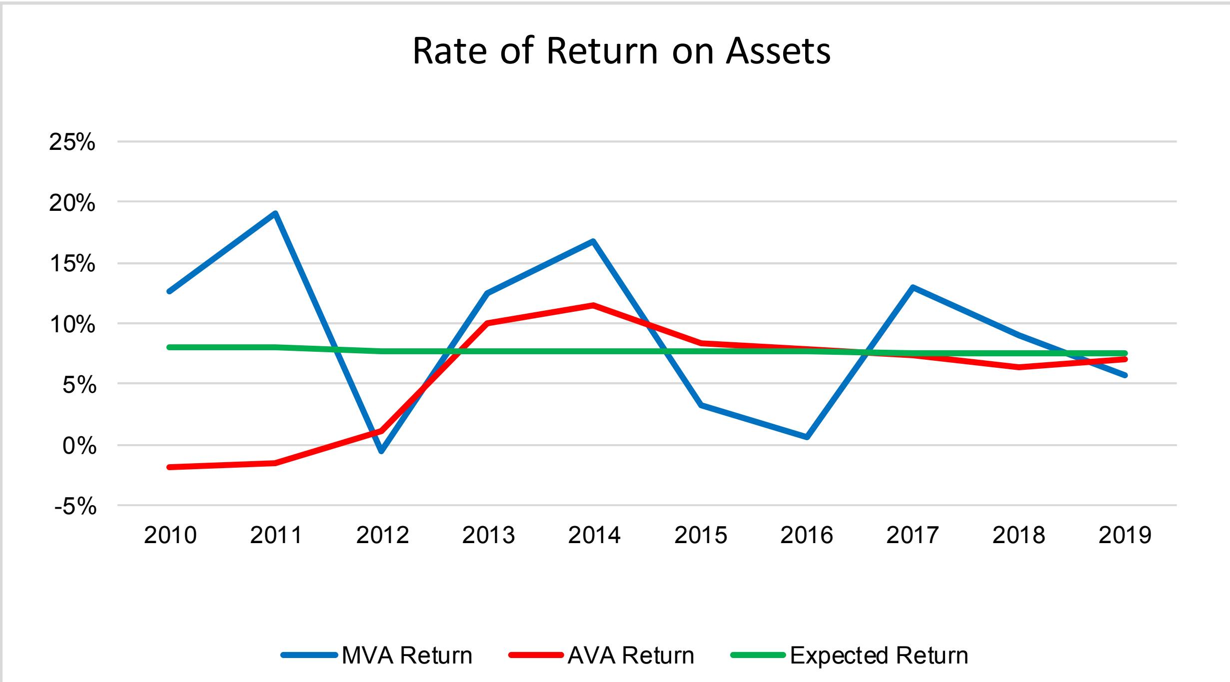
Numerous factors contributed to the change in the System's assets, liabilities, and actuarial contribution rate between June 30, 2018 and June 30, 2019. The components are examined in the following discussion.

ASSETS

As of June 30, 2019, SERS' basic benefits had net assets of $14,544,076,104, when measured on a market value basis. This was an increase of $273,560,356 from the previous year. The market value of assets is not used directly in the calculation of the unfunded actuarial accrued liability and the actuarially determined contribution. The asset valuation smoothing method, which recognizes the annual unexpected portion of market value investment returns over a four-year period, attempts to minimize the effect of market volatility. The resulting amount is called the "actuarial value of assets" and is utilized to determine the actuarial valuation results. In this year's valuation, the actuarial value of assets as of June 30, 2019, was $14,473,089,414, an increase of $460,910,283 from the value in the prior year. The components of change in the asset values are shown in the table below.

		Actuarial Value		Market Value
Net Assets, June 30, 2018	$	14,012,179,131	$	14,270,515,748
- Employer and Member Contributions	+	809,896,173	+	809,896,173
- Benefit Payments	-	1,336,040,170	-	1,336,040,170
- Investment Gains	+	987,054,280	+	799,704,353
Net Assets, June 30, 2019		14,473,089,414		14,544,076,104

The estimated investment return on the market value of assets for FY2019 was 5.67%. Due to the recognition of deferred investment losses from prior years, the resulting return on the smoothed actuarial value of assets was 7.09%. As this rate of return was less than the assumed rate of 7.50%, there was an actuarial investment experience loss of $44.1 million. Please see Section III, Schedule B, and Schedule F of this report for more detailed information on the market and actuarial value of assets.



Market value returns have been very volatile. As can be seen in this graph, the return on actuarial assets is much smoother than the return on market value. The asset smoothing method impacts only the timing of when the actual market experience is recognized in the valuation process. The remaining deferred investment experience net gain of $71 million will be absorbed in future years.

LIABILITIES

The actuarial accrued liability is the portion of the present value of future benefits allocated to service performed up to the valuation date. The difference between this liability and the actuarial value of assets is called the unfunded actuarial accrued liability (UAAL). The dollar amount of unfunded actuarial accrued liability is reduced if the contributions to the System exceed the normal cost for the year, plus interest on the prior year's UAAL.

The unfunded actuarial accrued liability is shown as of June 30, 2019 in the following table:

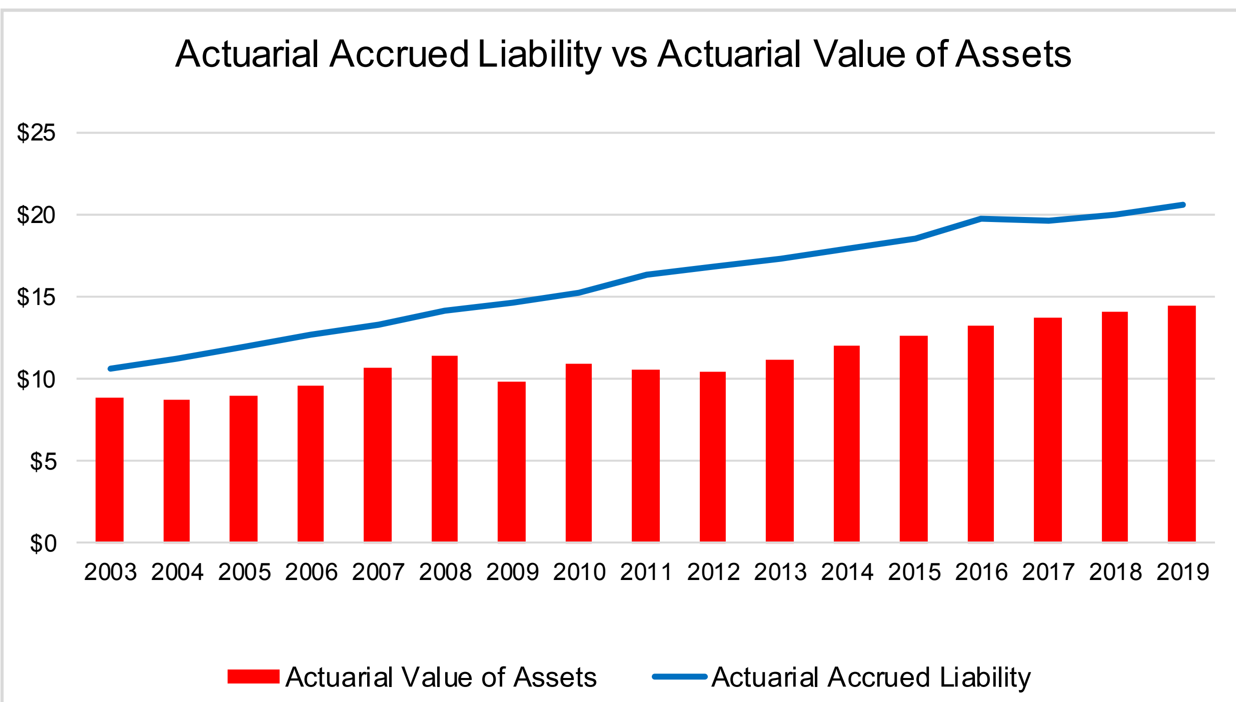
	Actuarial Value of Assets	Market Value of Assets
Actuarial Accrued Liability	$20,527,251,448	$20,527,251,448
Value of Assets	$14,473,089,414	$14,544,076,104
Unfunded Actuarial Accrued Liability*	$6,054,162,034	$5,983,175,344
Funded Ratio	70.51%	70.85%

* See Appendix B of the report for the detailed development of the unfunded actuarial accrued liability.

Changes in the UAAL occur for various reasons. The net increase in the UAAL from June 30, 2018, to June 30, 2019, was $68,640,199. The components of this net change are shown in the table below:

Unfunded Actuarial Accrued Liability, June 30, 2018		
($ Millions)		$5,985.5
Expected increase due to amortization method	($36.0)	
Investment experience	$44.1	
Liability experience	$60.6	
Benefit Changes	$0.0	
Total		$68.7
Unfunded Actuarial Accrued Liability, June 30, 2019		$6,054.2

As shown above, various components impacted the UAAL. Actuarial gains (losses) result from actual experience that is more (less) favorable than anticipated based on the actuarial assumptions. The amounts are measured as the difference between the expected unfunded actuarial accrued liability and the actual unfunded actuarial accrued liability net of any impact due to changes in actuarial assumptions and methods or benefit provisions. Overall, the System experienced a net increase to the UAAL of $68.7 million. The net UAAL increase is comprised primarily of experience and investment losses; the largest single source of liability losses was termination experience.

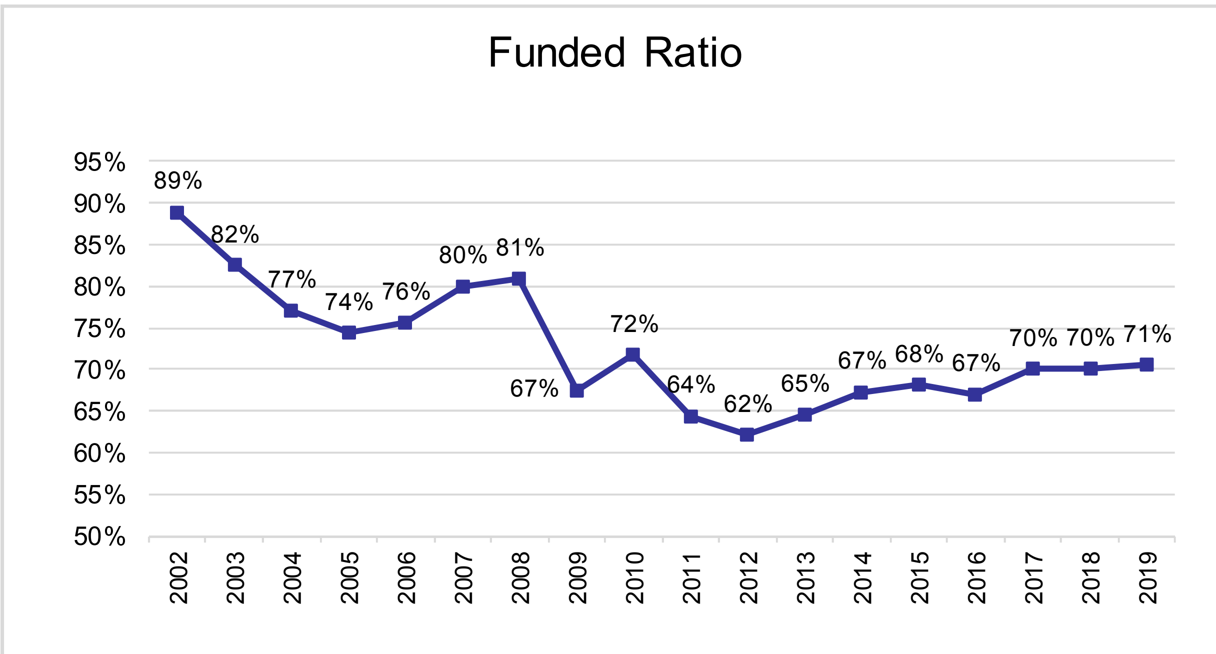


The actuarial accrued liability was slightly higher than the actuarial value of assets as of June 30, 2003. Investment experience below the assumed rate of return increased the difference between the actuarial accrued liability and actuarial assets. SERS implemented pension reform to improve the System's funding progress. In addition, the Board adopted a new funding policy that will allocate a higher portion of the employer contribution toward the basic benefits until the fund achieves a funded status of 90%. An evaluation of the unfunded actuarial accrued liability on a pure dollar basis may not provide a complete analysis since only the difference between the assets and liabilities (which are both very large numbers) is reflected.

Another way to evaluate the unfunded actuarial accrued liability and the progress made in its funding is to track the funded ratio, the ratio of the actuarial value of assets to the actuarial accrued liability.

	6/30/15	6/30/16	6/30/17	6/30/18	6/30/19
Funded Ratio	68.11%	66.66%	70.01%	70.07%	70.51%
Unfunded Actuarial Accrued Liability ($M)	$ 5,901.6	$ 6,591.1	$ 5,875.3	$ 5,985.5	$6,054.2

The longer-term historical funded ratio information is shown in the chart below.



Investment returns are the primary source of decreases in the funded ratio as can be seen during the 2002-2003 “tech bubble” recession and the “great” recession of 2008-2009.

CONTRIBUTION RATE

Under the Entry Age Normal cost method, the actuarial contribution rate consists of two components:

- a "normal cost" for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date which is funded by both member and employer contributions, and
- an "unfunded actuarial accrued liability contribution" for the excess of the portion of projected liabilities allocated to service-to-date over the actuarial value of assets.

See Section VI of the report for the detailed development of these contribution rates which are summarized in the following table:

Contribution Rates	June 30, 2019	June 30, 2018
1. Employer Portion of Normal Cost Rate	0.00%	(0.02%)
2. UAAL Contribution Rate	10.68%	10.73%
3. Total Actuarial Determined Contribution Rate (1) + (2)	10.68%	10.71%
4. Funded Ratio	70.51%	70.07%
5. Total Employer Contribution Rate	14.00%	14.00%
6. Amount Allocated to Basic Benefits	14.00%	13.50%

As discussed earlier, SERS' basic benefits includes retirement, disability and survivor benefits, along with Medicare Part B reimbursements and lump sum retiree death benefits. SERS also provides access to health care coverage for retiree members. The Health Care Fund is partially supported by employer contributions that are not required for actuarially funding basic benefits. The funding policy is expected to accelerate the pace at which SERS' basic benefits will achieve a funded ratio equal to 90%. Based on a Board Resolution dated October 17, 2019, the entire employer contribution rate will be allocated to SERS' basic benefits.

REPORT ON THE ANNUAL VALUATION OF THE
SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO

PREPARED AS OF JUNE 30, 2019

SECTION I – SUMMARY OF PRINCIPAL RESULTS

1. This report, prepared as of June 30, 2019, presents the results of the annual actuarial valuation of the basic benefits provided under the System, including pension, Medicare Part B reimbursement and post-retirement death benefits. For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized in the following table.

SUMMARY OF PRINCIPAL RESULTS

	June 30, 2019	June 30, 2018
Active members included in valuation		
Number	159,363	158,343
Annual Compensation	$3,462,524,396	$3,332,395,171
Retirees		
Number	81,024	81,332
Annual allowances	$1,218,955,506	$1,211,935,636
Deferred Vesteds		
Number	5,464	5,091
Annual deferred allowances	$36,548,329	$32,213,683
Assets (net of Health Care Assets)		
Market related actuarial value	$14,473,089,414	$14,012,179,131
Market value	$14,544,076,104	$14,270,515,748
Unfunded Accrued Liability	$6,054,162,034	$5,985,521,835
Funded Ratio (MVA/AAL)		
Pension Benefits	71.02%	70.68%
Medicare Part B	45.31%	41.10%
Post-retirement Death Benefits	64.50%	61.58%
Actuarially Determined Contribution Rate		
Normal	0.00%	(0.02)%
Accrued liability	10.68%	10.73%
Total	10.68%	10.71%
Funding Policy Contribution Rate	14.00%	13.50%
Accrued liability amortization period (years)	25	26

2. The statute sets a contribution cap of 24% of payroll: 14% from employers and 10% from employees. Employer contributions in excess of those required to support the basic benefits may be allocated to retiree health care funding. If the funded ratio is less than 70%, the entire 14% employers' contribution shall be allocated to SERS' basic benefits. If the funded ratio is 70% but less than 80%, at least 13.50% of the employers' contribution shall be allocated to SERS' basic benefits, with the remainder (if any) allocated to the Health Care Fund. If the funded ratio is 80% but less than 90%, at least 13.25% of the employers' contribution shall be allocated to SERS' basic benefits, with the remainder (if any) allocated to the Health Care Fund. If the funded ratio is 90% or greater, the Health Care Fund may receive any portion of the employers' contribution that is not needed to fund SERS' basic benefits.
3. The valuation balance sheet showing the results of the valuation is given in Schedule A.
4. Comments on the valuation results are given in Section IV, comments on the experience and the sources of actuarial gains and losses during the valuation year are given in Section V, and the rates of contribution payable by employers are given in Section VI.
5. Schedule B of this report presents the development of the actuarial value of assets. Schedule C details the actuarial assumptions and methods employed. Schedule D gives a summary of the benefit and contribution provisions of the plan.

SECTION II – MEMBERSHIP DATA

Data regarding the membership of the System for use as a basis for the valuation were furnished by the System's staff. The following tables summarize the membership of the system as of June 30, 2019, upon which the valuation was based. Detailed tabulations of the data are given in Schedule E.

Active Members

		Group Averages		
Number	Payroll	Salary	Age	Service
159,363	$3,462,524,396	$21,727	47.1	7.5

The total number of active members includes 47,343 vested members and 112,020 non-vested members. Those who reach 25 years of service on or before August 1, 2017 were eligible to retire under the previous age and service credit eligibility requirements.

The following table shows a six-year schedule of active member valuation data.

SCHEDULE OF SERS ACTIVE MEMBER VALUATION DATA

Valuation Date	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
6/30/2014	121,251	$2,759,281,606	$22,757	0.8%
6/30/2015	122,855	2,845,443,802	23,161	1.8
6/30/2016	124,540	2,932,236,551	23,545	1.7
6/30/2017	157,981*	3,302,805,662	20,906	(11.2)
6/30/2018	158,343	3,332,395,171	21,045	0.7
6/30/2019	159,363	3,462,524,396	21,727	3.2

*Effective in FY2017, the active member headcount reflects an increase of members who have been re-categorized from inactive to active status.

The following table shows the number and annual retirement allowances payable to retiree members and their beneficiaries on the roll of the Retirement System as of the valuation date as well as certain group averages.

Retiree Lives

			Group Averages	
Type of Benefit Payment	Number	Annual Benefits	Benefit	Age
Retirees and Beneficiaries	71,456	$1,086,489,678	$15,205	74.7
Disability	5,261	93,103,386	17,697	66.0
Survivors	4,307	39,362,442	9,139	72.6
Total in SERS	81,024	$1,218,955,506	$15,044	74.0

This valuation also includes 260,321 inactive members eligible for a contribution refund only (including 239,183 members reported separately who had completed one or more years of service before terminating). Their contributions totaled $203,711,769 as of June 30, 2019. There were also 5,464 terminated vested members with annual deferred pension benefits of $36,548,329. Included in the "Retiree" numbers in the above table are 13,257 reemployed retirees with account balances of $108,887,823 (including employer contributions and interest), 694 reemployed retirees receiving only an annuity from their contributions and their employers' matching contributions, and 767 reemployed retirees receiving such annuities in addition to their regular pension benefits. The sum of the annuity payments attributable to these reemployed retirees is $6,320,732.

SECTION III – ASSETS

1. As of June 30, 2019, the total market value of assets amounted to $15,007,886,783. All figures include the combined Pension Trust Fund, Medicare B Fund, Death Benefit Fund, and Health Care Fund, but exclude the QEBA Fund.

Asset Summary Based on Market Value			
(1)	Assets at June 30, 2018	$	14,706,145,385
(2)	Contributions and Misc. Revenue		963,761,980
(3)	Investment Gain (Loss)		819,147,258
(4)	Benefit Payments		(1,481,167,840)
(5)	Assets at June 30, 2019 (1) + (2) + (3) + (4)	$	15,007,886,783
(6)	Annualized Rate of Return*		5.67 %

2. The four-year smoothed market related actuarial value of assets used for the current valuation was $14,936,900,093. Schedule B shows the development of the actuarial value of assets as of June 30, 2019. Again all figures include the combined Pension Trust Fund, Medicare B Fund, Death Benefit Fund, and Health Care Fund, but exclude the QEBA Fund.

Asset Summary Based on Actuarial Value			
(1)	Assets at June 30, 2018	$	14,447,808,768
(2)	Contributions and Misc. Revenue		963,761,980
(3)	Investment Gain (Loss)		1,006,497,185
(4)	Benefit Payments		(1,481,167,840)
(5)	Assets at June 30, 2019 Before Application of Corridor (1) + (2) + (3) + (4)	$	14,936,900,093
(6)	Annualized Rate of Return*		7.09 %

*Based on the approximation formula: I / [0.5 x (A + B – I)], where

I = Investment Gain (Loss)
A = Beginning of year asset value
B = End of year asset value

SECTION IV - COMMENTS ON VALUATION

Schedule A of this report contains the valuation balance sheet which shows the present and prospective assets and liabilities of the System as of June 30, 2019.

1. The total retirement benefit valuation balance sheet shows that the System has total future retirement benefit liabilities of $23,142,190,810, of which $12,311,818,309 is for the future benefits payable for present retiree members and beneficiaries of deceased members; $629,702,097 is for the future benefits payable for present inactive members; and $10,200,670,404 is for the future benefits payable for present active members. Against these retirement benefit liabilities the System has a total present actuarial value of assets of $14,473,089,414 as of June 30, 2019. The difference of $8,669,101,396 between the total liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future for retirement benefits. Of this amount, $2,684,823,852 is the present value of future contributions expected to be made by members, and the balance of $5,984,277,544 represents the present value of future contributions payable by the employers.

2. The employers' contributions to the System on account of retirement benefits consist of normal contributions, accrued liability contributions and contributions for administrative expenses. The valuation indicates that employer normal contributions at the rate of (0.25%) of payroll for basic pension benefits, 0.01% of payroll for post-retirement death benefits, and 0.24% of payroll for Medicare Part B benefits are required to provide the benefits of the System for the average member of SERS. Prospective employer normal contributions on account of retirement benefits at the above rates have a present value of ($69,884,490).

3. For pension benefits, it is recommended that the unfunded accrued liability contribution rate payable by the employers on account of retirement benefits be set at 10.28% of payroll. For post-retirement death benefits, it is recommended that the unfunded accrued liability contribution rate payable by the employers on account of retirement benefits be set at 0.02% of payroll. Finally, for Medicare Part B benefits, it is recommended that the unfunded accrued liability contribution rate payable by the employers on account of retirement benefits be set at 0.38% of payroll. These rates are sufficient to amortize the unfunded accrued liability of $6,054,162,034 over 25 years based on the assumption that the aggregate payroll for SERS members will increase by 3.5% each year.

4. The present value of the total future contributions to be made by the employers for basic benefits is the sum of the future employer normal contributions and the unfunded accrued liability contributions and equals $5,984,277,544.

SECTION V – DERIVATION OF EXPERIENCE GAINS AND LOSSES

Actual experience will never (except by coincidence) match exactly with assumed experience. It is assumed that gains and losses will be in balance over a period of years, but sizable year-to-year fluctuations are common. Detail on the derivation of the experience gain (loss) for the year ended June 30, 2019, is shown below in $ millions.

Experience (Gain/Loss)

	Total Basic Benefits June 30:		2019	2018	2017	2016	2015	2014
(1)	UAAL from last valuation	$	5,985.5	5,875.3	6,591.1	5,901.6	5,851.3	6,121.2
(2)	Normal cost from last valuation		330.6	342.4	312.5	319.3	313.6	308.9
(3)	Contributions		809.9	759.9	804.4	750.7	701.5	700.7
(4)	Interest accrual:		443.3	437.8	487.6	453.0	450.5	471.2
	[(1) + (2) - (3)*.5] x .075							
(5)	Expected UAAL before changes:	$	5,949.5	5,895.6	6,586.8	5,923.2	5,913.9	6,200.6
	(1) + (2) - (3) + (4)							
(6)	Change due to plan amendments		0.0	357.6	998.5	0.0	0.0	0.0
(7)	Change due to new actuarial		0.0	0.0	0.0	(668.2)	0.0	0.0
	assumption or methods							
(8)	Expected UAAL after changes:	$	5,949.5	5,538.0	5,588.3	6,591.4	5,913.9	6,200.6
	(5) - (6) - (7)							
(9)	Actual UAAL from this valuation	$	6,054.2	5,985.5	5,875.3	6,591.1	5,901.6	5,851.3
(10)	Total Gain/(Loss): (8) - (9)	$	(104.7)	(447.4)	(287.0)	0.3	12.3	349.3
(11)	Investment Gain/(Loss):	$	(44.1)	(161.1)	(12.2)	50.6	62.1	403.3
(12)	Non-Investment Gain/(Loss)	$	(60.6)	(286.3)	(274.8)	(50.3)	(49.8)	(54.0)

	Pension June 30:		2019	2018	2017	2016	2015	2014
(1)	UAAL from last valuation	$	5,735.1	5,611.3	6,315.7	5,640.9	5,574.6	5,838.1
(2)	Normal cost from last valuation		322.1	334.1	305.6	313.3	307.7	303.0
(3)	Contributions		780.6	731.8	778.7	727.0	678.6	677.8
(4)	Interest accrual:		425.0	418.5	467.4	433.3	429.6	449.7
	[(1) + (2) - (3)*.5] x .075							
(5)	Expected UAAL before changes:	$	5,701.6	5,632.1	6,310.0	5,660.5	5,633.3	5,913.0
	(1) + (2) - (3) + (4)							
(6)	Change due to plan amendments		0.0	357.6	998.5	0.0	0.0	0.0
(7)	Change due to new actuarial		0.0	0.0	0.0	(643.5)	0.0	0.0
	assumption or methods							
(8)	Expected UAAL after changes:	$	5,701.6	5,274.5	5,311.5	6,304.0	5,633.3	5,913.0
	(5) - (6) - (7)							
(9)	Actual UAAL from this valuation	$	5,822.7	5,735.1	5,611.3	6,315.7	5,640.9	5,574.6
(10)	Total Gain/(Loss): (8) - (9)	$	(121.1)	(460.6)	(299.8)	(11.7)	(7.6)	338.4
(11)	Investment Gain/(Loss):	$	(44.1)	(159.0)	(12.3)	49.6	60.6	398.0
(12)	Non-Investment Gain/(Loss)	$	(77.0)	(301.6)	(287.5)	(61.3)	(68.2)	(59.6)

SECTION V – DERIVATION OF EXPERIENCE GAINS AND LOSSES
($ Millions)

	Medicare Part B June 30:		2019	2018	2017	2016	2015	2014
(1)	UAAL from last valuation	$	235.4	249.1	259.7	246.9	262.7	268.3
(2)	Normal cost from last valuation		8.0	7.8	6.4	5.5	5.4	5.4
(3)	Contributions		27.3	26.3	24.1	22.2	21.5	21.5
(4)	Interest accrual: [(1) + (2) - (3)*.5] x .075		17.2	18.3	19.0	18.7	19.9	20.4
(5)	Expected UAAL before changes: (1) + (2) - (3) + (4)	$	233.3	248.9	261.0	248.9	266.5	272.6
(6)	Change due to plan amendments		0.0	0.0	0.0	0.0	0.0	0.0
(7)	Change due to new actuarial assumption or methods		0.0	0.0	0.0	(22.4)	0.0	0.0
(8)	Expected UAAL after changes: (5) - (6) - (7)	$	233.3	248.9	261.0	271.3	266.5	272.6
(9)	Actual UAAL from this valuation	$	217.4	235.4	249.1	259.7	246.9	262.7
(10)	Total Gain/(Loss): (8) - (9)	$	15.9	13.5	11.9	11.6	19.6	9.9
(11)	Investment Gain/(Loss):	$	0.1	(1.9)	0.1	0.9	1.3	4.5
(12)	Non-Investment Gain/(Loss)	$	15.8	15.4	11.8	10.7	18.3	5.4

	Post-Retirement Death Benefits June 30:		2019	2018	2017	2016	2015	2014
(1)	UAAL from last valuation	$	15.0	14.9	15.7	13.8	14.0	14.8
(2)	Normal cost from last valuation		0.5	0.5	0.5	0.5	0.5	0.5
(3)	Contributions		2.0	1.8	1.6	1.5	1.5	1.4
(4)	Interest accrual: [(1) + (2) - (3)*.5] x .075		1.1	1.1	1.2	1.0	1.1	1.1
(5)	Expected UAAL before changes: (1) + (2) - (3) + (4)	$	14.6	14.7	15.8	13.8	14.1	15.0
(6)	Change due to plan amendments		0.0	0.0	0.0	0.0	0.0	0.0
(7)	Change due to new actuarial assumption or methods		0.0	0.0	0.0	(2.3)	0.0	0.0
(8)	Expected UAAL after changes: (5) - (6) - (7)	$	14.6	14.7	15.8	16.1	14.1	15.0
(9)	Actual UAAL from this valuation	$	14.1	15.0	14.9	15.7	13.8	14.0
(10)	Total Gain/(Loss): (8) - (9)	$	0.5	(0.3)	0.9	0.4	0.3	1.0
(11)	Investment Gain/(Loss):	$	(0.1)	(0.2)	0.0	0.1	0.2	0.8
(12)	Non-Investment Gain/(Loss)	$	0.6	(0.1)	0.9	0.3	0.1	0.2

ANALYSIS OF FINANCIAL EXPERIENCE

Gains and (Losses) in Accrued Liabilities Resulting from Difference Between Assumed Experience and Actual Experience ($ Millions)

Type of Activity	Pension	Medicare Part B	Post-Retirement Death Benefit	Total Basic Benefits
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	$ 3.4	$ 3.8	$ 0.6	$ 7.8
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(9.5)	0.0	0.0	(9.5)
Pre-Retirement Death Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	(3.8)	(0.2)	0.0	(4.0)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	(105.9)	(0.4)	0.0	(106.3)
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	20.3	0.0	0.0	20.3
New Members. Additional accrued liability attributable to members who entered the plan since the last valuation.	(21.6)	(0.8)	0.0	(22.4)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(44.1)	0.1	(0.1)	(44.1)
Death After Retirement. If retired members live longer than assumed, there is a loss. If not as long, a gain.	(35.6)	10.7	0.0	(24.9)
Other. Miscellaneous gains and losses resulting from changes in valuation software, data adjustments, timing of financial transactions, etc.	75.7	2.7	0.0	78.4
Gain (or Loss) During Year From Financial Experience	$ (121.1)	$ 15.9	$ 0.5	$ (104.7)
Non-Recurring Items. Adjustments for plan amendments, assumption changes and method changes	0.0	0.0	0.0	0.0
Composite Gain (or Loss) During Year	$ (121.1)	$ 15.9	$ 0.5	$ (104.7)

SECTION VI – ACTUARIALLY DETERMINED CONTRIBUTION RATES

The valuation balance sheet gives the basis for determining the percentage rates for contributions to be made by employers to the Retirement System. The following table shows the rates of contribution payable by employers.

Actuarially Determined Contribution Rates

	Contribution for	Pension	Post-Retirement Death Benefit	Medicare Part B	Total Basic Benefits
A.	Normal Cost:				
	(1) Service retirement benefits	6.10%			
	(2) Disability benefits	0.67			
	(3) Survivor benefits	0.23			
	(4) Refunds	2.75			
	(5) Total	9.75%	0.01%	0.24%	10.00%
B.	Member Contributions	10.00%	0.00%	0.00%	10.00%
C.	Employer Normal Cost: [A(5) - B]	(0.25%)	0.01%	0.24%	0.00%
D.	Unfunded Actuarial Accrued Liability Contributions	10.28%	0.02%	0.38%	10.68%
E.	Total Recommended Employer Contribution Rate:[C+D]	10.03%	0.03%	0.62%	10.68%

The statute sets a contribution cap of 24% of payroll: 14% from employers and 10% from employees. Employer contributions in excess of those required to support the basic benefits may be allocated to retiree health care funding. If the funded ratio is less than 70%, all 14% of the employers' contribution shall be allocated to SERS' basic benefits. If the funded ratio is 70% but less than 80%, at least 13.50% of the employers' contribution shall be allocated to SERS' basic benefits, with the remainder (if any) allocated to the Health Care Fund. If the funded ratio is 80% but less than 90%, at least 13.25% of the employers' contribution shall be allocated to SERS' basic benefits, with the remainder (if any) allocated to the Health Care Fund. If the funded ratio is 90% or greater, the Health Care Fund may receive any portion of the employers' contribution that is not needed to fund SERS' basic benefits. Based on a Board Resolution dated October 17, 2019, the entire 14% of the employers' contribution will be allocated to SERS' basic benefits.

SECTION VII – SCHEDULE OF FUNDING PROGRESS
($ Millions)

Actuarial Valuation Date	Value of Plan Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll (b - a)/ (c)
			Pension Benefits			
6/30/2014	$ 11,882	$ 17,457	$ 5,575	68.1%	$ 2,759	202.1%
6/30/2015	12,446	18,087	5,641	68.8	2,845	198.3
6/30/2016	13,015	19,331	6,316	67.3	2,932	215.4
6/30/2017	13,537	19,148	5,611	70.7	3,303	169.9
6/30/2018	13,824	19,559	5,735	70.7	3,332	172.1
6/30/2019	14,267	20,090	5,823	71.0	3,463	168.1
			Medicare Part B			
6/30/2014	$ 128	$ 390	$ 262	32.7%	$ 2,759	9.5%
6/30/2015	134	381	247	35.3	2,845	8.7
6/30/2016	142	402	260	35.4	2,932	8.9
6/30/2017	153	402	249	38.0	3,303	7.5
6/30/2018	164	400	236	41.1	3,332	7.1
6/30/2019	180	397	217	45.3	3,463	6.3
			Post-Retirement Death Benefits			
6/30/2014	$ 21	$ 35	$ 14	60.0%	$ 2,759	0.5%
6/30/2015	21	35	14	60.0	2,845	0.5
6/30/2016	22	38	16	57.9	2,932	0.5
6/30/2017	23	38	15	60.5	3,303	0.5
6/30/2018	24	39	15	61.5	3,332	0.5
6/30/2019	26	40	14	65.0	3,463	0.4

SECTION VIII – RISK CONSIDERATIONS

Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September, 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, is first applicable for the June 30, 2019 actuarial valuation for the System.

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become "pay as you go". The term "risk" is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay and
- external risks such as the regulatory and political environment.

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial contribution rate each year. The System is primarily funded by member and employer contributions to the trust fund, together with the earnings on these accumulated contributions. These contributions fund benefit accruals for current active members and administrative expenses. The remainder of the contributions amortizes the unfunded actuarial accrued liability. The contribution rates are set by state statute and are intended to provide the needed amounts to fund the system over time. The purpose of the valuation is to determine if the fixed employer and member contributions remain sufficient to fund the Plan. Due to the fixed nature of the contributions actuarial gains and losses are reflected in the amortization period. Generally, the largest source of actuarial gains and losses are caused by investment volatility. In addition, the unfunded liability is amortized as a level percentage of pay assuming payroll will grow by 3.50% per year. A key risk factor to the System's funding is that over time, the Statutory Contribution Rates will be insufficient to accumulate enough funds, with investment income, to fund the promised benefits. The funding insufficiency can be caused by amortization periods that are too long or by payroll not growing at the assumed rate.

The other significant risk factor for the System is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 10). A perusal of historical returns over 10-20 years reveals that the actual return each year is rarely close to the average return for the same period. This is to be expected, given the underlying capital market assumptions and the System's asset allocation. To the extent market rates of interest affect the expected return on assets, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results.

A key demographic risk for the Retirement System is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect a margin for improvement in mortality experience these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.

Historical Asset Volatility Ratios
(in 1,000's)

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Fiscal Year End	Market Value of Assets ($ Millions)	Covered Payroll ($ Millions)	Asset Volatility Ratio
6/30/2007	$11,711	$2,603	4.50
6/30/2008	10,793	2,652	4.07
6/30/2009	8,134	2,787	2.92
6/30/2010	9,072	2,843	3.19
6/30/2011	10,619	2,852	3.72
6/30/2012	10,332	2,788	3.71
6/30/2013	11,300	2,747	4.11
6/30/2014	12,821	2,759	4.65
6/30/2015	12,797	2,845	4.50
6/30/2016	12,452	2,932	4.25
6/30/2017	13,614	3,303	4.12
6/30/2018	14,271	3,332	4.28
6/30/2019	14,544	3,463	4.20

The assets at June 30, 2019 are 420% of payroll, so underperforming the investment return assumption by 1.00% (i.e., earn 6.50% for one year) is equivalent to 4.20% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAL, this illustrates the risk associated with volatile investment returns.

Historical Cash Flows

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments and administrative expenses. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. The System has negative cash flows of around which ranges from 3% to 4% for the prior five years, so there is no immediate concern.

Fiscal Year End	Market Value of Assets ($ Millions)	Contributions ($ Millions)	Benefit Payments & Expenses ($ Millions)	Net Cash Flow ($ Millions)	Net Cash Flow as % of Market Value
6/30/2007	$11,711	$792	$887	($95)	(0.81%)
6/30/2008	10,793	564	740	(176)	(1.63)
6/30/2009	8,134	587	779	(192)	(2.36)
6/30/2010	9,072	704	822	(118)	(1.30)
6/30/2011	10,619	682	880	(197)	(1.86)
6/30/2012	10,332	697	946	(249)	(2.41)
6/30/2013	11,300	695	1,020	(325)	(2.88)
6/30/2014	12,821	701	1,069	(368)	(2.87)
6/30/2015	12,797	702	1,156	(455)	(3.56)
6/30/2016	12,452	751	1,203	(452)	(3.63)
6/30/2017	13,614	804	1,256	(451)	(3.31)
6/30/2018	14,271	760	1,335	(575)	(4.03)
6/30/2019	14,544	810	1,368	(558)	(3.84)

Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs. Below are two tables which demonstrate the ratio of the System's retiree liability compared to the total accrued liability and the ratio of the number of retirees and beneficiaries to the number of active members.

Fiscal Year End	Retiree Liability ($ Millions)	Total Actuarial Liability ($ Millions)	Retiree Percentage
6/30/2007	$6,689	$13,303	0.50
6/30/2008	7,161	14,062	0.51
6/30/2009	7,592	14,582	0.52
6/30/2010	7,942	15,222	0.52
6/30/2011	8,605	16,325	0.53
6/30/2012	9,250	16,755	0.55
6/30/2013	9,793	17,247	0.57
6/30/2014	10,437	17,882	0.58
6/30/2015	11,047	18,503	0.60
6/30/2016	11,702	19,771	0.59
6/30/2017	11,679	19,588	0.60
6/30/2018	12,399	19,998	0.62
6/30/2019	12,629	20,527	0.62

Historical Member Statistics

Fiscal Year End	Active Count	Retiree Count	Active to Retiree Ratio
6/30/2007	123,013	63,529	1.94
6/30/2008	124,370	64,818	1.92
6/30/2009	125,465	65,757	1.91
6/30/2010	126,015	66,127	1.91
6/30/2011	125,337	67,221	1.86
6/30/2012	121,811	69,038	1.76
6/30/2013	121,642	70,771	1.72
6/30/2014	121,251	72,605	1.67
6/30/2015	122,855	74,372	1.65
6/30/2016	124,540	76,280	1.63
6/30/2017*	157,981	79,157	2.00
6/30/2018	158,343	81,332	1.95
6/30/2019	159,363	81,024	1.97

*Effective in FY2017, the active member headcount reflects an increase of members who have been re-categorized from inactive to active status.

SCHEDULE A

Valuation Balance Sheet and Solvency Test

The following valuation balance sheet shows the assets and liabilities of the retirement system as of the current valuation date of June 30, 2019, and, for comparison purposes, as of the immediately preceding valuation date of June 30, 2018. The items shown in the balance sheet are present values actuarially determined as of the relevant valuation date.

VALUATION BALANCE SHEET
SHOWING THE ASSETS AND LIABILITIES OF THE
SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO

	June 30, 2019	June 30, 2018
ASSETS		
Current actuarial value of assets	$ 14,473,089,414	$ 14,012,179,131
Prospective contributions		
Member contributions	$ 2,684,823,852	$ 2,588,013,885
Employer normal contributions	(69,884,490)	(70,927,620)
Unfunded accrued liability contributions	6,054,162,034	5,985,521,835
Total prospective contributions	$ 8,669,101,396	$ 8,502,608,100
Total assets	$ 23,142,190,810	$ 22,514,787,231
LIABILITIES		
Present value of benefits payable on account of present retired members and beneficiaries	$ 12,311,818,309	$ 12,129,404,995
Present value of benefits payable on account of active members	10,200,670,404	9,805,987,228
Present value of benefits payable on account of inactive and deferred vested members	629,702,097	579,395,008
Total liabilities	$ 23,142,190,810	$ 22,514,787,231

The following table provides the solvency test for SERS members. The table allocates the valuation assets of the System to its liabilities based on an order of precedence. The highest order of precedence is active member contributions. The second highest order of precedence are members in pay status, and vested and non-vested terminated members. The lowest order of precedence is the employer financed portion of active member accrued benefits. The liabilities are determined using the System's assumed rate of return.

Solvency Test
($ Millions)

	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Reported Asset		
Valuation Date	(1) Active Member Contributions	(2) Retired Members & Beneficiaries	(3) Active Members (Employer Financed Portion)	Actuarial Value of Assets	(1)	(2)	(3)
Pension Benefits							
6/30/2014	$ 2,892	$ 10,437	$ 4,128	$ 11,882	100.0%	86.1%	0.0%
6/30/2015	2,979	11,046	4,062	12,446	100.0	85.7	0.0
6/30/2016	2,914	11,689	4,728	13,015	100.0	86.4	0.0
6/30/2017	3,010	11,690	4,448	13,537	100.0	90.0	0.0
6/30/2018	2,733	12,427	4,399	13,824	100.0	89.2	0.0
6/30/2019	2,842	12,666	4,582	14,268	100.0	90.2	0.0
Medicare Part B							
6/30/2014	$ 0	$ 259	$ 131	$ 128	100.0%	49.3%	0.0%
6/30/2015	0	252	130	134	100.0	53.2	0.0
6/30/2016	0	251	151	142	100.0	56.6	0.0
6/30/2017	0	251	151	153	100.0	61.0	0.0
6/30/2018	0	251	149	164	100.0	65.3	0.0
6/30/2019	0	244	153	180	100.0	73.8	0.0
Post-Retirement Death Benefits							
6/30/2014	$ 0	$ 27	$ 8	$ 21	100.0%	75.9%	0.0%
6/30/2015	0	28	7	21	100.0	75.0	0.0
6/30/2016	0	30	8	22	100.0	73.3	0.0
6/30/2017	0	30	8	23	100.0	76.7	0.0
6/30/2018	0	31	8	24	100.0	77.4	0.0
6/30/2019	0	31	8	25	100.0	80.6	0.0

SCHEDULE B
Development of Actuarial Value of Assets

	Valuation date June 30:	2018	2019	2020	2021	2022
A.	Actuarial Value Beginning of Year	$ 14,095,197,393	$ 14,447,808,768			
B.	Market Value End of Year	14,706,145,385	15,007,886,783			
C.	Market Value Beginning of Year	13,995,748,150	14,706,145,385			
D.	Cash Flow					
	D1. Contributions	$ 823,485,048	$ 875,773,846			
	D2. Other Revenue	116,893,434	87,988,134			
	D3. Benefit Payments	(1,466,854,072)	(1,479,856,043)			
	D4. Net Transfers	6,734,065	(1,311,797)			
	D5. Net	$ (519,741,525)	$ (517,405,860)			
E.	Investment Income					
	E1. Market Total: B.-C.-D5.	$ 1,230,138,760	$ 819,147,258			
	E2. Assumed Rate (Net of Expenses)	7.50%	7.50%			
	E3. Amount for Immediate Recognition	1,030,190,804	1,083,558,184			
	E4. Amount for Phased-In Recognition	199,947,956	(264,410,926)			
F.	Phased-In Recognition of Investment Income					
	F1. Current Year: 0.25 * E4.	$ 49,986,989	$ (66,102,732)	$ 0	$ 0	$ 0
	F2. First Prior Year	169,320,910	49,986,989	(66,102,732)	0	0
	F3. Second Prior Year	(230,266,166)	169,320,910	49,986,989	(66,102,732)	0
	F4. Third Prior Year	(146,879,637)	(230,266,166)	169,320,910	49,986,989	(66,102,733)
	F5. Total Recognized Investment Gain/(Loss)	$ (157,837,904)	$ (77,060,999)	$ 153,205,167	$ (16,115,743)	$ (66,102,733)
G.	Preliminary Actuarial Value End of Year:					
	A.+D5.+E3.+F5.	$ 14,447,808,768	$ 14,936,900,093			
H.	Corridor					
	H1. 80% of Market Value	$ 11,764,916,308	$ 12,006,309,426			
	H2. 120% of Market Value	$ 17,647,374,462	$ 18,009,464,140			
I.	Actuarial Value End of Year:					
	G. Not Less than H1. or Not Greater than H2.	$ 14,447,808,768	$ 14,936,900,093			
J.	Difference Between Market & Actuarial Values	$ 258,336,617	$ 70,986,690	$ (82,218,476)	$ (66,102,733)	$ 0
K.	Health Care Valuation Assets	$ 435,629,637	$ 463,810,679			
L.	Basic Benefits Valuation Assets (G. - K.)	$ 14,012,179,131	$ 14,473,089,414			

The Actuarial Valuation of Assets recognizes assumed investment income (line E3) fully each year. Differences between actual and assumed investment income (line E4) are phased in over a closed four-year period. During periods when investment performance exceeds the assumed rate, Actuarial Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Actuarial Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for four consecutive years, actuarial value will become equal to market value.

SCHEDULE C

STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

The assumptions and methods used in the valuation were based on the actuarial experience study for the five-year period ending June 30, 2015, adopted by the Board on April 21, 2016

INTEREST RATE: 7.50% per annum, compounded annually (net after all System expenses).

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed rates of separation from active service are as follows:

Service	Annual Rates of Withdrawal
0	45.00%
1	31.00
2	23.00
3	17.00
4	13.00
5	10.50
10	4.00
15	2.00
20	2.00
25	1.50

	Annual Rates of			
	Death *		Disability	
Age	Male	Female	Male	Female
20	.022%	.013%	.020%	.010%
25	.053	.018	.038	.010
30	.059	.019	.068	.026
35	.063	.024	.122	.055
40	.068	.032	.212	.102
45	.081	.044	.311	.170
50	.126	.074	.411	.300
55	.218	.124	.530	.450
60	.361	.188	.590	.450
65	.607	.274	.550	.300
70	1.071	.415	.300	.200
74	1.570	.629	.300	.200

* Pre-retirement mortality is based on the RP-2014 Blue Collar Mortality Table with fully generational projection and a five year age set-back for both males and females. The above rates represent the base rates used.

	Annual Rates of							
	Retirement Eligible prior to 8/1/17				Retirement Eligible after 8/1/17			
Age	Reduced	Reduced (55/25)	First Eligible Unreduced	Subsequent Unreduced	Reduced	Reduced (60/25)	First Eligible Unreduced	Subsequent Unreduced
50			27%	19%				
55		10%	27%	19%				
60	11%	14%	27%	19%		14%	30%	19%
65			25%	19%	11%	14%	30%	19%
70			20%	22%			30%	22%
75			100%	100%			100%	100%

SALARY INCREASES: Representative values of the assumed annual rates of salary increases are as follows:

	Annual Rates of		
Service	Merit & Seniority (A)	Base (Economy) (B)	Increase Next Year (1+(A))*(1+(B))
0	14.20%	3.50%	18.20%
1	5.55	3.50	9.25
2	3.14	3.50	6.75
3	2.17	3.50	5.75
4	1.45	3.50	5.00
5	1.20	3.50	4.75
6	0.97	3.50	4.50
7	0.72	3.50	4.25
8	0.48	3.50	4.00
9	0.24	3.50	3.75
10 & over	0.00	3.50	3.50

PAYROLL GROWTH: 3.50% per annum, compounded annually.

PRICE INFLATION: 3.00% per annum, compounded annually.

ANNUAL COLA: Increase of 2.50% of initial retirement allowance on anniversary of retirement date. On and after April 1, 2018, COLA's for future retirees will be delayed for three years following commencement.

DEATH AFTER RETIREMENT: The RP-2014 Blue Collar Mortality Table with fully generational projection and Scale BB, 120% of male rates and 110% of female rates is used to evaluate allowances to be paid. The RP-2000 Disabled Mortality Table with 90% for male rates and 100% for female rates set back five years is used for the period after disability retirement. These assumptions are used to measure the probabilities of each benefit payment being made after retirement.

MARRIAGE ASSUMPTION: 80% married with the husband three years older than his wife.

VALUATION METHOD: Entry age normal cost method. Entry age is established on an individual basis.

ASSET VALUATION METHOD: Actuarial value, as developed in Schedule A. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation rate of return. The amount recognized each year is 25% of the difference between market value and expected market value. The actuarial value of assets cannot be less than 80% or more than 120% of market value.

FUNDING POLICY: If the funded ratio is less than 70%, the entire 14% employers' contribution shall be allocated to SERS' basic benefits. If the funded ratio is 70% but less than 80%, at least 13.50% of the employers' contribution shall be allocated to SERS' basic benefits, with the remainder (if any) allocated to the Health Care Fund. If the funded ratio is 80% but less than 90%, at least 13.25% of the employers' contribution shall be allocated to SERS' basic benefits, with the remainder (if any) allocated to the Health Care Fund. If the funded ratio is 90% or greater, the Health Care Fund may receive any portion of the employers' contribution that is not needed to fund SERS' basic benefits.

SCHEDULE D

SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO
Summary of Benefit and Contribution Provisions

Contributions for Basic Benefits — Members contribute 10% of pay and employers contribute 14% of pay. Employer contributions not required to finance basic benefits are allocated to the health care program.

Final Average Salary — Average annual salary over the member's three highest years of service.

Normal Retirement

Condition for Retirement

Retire before August 1, 2017 or have 25 years of service or more on or before August 1, 2017 — Attainment of age 65 with at least five years of creditable service, or completion of 30 years of creditable service, regardless of age.

Members attaining 25 years of service after August 1, 2017 — Attainment of age 67 with at least ten years of creditable service, or attainment of age 57 with at least 30 years of creditable service. Buy-up option was available.

Amount of Allowance — The annual retirement allowance payable shall not be greater than 100% of final average salary, and is the greater of:

1. Money Purchase - the greater of:
   The sum of:
   a. An annuity based on the value of the member's accumulated contributions at retirement
   b. A pension equal to the annuity
   c. For members who have 10 or more years of service credit prior to 10/1/1956, an annual benefit of $180.

2. Defined Benefit - the greater of:
   The sum of:
   a. 2.2% of final average salary multiplied by the member's years of service up to 30,
   b. 2.5% of final average salary multiplied by the member's years of service in excess of 30,

   or:
   c. $86 multiplied by the years of service.

Early Retirement

Condition for Early Retirement

Retire before August 1, 2017 or have 25 years of service or more on or before August 1, 2017	Not eligible for unreduced service retirement but has attained age 55 with at least 25 years of service, or age 60 with five years of service.
Members attaining 25 years of service after August 1, 2017	Attainment of age 62 with at least ten years of creditable service, or attainment of age 60 with at least 25 years of creditable service.

Amount of Allowance

Retire before August 1, 2017 or have 25 years of service or more on or before August 1, 2017

Normal retirement allowance accrued to the date of early retirement. The Defined Benefit amount determined above is adjusted by the following percentages based on attained age or years of service:

Attained Age	Years of Ohio Service Credit	Percentage
58	25	75%
59	26	80
60	27	85
61		88
	28	90
62		91
63		94
	29	95
64		97

Members attaining 25 years of service after August 1, 2017

Actuarial equivalent of the normal retirement allowance accrued to the date of early retirement. The Defined Benefit amount determined above is actuarially adjusted for the years before age 65 (age 67 if after August 1, 2017) or 30 years of service, whichever is shorter, but in no event is the adjusted benefit less than the following percentages of the Defined Benefit amount based on years of service:

Years of Ohio Service Credit	Percentage
25	75%
26	80
27	85
28	90
29	95

Disability Retirement

Condition for Retirement

An allowance is paid upon becoming permanently disabled after completion of at least 5 years of total service credit.

Amount of Allowance

1. For those who were active members prior to July 29, 1992 and did not elect the benefit structure outlined below, an allowance based on service to date of disablement, plus, if the age at disablement is less than 60, continuous

service to age 60. The allowance is computed in the same manner as the defined benefit service retirement allowance, subject to a minimum of 30% of FAS and a maximum of 75% of FAS. It is payable for life, unless terminated.

2. For those who became active members after July 28, 1992, and for those who were active members prior to July 29, 1992 who so elected, an allowance equal to the greater of (i) 45% of FAS, or (ii) the lesser of 60% of FAS, or the allowance computed in the same manner as the defined benefit service retirement allowance. The allowance will continue until:

   a. The date the member is granted a service retirement benefit, or
   b. The date the allowance is terminated, or
   c. The later of the date the member attains age 65 or the date the disability allowance has been paid for the minimum duration in accordance with the following schedule:

Age at Disability	Minimum Duration In Months
60 and earlier	60
61	60
62	48
63	48
64	36
65	36
66	24
67	24
68	24
69 and older	12

Death Benefits Prior to Retirement

Death While Eligible to Retire

If a member dies in service after becoming eligible to retire with a service allowance and leaves a surviving spouse or other sole dependent beneficiary, the survivor may elect to receive the same amount that would have been paid had the member retired the last day of the month of death and elected the 100% joint and survivor form of payment.

Survivor (Death-in-Service) Allowances

Condition for Benefit

Upon the death of a member with at least 1.5 years of Ohio service credit and with at least 0.25 year of Ohio contributing service credit within 2.5 years prior to the date of death, the survivor allowances are payable as follows:

1. Qualified Spouse: A monthly allowance commencing at age 62, except that the benefit is payable immediately if: (1) the qualified deceased member had 10 or more years of Ohio service credit; or (2) is caring for a surviving child, or (3) is incompetent.
2. Qualified Child: For allowances that commenced before January 7, 2013, an allowance is payable to a deceased member's qualified child who is under age 18 and never

been married, under age 22 and in school, or adjudged incompetent prior to the member's death and the child attaining age 18 or age 22 if attending school. For allowances that commence on or after January 7, 2013, an allowance is payable to a deceased member's qualified child who is under age 19 and never been married or adjudged incompetent prior to the member's death and the child attaining age 19.

3. Qualified Parent's Allowance: A monthly allowance is payable to a dependent parent age 65 or more.

Amount of Allowances

Except when survived by a qualified child(ren), upon the death of a member prior to retirement, the accumulated contributions of the member without interest is payable. Alternatively, the beneficiary may elect the following amounts, payable monthly while eligible:

Number of Qualified Survivors	**Annual Benefit as Percent of Member's FAS**	**Minimum Monthly Allowance**
1	25%	$96
2	40	186
3	50	236
4	55	236
5 or more	60	236

If the deceased member had attained at least 20 years of service, the total benefits payable to all qualified survivors are not less than:

Years of Service	**Annual Benefit as Percent of Member's FAS**
20	29%
21	33
22	37
23	41
24	45
25	48
26	51
27	54
28	57
29 or more	60

Termination Benefits

Refund of Members' Accumulated Contributions

In the event a member leaves service before any monthly benefits are payable on his/her behalf, the member's accumulated contributions, without interest, may be refunded.

Deferred Benefits

Members who retire prior to August 1, 2017 must have at least 5 years of service credit and those members who retire on and after August 1, 2017 must have at least 10 years of service credit and are eligible to draw the benefit the first of the month following their 62nd birthday.

Normal Form of Benefit	Single Life Annuity
Optional Forms of Benefit	A member upon retirement may elect to receive an allowance in one of the following forms that are computed to be actuarially equivalent to the applicable retirement allowance: Upon the death of a retiree, 50%, 100%, or some other percentage of his/her reduced retirement allowance shall be continued throughout the life of, and paid to, a designated beneficiary. A reduced retirement allowance shall be continued throughout the life of the pensioner, but with further payment to the pensioner, his/her beneficiary or estate for a specified number of years certain. A member can select a partial lump-sum option at retirement. Under this option, the partial lump- sum shall not be less than 6 times and not more than 36 times the unreduced monthly benefit, and the monthly benefit will be actuarially reduced. In addition, the monthly benefit payable cannot be less than 50% of the unreduced amount.
Post-Retirement Death Benefit	Regardless of the form of benefit selected, a lump sum benefit of $1,000 is paid at the death of the retiree.
Post-Retirement Increases	**Pre 1/1/2018:** On each anniversary of the initial date of retirement, the allowances of all retirees and survivors are increased by 3% of the base benefit. **On and after 1/1/2018:** On each anniversary of the initial retirement, the allowance of all retirees and survivors are increased by the annual rate of increase in the CPI-W measured as of the June preceding the beginning of the applicable calendar year. The annual rate of increase shall not be less than 0% nor greater than 2.5%. COLA's shall be suspended for calendar years 2018, 2019, and 2020. **On and after 4/1/2018:** COLA's for future retirees will be delayed for three years following commencement.
Medicare Part B	Each recipient of a service retirement benefit, a disability benefit, or a survivor benefit who was credited with at least 10 years of service and has paid Medicare Part B premiums and has chosen the health care option, is reimbursed $45.50 per month for premiums. The reimbursement will continue to the spouse upon the death of the retiree in cases where the retiree elected a Joint and Survivor payment form.

Reemployed Retirants

Eligibility Effective	July 1, 1991, service retirees of SERS, or service or disability retirees of one of the other four Ohio retirement systems who are employed in a SERS-covered position are required to contribute to a money purchase annuity, a type of defined contribution plan.
Amount of Allowance	Upon termination of employment, a reemployed retirant who has attained age 65 is eligible to receive an annuity based on the amount of his/her accumulated contributions, and an equal amount of employer contributions, plus interest to the effective date of retirement. Effective July 1, 2006 the amount of employer contributions will be determined by the Board. Interest is granted on the reemployed retirant's prior fiscal year account balance, calculated using a rate determined by the SERS Board, compounded annually. The benefit is payable as a lump sum or as an annuity if the amount of such annuity is at least $25. Upon termination of employment, a reemployed retirant who has not attained age 65 may request a lump sum refund of his/her own contributions; there is no payment of employer contributions or interest.
Benefits Payable Upon Death	If a reemployed retirant dies while employed, a lump sum payment of the monthly annuity, discounted to the present value using the current actuarial assumption rate of interest, will be paid to his/her beneficiary. If a reemployed retirant dies while receiving a monthly annuity, a lump sum payment will be made to a beneficiary in an amount equal to the excess, if any, of the lump sum payment the reemployed retirant would have received at the effective date of retirement over the sum of the annuity payments received by the reemployed retirant to the date of death.
Member Contributions	Each reemployed retirant is required to contribute 10% of his/her pay by payroll deductions.
Employer Contributions	Employer contributions are expressed as percents of member covered payroll. Employers are required to contribute 14% of payroll.
Other Benefits	Reemployed retirants of SERS are not eligible to receive any of the other benefits provided to SERS members.

Member Contributions 10% of salary.

SCHEDULE E

DETAILED TABULATIONS OF THE DATA

Schedule of Retiree Members Added to and Removed From Rolls
Last Six Fiscal Years

Year Ending June 30:	2014	2015	2016	2017	2018	2019
Number of Retiree Members						
Beginning of Year	70,771	72,605	74,372	76,280	79,157	81,332
Added	4,144	4,909	4,388	5,499	5,339	3,055
Removed	2,310	3,142	2,480	2,622	3,164	3,363
End of Year	72,605	74,372	76,280	79,157	81,332	81,024
Annual Retirement Allowances						
Beginning of Year	$ 898,267,601	$ 958,537,700	$ 1,020,368,894	$ 1,083,621,579	$ 1,162,015,515	$ 1,211,935,636
Added	61,331,002	70,608,680	66,860,652	70,973,748	74,311,354	56,557,169
Removed	1,060,903	8,777,486	3,607,967	(7,420,188)	24,391,233	49,537,299
End of Year	$ 958,537,700	$ 1,020,368,894	$ 1,083,621,579	$ 1,162,015,515	$ 1,211,935,636	$ 1,218,955,506
% Increase in Allowances	6.71%	6.45%	6.20%	7.23%	4.30%	0.58%
Average Annual Allowance	$ 13,202	$ 13,720	$ 14,206	$ 14,680	$ 14,901	$ 15,044

Schedule of Retiree Members Receiving a Medicare Part B Reimbursement
Added to and Removed From Rolls
Last Three Fiscal Years

Year Ending June 30:	2017	2018	2019
Number of Retiree Members			
Beginning of Year	46,166	44,741	43,645
Added	1,853	1,752	2,222
Removed	3,278	2,848	2,333
End of Year	44,741	43,645	43,534
Annual Retirement Allowances			
Beginning of Year	$ 25,206,636	$ 24,428,586	$ 23,830,170
Added	1,011,738	956,592	1,213,212
Removed	1,789,788	1,555,008	1,273,818
End of Year	$ 24,428,586	$ 23,830,170	$ 23,769,564
% Increase in Allowances	(3.09)%	(2.45)%	(0.25)%
Average Annual Allowance	$ 546	$ 546	$ 546

Annuity and Pension Reserve Fund
Retiree Information as of June 30, 2019
Tabulated by Type of Benefit

Amount of Monthly Benefit	Total	Service	Disability	Survivor
$ 1 - $ 250	10,379	9,585	37	757
251 - 500	11,492	10,005	341	1,146
501 - 750	10,973	9,521	631	821
751 - 1,000	9,700	8,251	857	592
1,001 - 1,500	14,319	12,401	1,377	541
1,501 - 2,000	8,725	7,661	855	209
Over 2,000	15,436	14,032	1,163	241
	81,024	71,456	5,261	4,307
Average Monthly Benefit		$ 1,264	$ 1,475	$ 762
Average Age		74.7	66.0	72.6

The 71,456 service retirees shown in the table above are comprised of 66,073 service retirees and 5,383 beneficiaries of deceased retirees. Excluded from the 66,073 service retirees are 694 reemployed retirees who are receiving a pension-only benefit resulting from the annuitization of the contributions accumulated during active membership. Multiple benefit recipients account for the higher total headcount than shown elsewhere in the report.

Annuity and Pension Reserve Fund
Retiree Information as of June 30, 2019
Tabulated by Attained Ages

	Retirement		Disability Retirement		Total	
Attained Age	Number	Annual Benefits	Number	Annual Benefits	Number	Annual Benefits
Under 45	34	$ 246,753	60	$ 818,052	94	$ 1,064,806
45-49	48	$ 722,980	145	$ 2,243,920	193	$ 2,966,900
50-54	295	$ 9,354,417	352	$ 6,046,042	647	$ 15,400,459
55-59	1,640	$ 53,281,181	862	$ 16,735,465	2,502	$ 70,016,646
60-64	7,984	$ 150,570,798	1394	$ 26,765,329	9,378	$ 177,336,127
65-69	14,762	$ 238,149,684	810	$ 16,950,379	15,572	$ 255,100,063
70-74	14,358	$ 225,273,363	630	$ 11,127,641	14,988	$ 236,401,004
75-79	11,936	$ 171,443,859	472	$ 7,096,374	12,408	$ 178,540,232
80-84	9,679	$ 126,436,787	307	$ 3,460,855	9,986	$ 129,897,642
85-89	6,310	$ 70,551,663	159	$ 1,403,107	6,469	$ 71,954,770
90 & Over	4,410	$ 37,824,767	70	$ 456,221	4,480	$ 38,280,987
Totals	71,456	$ 1,083,856,252	5,261	$ 93,103,385	76,717	$ 1,176,959,637

The 71,456 service retirees shown in the table above are comprised of 70,762 unique service retirees, and 694 unique reemployed retirees. The reemployed retirees included in the tabulation above are those who are receiving a pension-only benefit resulting from the annuitization of the contributions accumulated during active membership.

Annuity and Pension Reserve Fund
Survivors of Annuitants Information as of June 30, 2019
Tabulated by Attained Ages

	Life Annuities			Periods Certain			Total		
Attained Age	Number		Annual Benefits	Number		Annual Benefits	Number		Annual Benefits
Under 45	34	$	246,753	0	$	-	34	$	246,753
45-49	34	$	187,518	0	$	-	34	$	187,518
50-54	38	$	295,060	0	$	-	38	$	295,060
55-59	91	$	889,686	0	$	-	91	$	889,686
60-64	218	$	2,862,583	1	$	8,927	219	$	2,871,510
65-69	392	$	5,402,878	4	$	60,314	396	$	5,463,192
70-74	619	$	7,539,570	7	$	108,913	626	$	7,648,483
75-79	906	$	8,952,170	5	$	59,532	911	$	9,011,702
80-84	1,130	$	10,236,007	4	$	65,258	1,134	$	10,301,265
85-89	1,024	$	8,552,167	0	$	-	1,024	$	8,552,167
90 & Over	876	$	6,085,481	0	$	-	876	$	6,085,481
Totals	5,362	$	51,249,873	21	$	302,944	5,383	$	51,552,817

All Benefit Recipients
Male and Female Demographic Breakdown
June 30, 2019

Attained Age	Number of Males	Number of Females	Total Number
Under 20	20	27	47
20-24	4	4	8
25-29	3	3	6
30-34	6	10	16
35-39	11	21	32
40-44	25	51	76
45-49	81	157	238
50-54	311	464	775
55-59	1,134	1,612	2,746
60-64	2,772	7,109	9,881
65-69	4,346	11,892	16,238
70-74	4,250	11,481	15,731
75-79	3,430	9,625	13,055
80-84	2,645	7,910	10,555
85-89	1,588	5,263	6,851
90-94	687	2,882	3,569
95-99	164	886	1,050
100	1	60	61
101	4	31	35
102	4	24	28
103	3	9	12
104	0	6	6
105 & Over	0	8	8
Total	**21,489**	**59,535**	**81,024**

Survivor Benefit Fund
Survivors of Deceased Active Members Information as of June 30, 2019
Tabulated by Attained Ages

Attained Age	Number	Annual Benefits
Under 45	91	$ 1,006,684
45-49	45	$ 621,729
50-54	128	$ 1,543,102
55-59	244	$ 2,896,110
60-64	503	$ 5,552,141
65-69	666	$ 6,236,434
70-74	743	$ 7,335,790
75-79	647	$ 5,380,197
80-84	569	$ 4,659,770
85-89	382	$ 2,609,858
90 & Over	289	$ 1,520,627
Totals	4,307	$ 39,362,442

Total Active Members as of June 30, 2019
Tabulated by Attained Ages and Years of Service

Attained Age	Years of Service to Valuation Date							Totals
	0-4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	
Under 20	3,125							3,125
Avg Pay	$8,431							$8,431
20-24	10,033	87						10,120
Avg Pay	$9,761	$26,126						$9,902
25-29	10,041	855	34					10,930
Avg Pay	$13,925	$29,590	$39,885					$15,231
30-34	8,819	1,705	411	39				10,974
Avg Pay	$15,410	$32,051	$39,112	$43,726				$18,984
35-39	10,180	2,403	946	390	54			13,973
Avg Pay	$15,465	$29,911	$40,612	$46,948	$48,885			$20,660
40-44	10,692	3,085	1,369	814	331	29		16,320
Avg Pay	$14,351	$27,395	$35,544	$45,518	$48,875	$53,204		$20,918
44-49	10,608	3,880	2,374	1,721	873	250	26	19,732
Avg Pay	$13,754	$26,184	$32,254	$38,943	$47,686	$53,649	$48,696	$22,674
50-54	8,604	3,672	3,238	2,969	1,814	653	248	21,198
Avg Pay	$14,222	$26,550	$29,242	$34,372	$40,210	$51,441	$52,282	$25,290
55-59	6,989	3,102	3,184	4,112	3,590	1,448	671	23,096
Avg Pay	$13,808	$25,576	$29,099	$32,244	$35,592	$41,629	$49,274	$26,940
60-64	5,278	2,273	2,010	2,652	2,897	1,811	999	17,920
Avg Pay	$12,796	$24,490	$30,151	$32,461	$33,853	$37,611	$43,129	$26,739
65-69	3,053	965	694	730	814	685	759	7,700
Avg Pay	$9,288	$21,408	$27,794	$32,495	$34,242	$35,211	$39,056	$22,554
70 & over	2,004	575	408	319	241	203	525	4,275
Avg Pay	$7,796	$15,509	$21,617	$24,718	$30,806	$32,509	$32,973	$16,978
Totals	89,426	22,602	14,668	13,746	10,614	5,079	3,228	159,363
Avg Pay	$13,275	$26,647	$31,165	$34,659	$37,171	$40,886	$42,545	$21,727

Averages:

Age:	47.1
Service:	7.5
Annual Pay:	$21,727

Male Active Members as of June 30, 2019
Tabulated by Attained Ages and Years of Service

Attained Age	Years of Service to Valuation Date							Totals
	0-4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	
Under 20	1,775							1,775
Avg Pay	$8,783							$8,783
20-24	4,513	54						4,567
Avg Pay	$9,914	$29,897						$10,150
25-29	4,092	400	22					4,514
Avg Pay	$14,042	$34,223	$44,277					$15,978
30-34	3,067	699	212	31				4,009
Avg Pay	$16,546	$38,202	$43,656	$46,770				$21,989
35-39	2,955	781	408	214	25			4,383
Avg Pay	$17,264	$37,389	$49,458	$55,006	$61,431			$25,942
40-44	3,269	742	375	284	162	19		4,851
Avg Pay	$14,653	$35,802	$48,387	$58,421	$57,993	$54,293		$24,661
44-49	3,520	883	486	395	302	122	9	5,717
Avg Pay	$13,404	$33,797	$46,615	$54,938	$60,780	$60,031	$53,465	$25,807
50-54	3,109	863	564	466	398	253	111	5,764
Avg Pay	$14,526	$33,317	$42,520	$51,335	$57,450	$65,017	$55,981	$29,033
55-59	2,643	905	673	603	473	261	260	5,818
Avg Pay	$14,827	$32,117	$39,479	$47,141	$54,485	$57,657	$57,175	$30,755
60-64	2,153	904	597	540	375	248	282	5,099
Avg Pay	$14,152	$27,792	$38,087	$44,632	$49,350	$53,424	$55,593	$29,391
65-69	1,297	485	278	196	136	96	130	2,618
Avg Pay	$11,061	$23,611	$33,104	$40,658	$46,455	$49,466	$54,252	$23,334
70 & over	918	316	215	130	63	31	49	1,722
Avg Pay	$9,038	$18,175	$25,764	$28,080	$40,102	$40,623	$45,097	$16,972
Totals	33,311	7,032	3,830	2,859	1,934	1,030	841	50,837
Avg Pay	$13,572	$32,388	$41,577	$48,822	$54,433	$57,389	$55,292	$23,399

Averages:

Age:	45.1
Service:	5.7
Annual Pay:	$23,399

Female Active Members as of June 30, 2019
Tabulated by Attained Ages and Years of Service

Attained Age	Years of Service to Valuation Date							Totals
	0-4	5 - 19	20 - 24	25 - 219	30 - 24	25 - 219	30+	
Under 20	1,350							1,350
Avg Pay	$7,967							$7,967
20-24	5,520	33						5,553
Avg Pay	$9,636	$19,955						$9,698
25-29	5,949	455	12					6,416
Avg Pay	$13,844	$25,517	$31,834					$14,706
30-34	5,752	1,006	199	8				6,965
Avg Pay	$14,804	$27,778	$34,271	$31,928				$17,254
35-39	7,225	1,622	538	176	29			9,590
Avg Pay	$14,729	$26,311	$33,903	$37,150	$38,070			$18,246
40-44	7,423	2,343	994	530	169	10		11,469
Avg Pay	$14,218	$24,733	$30,699	$38,604	$40,134	$51,133		$19,335
44-49	7,088	2,997	1,888	1,326	571	128	17	14,015
Avg Pay	$13,928	$23,941	$28,557	$34,178	$40,761	$47,566	$46,172	$21,396
50-54	5,495	2,809	2,674	2,503	1,416	400	137	15,434
Avg Pay	$14,050	$24,471	$26,441	$31,214	$35,365	$42,854	$49,284	$23,892
55-59	4,346	2,197	2,511	3,509	3,117	1,187	411	17,278
Avg Pay	$13,189	$22,882	$26,317	$29,685	$32,726	$38,105	$44,276	$25,655
60-64	3,125	1,369	1,413	2,112	2,522	1,563	717	12,821
Avg Pay	$11,862	$22,309	$26,798	$29,350	$31,549	$35,102	$38,227	$25,685
65-69	1,756	480	416	534	678	589	629	5,082
Avg Pay	$7,979	$19,181	$24,246	$29,499	$31,793	$32,888	$35,915	$22,152
70 & over	1,086	259	193	189	178	172	476	2,553
Avg Pay	$6,746	$12,256	$16,997	$22,405	$27,516	$31,046	$31,724	$16,982
Totals	56,115	15,570	10,838	10,887	8,680	4,049	2,387	108,526
Avg Pay	$13,099	$24,054	$27,486	$30,939	$33,325	$36,687	$38,054	$20,944

Averages:

Age:	48.0
Service:	8.3
Annual Pay:	$20,944

Active Members as of June 30, 2019
Tabulated by Annual Pay

Annual Pay	Number of Active Members			Portion of Total Number	
	Men	Women	Totals	Group	Cumulative
Less than $1,000	2,236	4,021	6,257	3.9%	3.9%
$1,000 - 1,999	2,845	3,713	6,558	4.1%	8.0%
2,000 - 2,999	3,617	3,710	7,327	4.6%	12.6%
3,000 - 3,999	3,495	3,306	6,801	4.3%	16.9%
4,000 - 4,999	2,555	2,948	5,503	3.5%	20.4%
5,000 - 5,999	1,963	2,789	4,752	3.0%	23.3%
6,000 - 6,999	1,505	2,843	4,348	2.7%	26.1%
7,000 - 7,999	1,235	2,593	3,828	2.4%	28.5%
8,000 - 8,999	1,085	2,538	3,623	2.3%	30.7%
9,000 - 9,999	872	2,698	3,570	2.2%	33.0%
10,000 - 11,999	1,731	5,612	7,343	4.6%	37.6%
12,000 - 13,999	1,615	5,518	7,133	4.5%	42.1%
14,000 - 15,999	1,569	5,478	7,047	4.4%	46.5%
16,000 - 17,999	1,430	6,018	7,448	4.7%	51.2%
18,000 - 19,999	1,246	6,205	7,451	4.7%	55.8%
20,000 - 24,999	3,085	14,454	17,539	11.0%	66.8%
25,000 - 29,999	2,416	9,665	12,081	7.6%	74.4%
30,000 - 35,999	2,889	7,728	10,617	6.7%	81.1%
36,000 and over	13,448	16,689	30,137	18.9%	100.0%
Totals	**50,837**	**108,526**	**159,363**		

SCHEDULE F

GAIN/LOSS ANALYSIS DETAILS

COMMENTS

Regular actuarial valuations measure the Retirement System's present financial position and contributions adequacy by calculating and financing the liabilities created by the present benefit program. This process involves discounting to present values the future benefit payments on behalf of present active and Retiree members and their survivors. However, valuations do not produce information regarding the amount of increases or decreases in unfunded actuarial accrued liabilities (UAAL) -- gain/loss analyses do.

The overall gain/loss to the Retirement System is the difference between the actual UAAL and the expected UAAL. A gain/loss analysis shows the breakdown of the overall system gain/loss by economic and non-economic risk areas. The economic risk areas are investment return and pay increases. The non-economic risk areas are service retirement, disability retirement, death in active service, termination (vested and non-vested), retiree mortality, and new members. Gains and losses resulting from data adjustments, timing of financial transactions, etc. are included separately as a miscellaneous item.

It is expected that actual experience will not coincide with assumed experience. It is assumed that gains and losses will be in balance over a period of years, but sizable year-to-year fluctuations are common. Changes in actuarial assumptions should be made for risk areas when the differences between actual and expected experience are consistently sizable over a period of years. Differences over a relatively short period of time may or may not be indicative of long-term trends, which are the basis of actuarial assumptions.

The actuarial assumptions used in this analysis were adopted by the Board in April 21, 2016.

School Employees Retirement System of Ohio
Experience Gains and Losses By Risk Area
Comparative Schedule
($ Millions)

	Gain (Loss) by Risk Area										
	Economic		Non-Economic								
Year Ending June 30	Pay Increases	Investment	Age & Service Retirement	Disability	Death In Service	Withdrawal	New Members	Retiree Mortality	Other +	$	% of AAL
2010	182.5	390.5	(40.6)	(23.4)	(0.5)	11.0	(38.1)	46.5	(29.6)	498.3	3.4
2011	198.4	(1,082.9)	(59.2)	(28.1)	(0.7)	15.4	(36.4)	(1.0)	(10.0)	(1,004.5)	(6.2)
2012	178.7	(692.0)	(154.8)	(47.7)	(0.2)	46.5	(29.8)	51.9	(6.2)	(653.6)	(3.9)
2013	219.2	241.0	(121.9)	(53.6)	0.0	61.1	(35.1)	2.9	1.9	315.5	1.8
2014	103.4	403.3	(122.6)	(56.0)	0.1	48.3	(28.2)	3.1	(2.1)	349.3	2.0
2015	53.3	62.1	(123.0)	(53.1)	0.0	65.1	(47.7)	55.8	(0.2)	12.3	0.1
2016	70.0	50.6	(140.9)	(50.6)	(28.5)	30.4	(44.0)	113.9	(0.6)	0.3	0.0
2017	(69.2)	(12.0)	(211.8)	(37.7)	(0.6)	21.9	(48.1)	97.3	(26.8)	(287.0)	(1.5)
2018	85.2	(161.1)	(209.7)	(14.7)	(6.6)	(124.5)	(35.7)	15.0	4.7	(447.4)	(2.2)
2019	20.3	(44.1)	7.8	(9.5)	(4.0)	(106.3)	(22.4)	(24.9)	78.4	(104.7)	(0.5)

+ Includes effect of changes in data, timing of financial transactions, etc.

The market related actuarial value of assets is based on a four-year average of adjusted market value returns. The difference between the actual returns at market value for the year and expected returns is determined. Twenty-five percent (25%) of that difference is added to the expected value along with corresponding amounts from each of the prior three years.

The actuarial value of assets for the basic benefits as of June 30, 2019, was $14,473,089,414. The value for the previous year was $14,012,179,131.

School Employees Retirement System of Ohio
Development of Gain (Loss) for Basic Benefits
From Investment Return
For the Year Ended June 30, 2019
($ Millions)

			$ Millions
1.	Actuarial value of assets as of June 30, 2018		$ 14,012.2
2.	Actuarial value of assets as of June 30, 2019		
	a.	Actual	14,473.1
	b.	If 7.50% assumed investment return were achieved for all phased-in years recognized in the asset method	14,517.2
3.	Gain (Loss): 2a minus 2b		$ (44.1)

Pay Increases During the FY2019 Valuation Year
To Members Active at Beginning and End of Year

Central Age Group Beginning of Year	Number	Pay Increases Actual	Pay Increases Expected
Under 25	6,031	(21.04)%	16.01%
25	7,240	(1.45)	11.71
30	7,687	2.77	9.11
35	10,386	4.57	7.99
40	12,950	4.14	7.21
45	16,651	3.91	6.27
50	18,589	3.51	5.42
55	21,120	3.07	4.76
60	17,452	2.76	4.6
65 & Over	11,876	2.08	4.92
Total	129,982	2.67	6.22

Members Who Became Age & Service Retirees During the FY2019 Valuation Year
(Retirement With Allowance Beginning Immediately)

	Years of Service to Valuation Date							
Attained Age	0-4	5-9	10-14	15-19	20-24	25-29	30 plus	Total
Under 50	0	13	11	13	4	2	15	58
50	0	4	0	1	1	0	6	12
51	0	0	2	2	0	0	11	15
52	0	4	3	2	2	0	11	22
53	0	1	4	5	3	0	22	35
54	0	2	3	3	4	0	14	26
55	0	2	2	3	1	16	30	54
56	0	4	2	2	5	8	25	46
57	0	4	3	6	3	9	28	53
58	0	1	5	4	3	14	32	59
59	0	2	7	1	12	12	39	73
60	0	1	3	9	11	49	61	134
61	0	0	3	6	3	38	53	103
62	0	0	24	24	11	25	53	137
63	0	1	9	14	9	22	57	112
64	0	0	14	14	7	21	52	108
65	0	1	26	38	36	60	99	260
66	0	0	29	33	17	33	46	158
67	0	0	22	19	28	16	35	120
68	0	0	22	6	19	26	23	96
69	0	0	15	18	4	10	26	73
70 & Over	0	0	68	46	33	56	107	310
Totals	**0**	**40**	**277**	**269**	**216**	**417**	**845**	**2,064**

	Years of Service to Valuation Date							
	0-4	5-9	10-14	15-19	20-24	25-29	30 plus	Total
Avg. Monthly Benefit	$ 0	$ 993	$ 636	$ 886	$ 1,166	$ 1,521	$ 2,550	$ 1,694
Avg. FAS	$ 0	$ 26,486	$ 29,020	$ 31,114	$ 32,528	$ 35,122	$ 45,181	$ 37,460
Number of Retirees	0	40	277	269	216	417	845	2,064

Average Age: 63.5
Average Service: 25.3

Members Who Died in the FY2019 Valuation Year
With a Death-in-Service Allowance Payable

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	1
35	2
40	2
45	3
50	7
55	11
60	12
65	9
70 & Over	10
Total	57

Average Age:	57.8
Average Service:	16.8

Members Who Died in the FY2019 Valuation Year and Received a Refund of Contributions

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	1
35	2
40	2
45	1
50	2
55	1
60	4
65	0
70 & Over	4
Total	17

Average Age: 54.1
Average Service: 5.8

Members Who Became Disability Retirees
During the FY2019 Valuation Year

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	1
35	2
40	7
45	17
50	40
55	73
60	78
65	17
70 & Over	0
Total	235

Average Age:	55.1
Average Service:	16.8
Average FAS:	$32,962

Members Receiving a Refund of Contributions or Becoming Inactive Without a Refund in the FY2019 Valuation Year (Non-vested Terminations)

Central Age Group Beginning of Year	Number
Under 25	3,033
25	3,750
30	2,379
35	2,028
40	2,044
45	2,051
50	1,958
55	1,517
60	1,117
65	609
70 & Over	371
Total	20,857

Average Age:	37.6
Average Service:	1.1

Members Who Became Inactive in the FY2019 Valuation Year with a Deferred Allowance (Vested Terminations)

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	4
35	26
40	53
45	90
50	150
55	205
60	197
65	22
70 & Over	12
Total	759

Average Age: 52.7
Average Service: 15.2

SCHEDULE G

GLOSSARY

Actuarial Accrued Liability. The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability".

Accrued Service. The service credited under the plan which was rendered before the date of the actuarial valuation.

Actuarial Assumptions. Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method".

Actuarial Equivalent. A series of payments is called an actuarial equivalent of another series of payments if the two series have the same actuarial present value.

Actuarial Present Value. The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Amortization. Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

Experience Gain (Loss). A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

Normal Cost. The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost". Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.

Plan Termination Liability. The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for future service and salary. The termination liability will generally be less than the liabilities computed on a "going concern" basis and is not normally determined in a routine actuarial valuation.

Reserve Account. An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

Unfunded Actuarial Accrued Liability. The difference between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability".

Valuation Assets. The value of current plan assets recognized for valuation purposes. Generally based on book value plus a portion of unrealized appreciation or depreciation.

APPENDIX A

ACTUARIAL ACCRUED LIABILITIES
AS OF JUNE 30, 2019

Present Value of:	Pension Benefits	Medicare Part B	Post-Retirement Death Benefit	Total Basic Benefits
Future benefits to present retirees and survivors	$12,053,886,231	$227,492,251	$30,439,827	$12,311,818,309
Benefits and refunds to present inactive members	612,246,591	16,539,111	916,395	629,702,097
Allowances to present active members				
Service	7,088,787,739	138,539,049	7,360,817	7,234,687,605
Disability	237,436,261	3,803,512	441,893	241,681,666
Survivor benefits	128,306,072	2,224,598	0	130,530,670
Withdrawal	(30,410,837)	8,856,392	385,546	(21,168,899)
Total Active AAL	7,424,119,235	153,423,551	8,188,256	7,585,731,042
Total AAL	$20,090,252,057	$397,454,913	$39,544,478	$20,527,251,448

APPENDIX B

BREAKDOWN OF TOTAL AND ACCRUED LIABILITIES AS OF JUNE 30, 2019

	Total Liability	Accrued Liability
Active Members		
Retirement	$8,689,859,490	$7,088,787,739
Death	183,157,796	128,306,072
Disability	416,820,377	237,436,261
Termination	692,986,693	(30,410,837)
Medicare Part B	206,538,521	153,423,551
Death after Retirement	11,307,527	8,188,256
Total	$10,200,670,404	$7,585,731,042
Retirees		
Retirement/Survivor/Disability	$12,053,886,231	$12,053,886,231
Medicare Part B	227,492,251	227,492,251
Death after Retirement	30,439,827	30,439,827
Total	$12,311,818,309	$12,311,818,309
Deferred Vested Members	317,102,505	317,102,505
Inactive Members	312,599,592	312,599,592
Total Actuarial Values	$23,142,190,810	$20,527,251,448
Actuarial Value of Assets		14,473,089,414
Unfunded Actuarial Accrued Liability		$6,054,162,034

APPENDIX C

COMPARATIVE SCHEDULE
AS OF JUNE 30, 2019

Valuation Date June 30	Active Members				Retired Lives: Number		Retired Lives: Annual Benefits		Accrued Liability	Valuation Assets	UAAL
	Number	Payroll $ Millions	Average Salary $	Average Salary % Increase	Retired	Active / Retired	$ Millions	% of Payroll	$ Millions	$ Millions	$ Millions
2010	126,015	2,843	22,558	1.5	66,127	1.9	729.9	25.7	15,222	10,909	4,312
2011	125,337	2,852	22,758	0.9	67,221	1.9	777.9	27.3	16,325	10,513	5,812
2012	121,811	2,788	22,889	0.6	69,038	1.8	838.1	30.1	16,755	10,397	6,358
2013	121,642	2,747	22,581	(1.3)	70,771	1.7	898.3	32.7	17,247	11,126	6,121
2014	121,251	2,759	22,757	0.8	72,605	1.7	958.5	34.7	17,882	12,030	5,851
2015	122,855	2,845	23,161	1.8	74,372	1.7	1,020.4	35.9	18,503	12,602	5,902
2016	124,540	2,932	23,545	1.7	76,280	1.6	1,083.6	37.0	19,771	13,180	6,591
2017	157,981	3,303	20,906	(11.2)	79,157	2.0	1,162.0	35.2	19,588	13,713	5,875
2018	158,343	3,332	21,045	0.7	81,332	1.9	1,211.9	36.4	19,998	14,012	5,986
2019	159,363	3,463	21,727	3.2	81,024	2.0	1,219.0	35.2	20,527	14,473	6,054