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

Prepared as of June 30, 2018





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

November 7, 2018

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, 2018. 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, 2018.

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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Principal and Consulting Actuary

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TBG/JJG:bvb



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

PREPARED AS OF JUNE 30, 2018

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, 2018 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, 2018. 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 \$5,895.6 million as of June 30, 2018, taking into account contributions from the employers and members of \$759.9 million. The actual UAAL is \$5,985.5 million. The net increase of \$89.9 million is attributable to liability and investment gains and losses which are detailed in Section V. These losses were offset by the enactment of SB 8. The remaining amortization period of the UAAL is 26 years as of June 30, 2018.

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, 2018 actuarial valuation is shown below. Further detail on the valuation results can be found in the following sections of this Executive Summary.

	June 30, 2018 Valuation Results	June 30, 2017 Valuation Results
Actuarially Determined Contribution Rate	10.71%	10.84%
Employer Contribution Rate	13.50%	13.50%
Sufficiency/(Deficiency)	2.79%	2.66%
Remaining Amortization Period	26	27
Unfunded Actuarial Accrued Liability (\$M)	\$5,985.5	\$5,875.3
Basic Benefit Funded Ratio (Actuarial Assets)	70.07%	70.01%

The funded ratio of the basic benefits is 70.07%. Since this is greater than 70%, per the Board-adopted funding policy, the basic benefits may receive an employer contribution of 13.50% of compensation for FY2019. The Health Care Fund may receive an employer contribution of 0.50%. The valuation assumes an allocation of 13.50% to the basic benefits and 0.50% 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, 2017 and June 30, 2018. The components are examined in the following discussion.

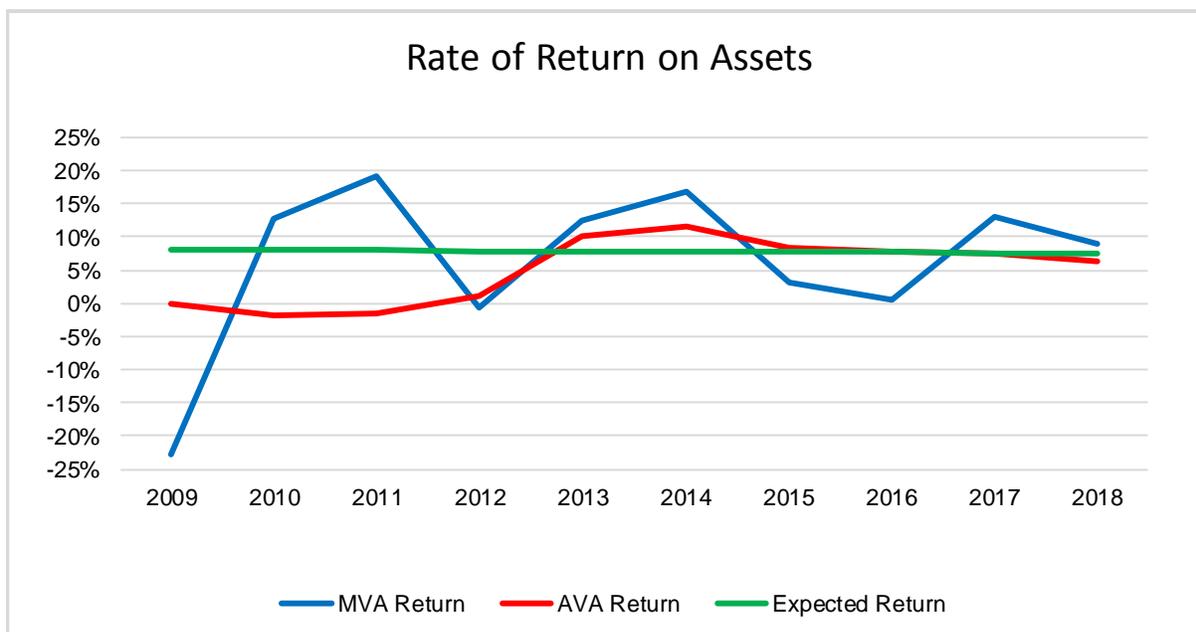
ASSETS

As of June 30, 2018, SERS' basic benefits had net assets of \$14,270,515,748, when measured on a market value basis. This was an increase of \$656,877,158 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, 2018 was \$14,012,179,131, an increase of \$299,091,298 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, 2017	\$ 13,713,087,833	\$ 13,613,638,590
- Employer and Member Contributions	+ 759,945,694	+ 759,945,694
- Benefit Payments	- 1,307,672,592	- 1,307,672,592
- Investment Income	+ 846,818,196	+ 1,204,604,056
Net Assets, June 30, 2018	14,012,179,131	14,270,515,748



The estimated investment return on the market value of assets for FY2018 was 8.96%. Due to the recognition of deferred investment losses from prior years, the resulting return on the smoothed actuarial value of assets was 6.31%. As this rate of return was less than the assumed rate of 7.50%, there was an actuarial investment experience loss of \$161.1 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 \$258 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, 2018 in the following table:

	Actuarial Value of Assets	Market Value of Assets
Actuarial Accrued Liability	\$19,997,700,966	\$19,997,700,966
Value of Assets	\$14,012,179,131	\$14,270,515,748
Unfunded Actuarial Accrued Liability*	\$5,985,521,835	\$5,727,185,218
Funded Ratio	70.07%	71.36%

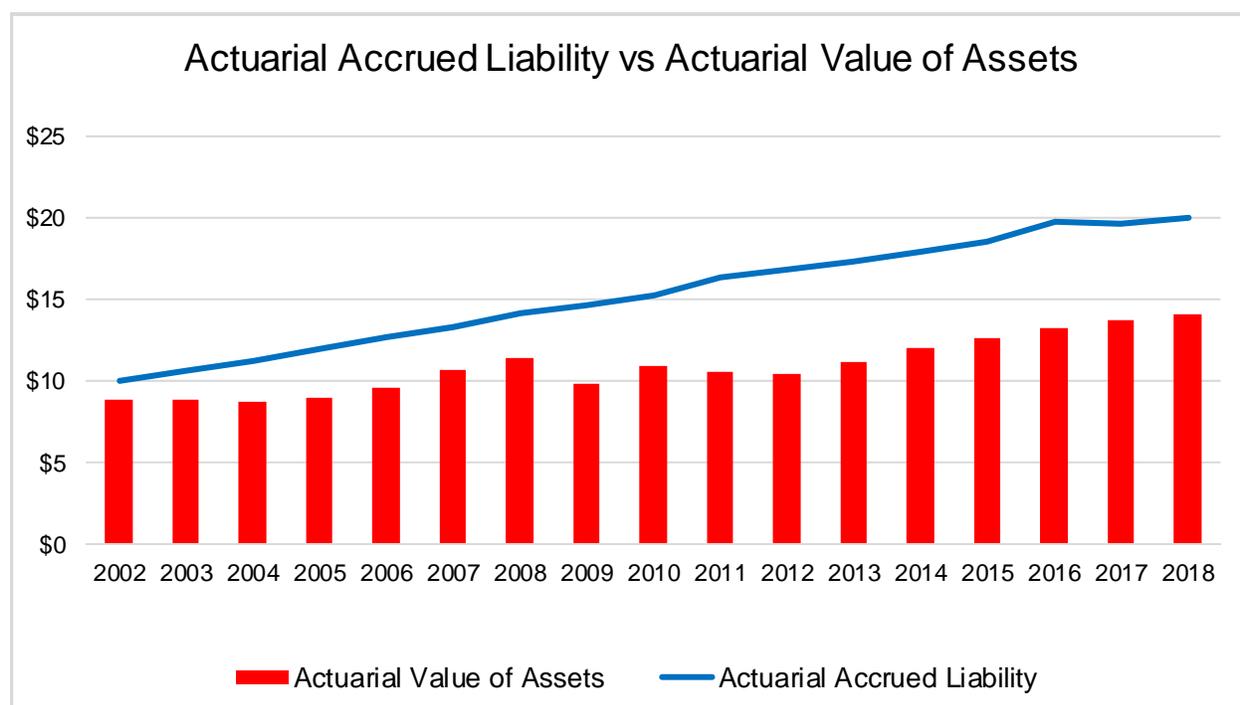
* See Appendix B of the report for the detailed development of the unfunded actuarial accrued liability.



Changes in the UAAL occur for various reasons. The net increase in the UAAL from June 30, 2017 to June 30, 2018 was \$110,191,981. The components of this net change are shown in the table below:

Unfunded Actuarial Accrued Liability, June 30, 2017		\$5,875.3
(\$ Millions)		
Expected increase due to amortization method	\$20.4	
Investment experience	\$161.1	
Liability experience	\$286.3	
Benefit Changes	(\$357.6)	
Total		\$110.2
Unfunded Actuarial Accrued Liability, June 30, 2018		\$5,985.5

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 \$110.2 million. The net UAAL increase is comprised primarily of experience losses; the largest single source of liability losses was retirement experience. The losses were offset by the reduction in liability due to SB 8 and the Board's adopted COLA delay.



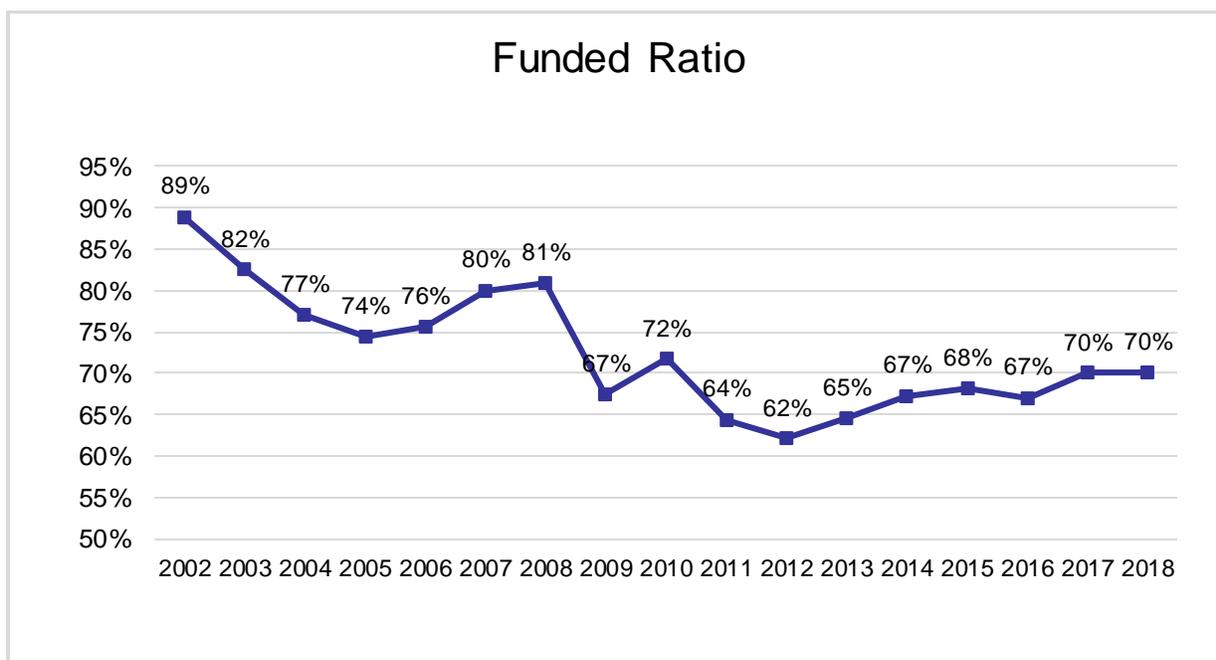
The actuarial accrued liability was slightly higher than the actuarial value of assets as of June 30, 2002. Investment experience below the assumed rate of return increased the difference between the actuarial accrued liability and actuarial assets. SERS implemented pension reform to improve the System's 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.

	6/30/14	6/30/15	6/30/16	6/30/17	6/30/18
Funded Ratio	67.30%	68.10%	66.66%	70.01%	70.07%
Unfunded Actuarial Accrued Liability (\$M)	\$ 5,851.3	\$ 5,901.6	\$ 6,591.1	\$ 5,875.3	\$5,985.5

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, 2018	June 30, 2017
1. Employer Portion of Normal Cost Rate	(0.02%)	0.44%
2. UAAL Contribution Rate	10.73%	10.40%
3. Total Actuarial Determined Contribution Rate (1) + (2)	10.71%	10.84%
4. Funded Ratio	70.07%	70.01%
5. Total Employer Contribution Rate	14.00%	14.00%
6. Amount Allocated to Basic Benefits	13.50%	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%.



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

PREPARED AS OF JUNE 30, 2018

SECTION I – SUMMARY OF PRINCIPAL RESULTS

1. This report, prepared as of June 30, 2018, 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, 2018	June 30, 2017
Active members included in valuation		
Number	158,343	157,981
Annual Compensation	\$3,332,395,171	\$3,302,805,662
Retirees		
Number	81,332	79,157
Annual allowances	\$1,211,935,636	\$1,162,015,515
Deferred Vesteds		
Number	5,091	4,735
Annual deferred allowances	\$32,213,683	\$24,428,538
Assets (net of Health Care Assets)		
Market related actuarial value	\$14,012,179,131	\$13,713,087,833
Market value	\$14,270,515,748	\$13,613,638,590
Unfunded Accrued Liability	\$5,985,521,835	\$5,875,329,854
Funded Ratio (MVA/AAL)		
Pension Benefits	70.68%	70.70%
Medicare Part B	41.10%	38.00%
Post-retirement Death Benefits	61.58%	61.04%
Actuarially Determined Contribution Rate		
Normal	(0.02)%	0.44%
Accrued liability	<u>10.73%</u>	<u>10.40%</u>
Total	10.71%	10.84%
Funding Policy Contribution Rate	13.50%	13.50%
Accrued liability amortization period (years)	26	27



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 enactment of SB 8 granted authority to the Board 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 benefit recipients must wait until the fourth anniversary to become eligible for a COLA. This change became effective for benefits commencing on or after April 1, 2018.
4. The valuation balance sheet showing the results of the valuation is given in Schedule A.
5. 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.
6. 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, 2018 upon which the valuation was based. Detailed tabulations of the data are given in Schedule E.

Active Members

Number	Payroll	Group Averages		
		Salary	Age	Service
158,343	\$3,332,395,171	\$21,045	46.8	7.4

The total number of active members includes 47,793 vested members and 110,550 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
6/30/2013	121,642	\$2,746,827,535	\$22,581	(1.3)%
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

*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

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age
Retirees and Beneficiaries	71,670	\$1,070,700,635	\$14,939	74.4
Disability	5,352	102,417,760	19,136	65.7
Survivors	4,310	38,817,241	9,006	72.4
Total in SERS	81,332	\$1,211,935,636	\$14,901	73.7

This valuation also includes 277,923 inactive members eligible for a contribution refund only (including 256,636 members reported separately who had completed one or more years of service before terminating). Their contributions totaled \$210,175,565 as of June 30, 2018. There were also 5,091 terminated vested members with annual deferred pension benefits of \$32,213,683. Included in the "Retiree" numbers in the above table are 13,327 re-employed retirees with account balances of \$99,725,487 (including employer contributions and interest), 649 re-retirees receiving only an annuity from their contributions and their employers' matching contributions, and 707 re-retirees receiving such annuities in addition to their regular pension benefits. The sum of the annuity payments attributable to these re-retirees is \$5,656,497.



SECTION III – ASSETS

1. As of June 30, 2018 the total market value of assets amounted to \$14,706,145,385. 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, 2017	\$	13,995,748,150
(2)	Contributions and Misc. Revenue		940,378,482
(3)	Investment Gain (Loss)		1,230,138,760
(4)	Benefit Payments		(1,460,120,007)
(5)	Assets at June 30, 2018 (1) + (2) + (3) + (4)	\$	14,706,145,385
(6)	Annualized Rate of Return*		8.96 %

2. The four-year smoothed market related actuarial value of assets used for the current valuation was \$14,447,808,768. Schedule B shows the development of the actuarial value of assets as of June 30, 2018. 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, 2017	\$	14,095,197,393
(2)	Contributions and Misc. Revenue		940,378,482
(3)	Investment Gain (Loss)		872,352,900
(4)	Benefit Payments		(1,460,120,007)
(5)	Assets at June 30, 2018 Before Application of Corridor (1) + (2) + (3) + (4)	\$	14,447,808,768
(6)	Annualized Rate of Return*		6.31 %

*Based on the approximation formula: $I / [0.5 \times (A + B - I)]$, 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, 2018.

1. The total retirement benefit valuation balance sheet shows that the System has total future retirement benefit liabilities of \$22,514,787,231, of which \$12,129,404,995 is for the future benefits payable for present retiree members and beneficiaries of deceased members; \$579,395,008 is for the future benefits payable for present inactive members; and \$9,805,987,228 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 \$14,012,179,131 as of June 30, 2018. The difference of \$8,502,608,100 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, \$2,588,013,885 is the present value of future contributions expected to be made by members, and the balance of \$5,914,594,215 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 (0.28%) of payroll for basic pension benefits, 0.02% 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 (\$70,927,620).
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 0.03% 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 0.42% of payroll. These rates are sufficient to amortize the unfunded accrued liability of \$5,985,521,835 over 26 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 \$5,914,594,215.



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, 2018 is shown below in \$ millions.

Experience (Gain/Loss)

Total Basic Benefits June 30:		2018	2017	2016	2015	2014	2013
(1)	UAAL from last valuation	\$ 5,875.3	6,591.1	5,901.6	5,851.3	6,121.2	6,357.7
(2)	Normal cost from last valuation	342.4	312.5	319.3	313.6	308.9	311.9
(3)	Contributions	759.9	804.4	750.7	701.5	700.7	695.1
(4)	Interest accrual: [(1) + (2) - (3)*.5] x .075	437.8	487.6	453.0	450.5	471.2	490.0
(5)	Expected UAAL before changes: (1) + (2) - (3) + (4)	\$ 5,895.6	6,586.8	5,923.2	5,913.9	6,200.6	6,464.5
(6)	Change due to plan amendments	357.6	998.5	0.0	0.0	0.0	27.8
(7)	Change due to new actuarial assumption or methods	0.0	0.0	(668.2)	0.0	0.0	0.0
(8)	Expected UAAL after changes: (5) - (6) - (7)	\$ 5,538.0	5,588.3	6,591.4	5,913.9	6,200.6	6,436.7
(9)	Actual UAAL from this valuation	\$ 5,985.5	5,875.3	6,591.1	5,901.6	5,851.3	6,121.2
(10)	Total Gain/(Loss): (8) - (9)	\$ (447.4)	(287.0)	0.3	12.3	349.3	315.5
(11)	Investment Gain/(Loss):	\$ (161.1)	(12.2)	50.6	62.1	403.3	241.0
(12)	Non-Investment Gain/(Loss)	\$ (286.3)	(274.8)	(50.3)	(49.8)	(54.0)	74.4

Pension June 30:		2018	2017	2016	2015	2014	2013
(1)	UAAL from last valuation	\$ 5,611.3	6,315.7	5,640.9	5,574.6	5,838.1	6,072.1
(2)	Normal cost from last valuation	334.1	305.6	313.3	307.7	303.0	305.9
(3)	Contributions	731.8	778.7	727.0	678.6	677.8	673.0
(4)	Interest accrual: [(1) + (2) - (3)*.5] x .075	418.5	467.4	433.3	429.6	449.7	468.2
(5)	Expected UAAL before changes: (1) + (2) - (3) + (4)	\$ 5,632.1	6,310.0	5,660.5	5,633.3	5,913.0	6,173.2
(6)	Change due to plan amendments	357.6	998.5	0.0	0.0	0.0	27.1
(7)	Change due to new actuarial assumption or methods	0.0	0.0	(643.5)	0.0	0.0	0.0
(8)	Expected UAAL after changes: (5) - (6) - (7)	\$ 5,274.5	5,311.5	6,304.0	5,633.3	5,913.0	6,146.1
(9)	Actual UAAL from this valuation	\$ 5,735.1	5,611.3	6,315.7	5,640.9	5,574.6	5,838.1
(10)	Total Gain/(Loss): (8) - (9)	\$ (460.6)	(299.8)	(11.7)	(7.6)	338.4	308.0
(11)	Investment Gain/(Loss):	\$ (159.0)	(12.3)	49.6	60.6	398.0	237.9
(12)	Non-Investment Gain/(Loss)	\$ (301.6)	(287.5)	(61.3)	(68.2)	(59.6)	70.1



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

Medicare Part B								
June 30:			2018	2017	2016	2015	2014	2013
(1)	UAAL from last valuation	\$	249.1	259.7	246.9	262.7	268.3	270.0
(2)	Normal cost from last valuation		7.8	6.4	5.5	5.4	5.4	5.5
(3)	Contributions		26.3	24.1	22.2	21.5	21.5	20.7
(4)	Interest accrual:		18.3	19.0	18.7	19.9	20.4	20.5
	[(1) + (2) - (3)*.5] x .075							
(5)	Expected UAAL before changes:	\$	248.9	261.0	248.9	266.5	272.6	275.3
	(1) + (2) - (3) + (4)							
(6)	Change due to plan amendments		0.0	0.0	0.0	0.0	0.0	0.6
(7)	Change due to new actuarial assumption or methods		0.0	0.0	(22.4)	0.0	0.0	0.0
(8)	Expected UAAL after changes:	\$	248.9	261.0	271.3	266.5	272.6	274.7
	(5) - (6) - (7)							
(9)	Actual UAAL from this valuation	\$	235.4	249.1	259.7	246.9	262.7	268.3
(10)	Total Gain/(Loss): (8) - (9)	\$	13.5	11.9	11.6	19.6	9.9	6.4
(11)	Investment Gain/(Loss):	\$	(1.9)	0.1	0.9	1.3	4.5	2.6
(12)	Non-Investment Gain/(Loss)	\$	15.4	11.8	10.7	18.3	5.4	3.8

Post-Retirement Death Benefits								
June 30:			2018	2017	2016	2015	2014	2013
(1)	UAAL from last valuation	\$	14.9	15.7	13.8	14.0	14.8	15.6
(2)	Normal cost from last valuation		0.5	0.5	0.5	0.5	0.5	0.5
(3)	Contributions		1.8	1.6	1.5	1.5	1.4	1.4
(4)	Interest accrual:		1.1	1.2	1.0	1.1	1.1	1.2
	[(1) + (2) - (3)*.5] x .075							
(5)	Expected UAAL before changes:	\$	14.7	15.8	13.8	14.1	15.0	15.9
	(1) + (2) - (3) + (4)							
(6)	Change due to plan amendments		0.0	0.0	0.0	0.0	0.0	0.1
(7)	Change due to new actuarial assumption or methods		0.0	0.0	(2.3)	0.0	0.0	0.0
(8)	Expected UAAL after changes:	\$	14.7	15.8	16.1	14.1	15.0	15.8
	(5) - (6) - (7)							
(9)	Actual UAAL from this valuation	\$	15.0	14.9	15.7	13.8	14.0	14.8
(10)	Total Gain/(Loss): (8) - (9)	\$	(0.3)	0.9	0.4	0.3	1.0	1.0
(11)	Investment Gain/(Loss):	\$	(0.2)	0.0	0.1	0.2	0.8	0.5
(12)	Non-Investment Gain/(Loss)	\$	(0.1)	0.9	0.3	0.1	0.2	0.5



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.	\$ (211.1)	\$ 1.2	\$ 0.3	\$ (209.7)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(14.6)	(0.1)	(0.0)	(14.7)
Pre-Retirement Death Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	(6.4)	(0.2)	(0.0)	(6.6)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	(124.0)	(0.5)	(0.0)	(124.5)
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	85.2	0.0	0.0	85.2
New Members. Additional accrued liability attributable to members who entered the plan since the last valuation.	(34.6)	(1.0)	(0.1)	(35.7)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(159.0)	(1.9)	(0.2)	(161.1)
Death After Retirement. If retired members live longer than assumed, there is a loss. If not as long, a gain.	4.6	10.5	(0.1)	15.0
Other. Miscellaneous gains and losses resulting from changes in valuation software, data adjustments, timing of financial transactions, etc.	(0.7)	5.5	(0.2)	4.7
Gain (or Loss) During Year From Financial Experience	\$ (460.6)	\$ 13.5	\$ (0.3)	\$ (447.4)
Non-Recurring Items. Adjustments for plan amendments, assumption changes and method changes	357.6	0.0	0.0	357.6
Composite Gain (or Loss) During Year	\$ (103.0)	\$ 13.5	\$ (0.3)	\$ (89.8)



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	6.08%			
(2) Disability benefits	0.67			
(3) Survivor benefits	0.23			
(4) Refunds	2.74			
(5) Total	9.72%	0.02%	0.24%	9.98%
B. Member Contributions	10.00%	0.00%	0.00%	10.00%
C. Employer Normal Cost: [A(5) - B]	(0.28%)	0.02%	0.24%	(0.02%)
D. Unfunded Actuarial Accrued Liability Contributions	10.28%	0.03%	0.42%	10.73%
E. Total Recommended Employer Contribution Rate:[C+D]	10.00%	0.05%	0.66%	10.71%

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.



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						
6/30/2013	\$ 10,988	\$ 16,826	5,838	65.3%	\$ 2,747	212.5%
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
Medicare Part B						
6/30/2013	\$ 119	\$ 387	\$ 268	30.6%	\$ 2,747	9.8%
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
Post-Retirement Death Benefits						
6/30/2013	\$ 19	\$ 34	\$ 15	55.9%	\$ 2,747	0.5%
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



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, 2018 and, for comparison purposes, as of the immediately preceding valuation date of June 30, 2017. 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, 2018	June 30, 2017
ASSETS		
Current actuarial value of assets	\$ 14,012,179,131	\$ 13,713,087,833
Prospective contributions		
Member contributions	\$ 2,588,013,885	\$ 2,527,383,701
Employer normal contributions	(70,927,620)	33,991,294
Unfunded accrued liability contributions	<u>5,985,521,835</u>	<u>5,875,329,854</u>
Total prospective contributions	<u>\$ 8,502,608,100</u>	<u>\$ 8,436,704,849</u>
Total assets	<u>\$ 22,514,787,231</u>	<u>\$ 22,149,792,682</u>
LIABILITIES		
Present value of benefits payable on account of present retired members and beneficiaries	\$ 12,129,404,995	\$ 11,467,627,073
Present value of benefits payable on account of active members	9,805,987,228	10,178,625,427
Present value of benefits payable on account of inactive and deferred vested members	<u>579,395,008</u>	<u>503,540,182</u>
Total liabilities	<u>\$ 22,514,787,231</u>	<u>\$ 22,149,792,682</u>



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)

Valuation Date	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Reported Asset		
	(1) Active Member Contributions	(2) Retired Members & Beneficiaries	(3) Active Members (Employer Financed Portion)	Actuarial Value of Assets	(1)	(2)	(3)
Pension Benefits							
6/30/2013	\$ 2,860	\$ 9,796	\$ 4,196	\$ 10,988	100.0%	83.0%	0.0%
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
Medicare Part B							
6/30/2013	\$ 0	\$ 255	\$ 132	\$ 119	100.0%	46.5%	0.0%
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
Post-Retirement Death Benefits							
6/30/2013	\$ 0	\$ 27	\$ 7	\$ 19	100.0%	72.6%	0.0%
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



SCHEDULE B
Development of Actuarial Value of Assets

Valuation date June 30:	2017	2018	2019	2020	2021
A. Actuarial Value Beginning of Year	\$ 13,549,823,117	\$ 14,095,197,393			
B. Market Value End of Year	13,995,748,150	14,706,145,385			
C. Market Value Beginning of Year	12,821,835,338	13,995,748,150			
D. Cash Flow					
D1. Contributions	\$ 852,097,282	\$ 823,485,048			
D2. Other Revenue	98,190,524	116,893,434			
D3. Benefit Payments	(1,401,628,622)	(1,466,854,072)			
D4. Net Transfers	3,139,875	6,734,065			
D5. Net	\$ (448,200,941)	\$ (519,741,525)			
E. Investment Income					
E1. Market Total: B.-C.-D5.	\$ 1,622,113,753	\$ 1,230,138,760			
E2. Assumed Rate (Net of Expenses)	7.50%	7.50%			
E3. Amount for Immediate Recognition	944,830,115	1,030,190,804			
E4. Amount for Phased-In Recognition	677,283,638	199,947,956			
F. Phased-In Recognition of Investment Income					
F1. Current Year: 0.25 * E4.	\$ 169,320,910	\$ 49,986,989	\$ 0	\$ 0	\$ 0
F2. First Prior Year	(230,266,166)	169,320,910	49,986,989	0	0
F3. Second Prior Year	(146,879,637)	(230,266,166)	169,320,910	49,986,989	0
F4. Third Prior Year	256,569,995	(146,879,637)	(230,266,166)	169,320,910	49,986,988
F5. Total Recognized Investment Gain/(Loss)	\$ 48,745,102	\$ (157,837,904)	\$ (10,958,267)	\$ 219,307,899	\$ 49,986,988
G. Preliminary Actuarial Value End of Year:					
A.+D5.+E3.+F5.	\$ 14,095,197,393	\$ 14,447,808,768			
H. Corridor					
H1. 80% of Market Value	\$ 11,196,598,520	\$ 11,764,916,308			
H2. 120% of Market Value	\$ 16,794,897,780	\$ 17,647,374,462			
I. Actuarial Value End of Year:					
G. Not Less than H1. or Not Greater than H2.	\$ 14,095,197,393	\$ 14,447,808,768			
J. Difference Between Market & Actuarial Values	\$ (99,449,243)	\$ 258,336,617	\$ 269,294,885	\$ 49,986,986	\$ 0
K. Health Care Valuation Assets	\$ 382,109,560	\$ 435,629,637			
L. Basic Benefits Valuation Assets (G. - K.)	\$ 13,713,087,833	\$ 14,012,179,131			

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

Age	Annual Rates of			
	Death *		Disability	
	Male	Female	Male	Female
20	.022%	.013%	.020%	.010%
25	.053	.018	.038	.010
30	.063	.019	.068	.026
35	.059	.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								
Age	Retirement Eligible prior to 8/1/17				Retirement Eligible after 8/1/17			
	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:

Service	Annual Rates of		
	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	
<i>Retire before August 1, 2017 or have 25 years of service or more on or before August 1, 2017</i>	Attainment of age 65 with at least five years of creditable service, or completion of 30 years of creditable service, regardless of age.
<i>Members attaining 25 years of service after August 1, 2017</i>	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: <ol style="list-style-type: none">1. Money Purchase - the greater of: The sum of:<ol style="list-style-type: none">a. An annuity based on the value of the member's accumulated contributions at retirementb. A pension equal to the annuityc. 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:<ol style="list-style-type: none">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:<ol style="list-style-type: none">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:

<u>Attained Age</u>	<u>Years of Ohio Service Credit</u>	<u>Percentage</u>
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:

<u>Years of Ohio Service Credit</u>	<u>Percentage</u>
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:

<u>Age at Disability</u>	<u>Minimum Duration In Months</u>
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:

<u>Number of Qualified Survivors</u>	<u>Annual Benefit as Percent of Member's FAS</u>	<u>Minimum Monthly Allowance</u>
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:

<u>Years of Service</u>	<u>Annual Benefit as Percent of Member's FAS</u>
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	<p>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.</p> <p>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.</p>
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:	2013	2014	2015	2016	2017	2018
<u>Number of Retiree Members</u>						
Beginning of Year	69,038	70,771	72,605	74,372	76,280	79,157
Added	4,197	4,144	4,909	4,388	5,499	5,339
Removed	2,464	2,310	3,142	2,480	2,622	3,164
End of Year	70,771	72,605	74,372	76,280	79,157	81,332
<u>Annual Retirement Allowances</u>						
Beginning of Year	\$ 838,076,567	\$ 898,267,601	\$ 958,537,700	\$ 1,020,368,894	\$ 1,083,621,579	\$ 1,162,015,515
Added	62,841,820	61,331,002	70,608,680	66,860,652	70,973,748	74,311,354
Removed	2,650,786	1,060,903	8,777,486	3,607,967	(7,420,188)	24,391,233
End of Year	\$ 898,267,601	\$ 958,537,700	\$ 1,020,368,894	\$ 1,083,621,579	\$ 1,162,015,515	\$ 1,211,935,636
% Increase in Allowances	7.18%	6.71%	6.45%	6.20%	7.23%	4.30%
Average Annual Allowance	\$ 12,693	\$ 13,202	\$ 13,720	\$ 14,206	\$ 14,680	\$ 14,901



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

Year Ending June 30:	2016	2017	2018
<u>Number of Retiree Members</u>			
Beginning of Year	46,619	46,166	44,741
Added	2,006	1,853	1,752
Removed	2,459	3,278	2,848
End of Year	46,166	44,741	43,645
<u>Annual Retirement Allowances</u>			
Beginning of Year	\$ 25,453,974	\$25,206,636	\$24,428,586
Added	1,095,276	1,011,738	956,592
Removed	1,342,614	1,789,788	1,555,008
End of Year	\$ 25,206,636	\$24,428,586	\$23,830,170
% Increase in Allowances	(0.97)%	(3.09)%	(2.45)%
Average Annual Allowance	\$ 546	\$ 546	\$ 546



**Annuity and Pension Reserve Fund
Retiree Information as of June 30, 2018
Tabulated by Type of Benefit**

Amount of Monthly Benefit		Total	Service	Disability	Survivor
\$ 1 - \$	250	10,726	9,895	45	786
251 -	500	11,754	10,237	366	1,151
501 -	750	11,154	9,682	642	830
751 -	1,000	9,745	8,306	867	572
1,001 -	1,500	14,284	12,371	1,379	534
1,501 -	2,000	8,632	7,567	864	201
Over	2,000	<u>15,037</u>	<u>13,612</u>	<u>1,189</u>	<u>236</u>
		81,332	71,670	5,352	4,310

Average Monthly Benefit	\$ 1,242	\$ 1,595	\$ 751
Average Age	74.4	65.7	72.4

The 71,670 service retirees shown in the table above are comprised of 66,329 service retirees and 5,341 beneficiaries of deceased retirees. Excluded from the 66,329 service retirees are 649 re-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, 2018
Tabulated by Attained Ages**

Attained Age	Retirement		Disability Retirement		Total	
	Number	Annual Benefits	Number	Annual Benefits	Number	Annual Benefits
Under 45	38	\$ 249,852	58	\$ 795,001	96	\$ 1,044,853
45-49	38	\$ 563,585	158	\$ 2,523,847	196	\$ 3,087,433
50-54	366	\$ 11,590,751	392	\$ 6,878,409	758	\$ 18,469,160
55-59	1,811	\$ 57,913,703	921	\$ 18,407,765	2,732	\$ 76,321,467
60-64	9,272	\$ 161,884,875	1382	\$ 26,660,269	10,654	\$ 188,545,144
65-69	14,688	\$ 236,059,727	832	\$ 23,916,519	15,520	\$ 259,976,245
70-74	13,597	\$ 209,665,660	622	\$ 11,701,595	14,219	\$ 221,367,256
75-79	11,723	\$ 165,705,417	453	\$ 6,340,303	12,176	\$ 172,045,721
80-84	9,518	\$ 120,608,036	296	\$ 3,325,849	9,814	\$ 123,933,885
85-89	6,244	\$ 68,029,602	163	\$ 1,406,482	6,407	\$ 69,436,084
90 & Over	4,375	\$ 36,134,811	75	\$ 461,721	4,450	\$ 36,596,532
Totals	71,670	\$ 1,068,406,020	5,352	\$ 102,417,760	77,022	\$ 1,170,823,780

The 71,670 service retirees shown in the table above are comprised of 71,021 unique service retirees, and 649 unique re-retirees. The re-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, 2018
Tabulated by Attained Ages

Attained Age	Life Annuities		Periods Certain		Total	
	Number	Annual Benefits	Number	Annual Benefits	Number	Annual Benefits
Under 45	38	\$ 249,852	0	\$ -	38	\$ 249,852
45-49	27	\$ 144,875	0	\$ -	27	\$ 144,875
50-54	45	\$ 325,875	0	\$ -	45	\$ 325,875
55-59	100	\$ 999,442	0	\$ -	100	\$ 999,442
60-64	216	\$ 2,908,469	1	\$ 18,261	217	\$ 2,926,730
65-69	382	\$ 4,984,323	4	\$ 62,043	386	\$ 5,046,366
70-74	606	\$ 6,940,396	10	\$ 141,220	616	\$ 7,081,616
75-79	889	\$ 8,323,705	5	\$ 20,361	894	\$ 8,344,066
80-84	1,119	\$ 9,921,309	4	\$ 99,418	1,123	\$ 10,020,727
85-89	991	\$ 8,332,487	0	\$ -	991	\$ 8,332,487
90 & Over	904	\$ 6,013,413	0	\$ -	904	\$ 6,013,413
Totals	5,317	\$ 49,144,146	24	\$ 341,303	5,341	\$ 49,485,449



**All Benefit Recipients
Male and Female Demographic Breakdown
June 30, 2018**

Attained Age	Number of		Total Number
	Males	Females	
Under 20	26	22	48
20-24	3	6	9
25-29	5	3	8
30-34	6	9	15
35-39	12	21	33
40-44	32	49	81
45-49	82	167	249
50-54	349	539	888
55-59	1,214	1,783	2,997
60-64	3,058	8,103	11,161
65-69	4,409	11,786	16,195
70-74	4,000	10,926	14,926
75-79	3,346	9,488	12,834
80-84	2,611	7,768	10,379
85-89	1,572	5,206	6,778
90-94	687	2,875	3,562
95-99	155	876	1,031
100	6	50	56
101	7	38	45
102	2	12	14
103	0	10	10
104	1	8	9
105 & Over	0	4	4
Total	21,583	59,749	81,332



Survivor Benefit Fund
Survivors of Deceased Active Members Information as of June 30, 2018
Tabulated by Attained Ages

Attained Age	Number	Annual Benefits
Under 45	98	\$ 1,039,067
45-49	53	\$ 845,372
50-54	130	\$ 1,555,466
55-59	265	\$ 3,198,551
60-64	507	\$ 5,324,349
65-69	675	\$ 6,534,519
70-74	707	\$ 6,623,709
75-79	658	\$ 5,516,433
80-84	565	\$ 4,276,700
85-89	371	\$ 2,448,347
90 & Over	281	\$ 1,454,727
Totals	4,310	\$ 38,817,240



**Total Active Members as of June 30, 2018
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	3,091							3,091
Avg Pay	\$8,346							\$8,346
20-24	10,426	81						10,507
Avg Pay	\$9,521	\$25,992						\$9,648
25-29	10,043	713	45	1				10,802
Avg Pay	\$13,652	\$29,823	\$34,749	\$60,631				\$14,812
30-34	8,913	1,463	439	37				10,852
Avg Pay	\$15,195	\$30,040	\$38,013	\$48,239				\$18,232
35-39	10,277	2,131	994	452	48			13,902
Avg Pay	\$15,015	\$28,396	\$39,236	\$45,034	\$44,055			\$19,874
40-44	10,827	2,666	1,438	907	294	28		16,160
Avg Pay	\$13,992	\$25,619	\$33,811	\$44,744	\$46,056	\$52,855		\$20,051
44-49	10,958	3,758	2,612	1,914	810	273	29	20,354
Avg Pay	\$13,857	\$24,028	\$30,668	\$37,629	\$47,454	\$51,876	\$61,382	\$22,042
50-54	8,743	3,446	3,438	3,472	1,781	714	277	21,871
Avg Pay	\$14,306	\$24,416	\$28,394	\$33,012	\$38,976	\$48,676	\$50,333	\$24,670
55-59	7,056	2,919	3,324	4,525	3,491	1,454	648	23,417
Avg Pay	\$13,802	\$24,116	\$27,883	\$31,588	\$33,994	\$41,265	\$48,305	\$26,193
60-64	5,108	2,017	1,845	2,460	2,317	1,779	1,001	16,527
Avg Pay	\$12,346	\$23,602	\$29,195	\$32,426	\$33,066	\$36,486	\$41,760	\$25,874
65-69	2,878	790	647	714	654	673	680	7,036
Avg Pay	\$9,652	\$20,358	\$26,630	\$30,436	\$33,720	\$35,118	\$38,229	\$21,959
70 & over	1,762	494	393	278	203	201	493	3,824
Avg Pay	\$7,497	\$14,364	\$20,925	\$24,050	\$30,901	\$31,739	\$31,400	\$16,566
Totals	90,082	20,478	15,175	14,760	9,598	5,122	3,128	158,343
Avg Pay	\$13,119	\$24,990	\$30,023	\$33,912	\$36,166	\$40,085	\$41,657	\$21,045

Averages:

Age: 46.8

Service: 7.4

Annual Pay: \$21,045



**Male Active Members as of June 30, 2018
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	1,785							1,785
Avg Pay	\$8,764							\$8,764
20-24	4,770	52						4,822
Avg Pay	\$9,540	\$28,716						\$9,747
25-29	4,147	340	26	1				4,514
Avg Pay	\$14,009	\$34,694	\$41,425	\$60,631				\$15,735
30-34	3,156	636	244	26				4,062
Avg Pay	\$16,703	\$34,767	\$41,852	\$53,858				\$21,280
35-39	2,990	725	417	236	20			4,388
Avg Pay	\$16,660	\$35,980	\$48,078	\$53,217	\$49,556			\$24,954
40-44	3,296	697	366	333	139	17		4,848
Avg Pay	\$14,253	\$32,545	\$46,718	\$57,460	\$53,605	\$54,598		\$23,571
44-49	3,623	833	497	407	306	135	14	5,815
Avg Pay	\$14,061	\$31,517	\$43,276	\$53,649	\$59,751	\$56,479	\$64,073	\$25,339
50-54	3,153	845	591	525	377	272	118	5,881
Avg Pay	\$14,264	\$30,574	\$42,340	\$48,587	\$56,080	\$58,532	\$56,406	\$28,067
55-59	2,634	888	693	673	444	307	257	5,896
Avg Pay	\$15,102	\$29,484	\$38,519	\$45,932	\$51,850	\$55,305	\$55,726	\$30,171
60-64	2,087	862	559	516	301	271	273	4,869
Avg Pay	\$13,662	\$27,676	\$37,358	\$44,518	\$47,722	\$51,102	\$53,114	\$28,535
65-69	1,324	416	257	184	106	96	114	2,497
Avg Pay	\$11,062	\$22,437	\$31,333	\$37,568	\$44,623	\$48,581	\$54,985	\$21,869
70 & over	844	253	202	107	54	26	49	1,535
Avg Pay	\$8,976	\$17,428	\$25,537	\$28,989	\$41,626	\$39,316	\$39,818	\$16,590
Totals	33,809	6,547	3,852	3,008	1,747	1,124	825	50,912
Avg Pay	\$13,463	\$30,555	\$40,435	\$48,004	\$52,794	\$54,259	\$54,053	\$22,651

Averages:

Age: 44.8

Service: 5.7

Annual Pay: \$22,651



**Female Active Members as of June 30, 2018
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 30	1,306							1,306
Avg Pay	\$7,774							\$7,774
30-24	5,656	29						5,685
Avg Pay	\$9,504	\$21,107						\$9,564
25-219	5,896	373	19					6,288
Avg Pay	\$13,402	\$25,383	\$25,612					\$14,149
30-34	5,757	827	195	11				6,790
Avg Pay	\$14,369	\$26,404	\$33,208	\$34,958				\$16,409
35-319	7,287	1,406	577	216	28			9,514
Avg Pay	\$14,341	\$24,485	\$32,845	\$36,094	\$40,126			\$17,532
40-44	7,531	1,969	1,072	574	155	11		11,312
Avg Pay	\$13,879	\$23,167	\$29,405	\$37,367	\$39,287	\$50,161		\$18,542
44-419	7,335	2,925	2,115	1,507	504	138	15	14,539
Avg Pay	\$13,756	\$21,895	\$27,705	\$33,303	\$39,988	\$47,373	\$58,870	\$20,723
50-54	5,590	2,601	2,847	2,947	1,404	442	159	15,990
Avg Pay	\$14,329	\$22,416	\$25,499	\$30,238	\$34,383	\$42,610	\$45,827	\$23,421
55-519	4,422	2,031	2,631	3,852	3,047	1,147	391	17,521
Avg Pay	\$13,027	\$21,769	\$25,082	\$29,082	\$31,392	\$37,507	\$43,427	\$24,855
60-64	3,021	1,155	1,286	1,944	2,016	1,508	728	11,658
Avg Pay	\$11,437	\$20,561	\$25,646	\$29,217	\$30,878	\$33,859	\$37,502	\$24,763
65-619	1,554	374	390	530	548	577	566	4,539
Avg Pay	\$8,450	\$18,046	\$23,531	\$27,960	\$31,611	\$32,878	\$34,854	\$22,009
70 & over	918	241	191	171	149	175	444	2,289
Avg Pay	\$6,137	\$11,148	\$16,047	\$20,959	\$27,014	\$30,614	\$30,471	\$16,549
Totals	56,273	13,931	11,323	11,752	7,851	3,998	2,303	107,431
Avg Pay	\$12,912	\$22,375	\$26,481	\$30,305	\$32,466	\$36,101	\$37,216	\$20,285

Averages:

Age: 47.8

Service: 8.2

Annual Pay: \$20,285



**Active Members as of June 30, 2018
Tabulated by Annual Pay**

Annual Pay	Number of Active Members			Portion of Total Number	
	Men	Women	Totals	Group	Cumulative
Less than \$1,000	2,306	4,090	6,396	4.0%	4.0%
\$1,000 - 1,999	2,950	3,612	6,562	4.1%	8.2%
2,000 - 2,999	3,707	3,739	7,446	4.7%	12.9%
3,000 - 3,999	3,455	3,288	6,743	4.3%	17.1%
4,000 - 4,999	2,608	3,051	5,659	3.6%	20.7%
5,000 - 5,999	1,857	2,944	4,801	3.0%	23.8%
6,000 - 6,999	1,451	2,946	4,397	2.8%	26.5%
7,000 - 7,999	1,271	2,767	4,038	2.6%	29.1%
8,000 - 8,999	1,042	2,741	3,783	2.4%	31.5%
9,000 - 9,999	977	2,766	3,743	2.4%	33.8%
10,000 - 11,999	1,930	6,045	7,975	5.0%	38.9%
12,000 - 13,999	1,683	5,445	7,128	4.5%	43.4%
14,000 - 15,999	1,669	5,734	7,403	4.7%	48.0%
16,000 - 17,999	1,456	6,356	7,812	4.9%	53.0%
18,000 - 19,999	1,371	6,529	7,900	5.0%	58.0%
20,000 - 24,999	3,065	13,636	16,701	10.5%	68.5%
25,000 - 29,999	2,310	8,988	11,298	7.1%	75.6%
30,000 - 35,999	2,995	7,403	10,398	6.6%	82.2%
36,000 and over	12,809	15,351	28,160	17.8%	100.0%
Totals	50,912	107,431	158,343		



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)

Year Ending June 30	Gain (Loss) by Risk Area									\$	% of AAL
	Economic		Non-Economic								
	Pay Increases	Investment	Age & Service Retirement	Disability	Death In Service	Withdrawal	New Members	Retiree Mortality	Other ⁺		
2009	107.5	(2,265.2)	(50.8)	(28.7)	(0.6)	(11.9)	(50.4)	51.8	200.1	(2,048.2)	(14.0)
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)

⁺ 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, 2018 was \$14,012,179,131. The value for the previous year was \$13,713,087,833.

School Employees Retirement System of Ohio Development of Gain (Loss) for Basic Benefits From Investment Return For the Year Ended June 30, 2018 (\$ Millions)		<u>\$ Millions</u>
1.	Actuarial value of assets as of June 30, 2017	\$ 13,713.1
2.	Actuarial value of assets as of June 30, 2018	
	a. Actual	14,012.2
	b. If 7.50% assumed investment return were achieved for all phased-in years recognized in the asset method	14,173.3
3.	Gain (Loss): 2a minus 2b	<u>\$ (161.1)</u>



**Pay Increases During the FY2018 Valuation Year
To Members Active at Beginning and End of Year**

Central Age Group Beginning of Year	Number	Pay Increases	
		Actual	Expected
Under 25	6,242	(25.38)%	16.31%
25	6,933	(3.05)	11.85
30	7,500	0.57	9.34
35	10,095	2.75	8.1
40	12,650	2.62	7.28
45	16,634	2.74	6.18
50	19,106	2.54	5.38
55	21,397	2.09	4.73
60	16,121	1.78	4.64
65 & Over	10,668	0.32	4.94
Total	127,346	1.31	6.26



**Members Who Became Age & Service Retirees During the FY2018 Valuation Year
(Retirement With Allowance Beginning Immediately)**

Attained Age	Years of Service to Valuation Date							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30 plus	
Under 50	0	8	9	11	7	0	10	45
50	0	1	1	4	2	0	9	17
51	0	0	0	2	0	0	12	14
52	0	2	2	3	1	2	24	34
53	0	2	2	3	1	1	30	39
54	0	2	2	5	1	2	37	49
55	0	1	4	3	2	42	30	82
56	0	3	5	7	2	13	39	69
57	0	1	5	6	4	26	45	87
58	0	1	3	8	2	15	40	69
59	0	2	2	5	5	27	52	93
60	0	22	71	143	160	52	54	502
61	0	36	54	98	98	38	54	378
62	0	26	51	108	122	47	54	408
63	0	30	34	91	98	40	44	337
64	0	23	48	91	125	44	61	392
65	0	34	65	65	90	93	89	436
66	0	21	22	34	28	34	50	189
67	0	16	24	29	32	42	45	188
68	0	13	17	22	20	27	35	134
69	0	13	27	19	17	17	25	118
70 & Over	0	31	64	72	45	51	145	408
Totals	0	288	512	829	862	613	984	4,088

	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	\$ 369	\$ 595	\$ 938	\$ 1,263	\$ 1,603	\$ 2,545	\$ 1,410
Avg. FAS	\$ 0	\$ 25,696	\$ 28,132	\$ 33,441	\$ 35,622	\$ 37,031	\$ 44,995	\$ 36,010
Number of Retirees	0	288	512	829	862	613	984	4088

Average Age: 63.2
Average Service: 22.2



**Members Who Died in the FY2018 Valuation Year
With a Death-in-Service Allowance Payable**

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	2
35	1
40	3
45	9
50	6
55	10
60	15
65	10
70 & Over	5
Total	61

Average Age: 55.1
Average Service: 16.4



**Members Who Died in the FY2018 Valuation Year
and Received a Refund of Contributions**

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

Average Age: 48.2
Average Service: 3.1



**Members Who Became Disability Retirees
During the FY2018 Valuation Year**

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	1
35	0
40	10
45	15
50	33
55	76
60	70
65	17
70 & Over	1
Total	223

Average Age: 55.3
Average Service: 17.5
Average FAS: \$32,403



**Members Receiving a Refund of Contributions
or Becoming Inactive Without a Refund in
the FY2018 Valuation Year
(Non-vested Terminations)**

Central Age Group Beginning of Year	Number
Under 25	3,809
25	3,968
30	2,281
35	1,953
40	2,085
45	2,128
50	1,763
55	1,359
60	856
65	473
70 & Over	276
Total	20,951

Average Age: 37.1
Average Service: 1.1



**Members Who Became Inactive
in the FY2018 Valuation Year
with a Deferred Allowance
(Vested Terminations)**

Central Age Group Beginning of Year	Number
Under 25	0
25	0
30	3
35	29
40	45
45	99
50	176
55	200
60	135
65	21
70 & Over	10
Total	718

Average Age: 52.1
Average Service: 14.9



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, 2018**

Present Value of:	Pension Benefits	Medicare Part B	Post-Retirement Death Benefit	Total Basic Benefits
Future benefits to present retirees and survivors	\$11,862,831,988	\$236,229,932	\$30,343,075	\$12,129,404,995
Benefits and refunds to present inactive members	563,793,631	14,769,034	832,343	579,395,008
Allowances to present active members				
Service	6,806,173,300	133,497,430	7,098,605	6,946,769,335
Disability	230,742,933	3,805,769	440,003	234,988,705
Survivor benefits	123,874,430	2,193,344	0	126,067,774
Withdrawal	<u>(28,455,848)</u>	<u>9,137,386</u>	<u>393,611</u>	<u>(18,924,851)</u>
Total Active AAL	7,132,334,815	148,633,929	7,932,219	7,288,900,963
Total AAL	<u>\$19,558,960,434</u>	<u>\$399,632,895</u>	<u>\$39,107,637</u>	<u>\$19,997,700,966</u>



APPENDIX B

**BREAKDOWN OF TOTAL AND ACCRUED LIABILITIES
AS OF JUNE 30, 2018**

	Total Liability	Accrued Liability
Active Members		
Retirement	\$8,345,505,278	\$6,806,173,300
Death	176,813,971	123,874,430
Disability	404,439,835	230,742,933
Termination	667,414,362	(28,455,848)
Medicare Part B	200,802,637	148,633,929
Death after Retirement	<u>11,011,145</u>	<u>7,932,219</u>
Total	\$9,805,987,228	\$7,288,900,963
Retirees		
Retirement/Survivor/Disability	\$11,862,831,988	\$11,862,831,988
Medicare Part B	236,229,932	236,229,932
Death after Retirement	<u>30,343,075</u>	<u>30,343,075</u>
Total	\$12,129,404,995	\$12,129,404,995
Deferred Vested Members	269,493,956	269,493,956
Inactive Members	<u>309,901,052</u>	<u>309,901,052</u>
Total Actuarial Values	\$22,514,787,231	\$19,997,700,966
Actuarial Value of Assets		<u>14,012,179,131</u>
Unfunded Actuarial Accrued Liability		\$5,985,521,835



APPENDIX C
COMPARATIVE SCHEDULE
AS OF JUNE 30, 2018

Valuation Date June 30	Active Members				Retired Lives				Accrued Liability	Valuation Assets	UAAL
					Number		Annual Benefits				
	Payroll	Average Salary		Retired	Active / Retired	\$ Millions	% of Payroll	\$ Millions			
	Number	\$ Millions	\$						% Increase		
2009	125,465	2,787	22,216	4.2	65,757	1.9	693.8	24.9	14,582	9,836	4,746
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	14,024	5,974