

State Teachers Retirement System of Ohio

Actuarial Valuation and Review as of
July 1, 2017





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November 10, 2017

Board of Trustees
State Teachers Retirement System of Ohio
275 East Broad Street
Columbus, Ohio 43215

Ladies and Gentlemen:

This report presents the results of the annual valuation of the assets and liabilities of the State Teachers Retirement System of Ohio (STRS Ohio or System) as of July 1, 2017, prepared in accordance with Section 3307.51 of Chapter 3307 of the Ohio Revised Code. This valuation takes into account all of the pension and survivor benefits to which members are entitled. A separate valuation of the retiree health care benefits provided by the System is performed as of January 1 of each year.

Actuarial Assumptions and Methods

The valuation was based on the actuarial assumptions and methods as adopted by the Board of Trustees, reflecting the five-year experience review covering the period July 1, 2011 through June 30, 2016. In our opinion, the actuarial assumptions as approved by the Board are reasonable, taking into account the experience of the Plan and reasonable long-term expectations, and represent our best estimate of the anticipated long-term experience of the Plan. The actuarial assumptions and methods used for funding purposes meet the parameters set by Actuarial Standards of Practice.

Assets and Membership Data

STRS Ohio reported to the actuary the individual data for members of the System as of the valuation date. The amount of assets in the trust fund taken into account in the valuation was based on statements prepared by STRS Ohio.

Funding Adequacy

The member and employer contribution rates are established by statute. The member contribution rate is 14% of salary as of July 1, 2017. The employer contribution rate is 14% of payroll. For members participating in the Combined Plan, 2% of the 14% member contribution rate is allocated to the Defined Benefit portion as of July 1, 2017. For fiscal 2018, the total contribution rate is 28% of payroll for the Defined Benefit Plan and 16% for the Combined Plan. In the past, the Board has allocated the total contribution rate between pension and survivor benefits and health care. Beginning in fiscal 2016, the Board allocated the total contribution rate toward pension and survivor benefits and made no allocation to health care.

The valuation indicates that the pension and survivor benefits contribution rate of 28% for the Defined Benefit Plan and 16% for Combined Plan for fiscal 2018 and beyond is sufficient to provide for the payment of the pension and survivor benefits. This is because the funding period is 18.4 years and, if all assumptions are realized, the funding period is expected to decrease by one year in each future year. This funding period calculation reflects all assumption changes as approved by the Board and the reduction of the annual cost-of-living adjustments (COLA) to zero effective July 1, 2017.

The valuation indicates that for the fiscal year ending June 30, 2017, the actuarial experience of STRS Ohio was favorable generating a net actuarial gain of \$1,268 million. This gain is the net result of a \$857 million gain due to favorable investment return experience in prior years and a \$411 million gain due to favorable net demographic experience in fiscal 2017.

Financial Results

This report shows detailed summaries of the financial results of the valuation used in preparing this valuation. The actuary prepared the following supporting schedules included in the Financial, Actuarial and Statistical Sections of the STRS Ohio Comprehensive Annual Financial Report:

- Financial / Required Supplementary Information
 - Schedules of Changes in Employers' Net Pension Liability
 - Schedule of the Employers' Net Pension Liability
 - Schedule of Employers' Contributions
- Actuarial
 - Schedule of Valuation Data – Active Members
 - Schedule of Valuation Data – Retirees/Beneficiaries
 - Solvency Test
 - Analysis of Financial Experience
- Statistical
 - Actuarial Funded Ratio and Funding Period
 - Selected Funding Information – Defined Benefit Plan
 - Number of Benefit Recipients by Type
 - Summary of Active Membership Data
 - Benefit Payments by Type

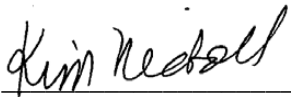
Actuarial Certification

In preparing the results presented in this report, we have relied upon information STRS Ohio provided to us regarding the benefit provisions, System members, benefit payments and unaudited plan assets. While the scope of our engagement did not call for us to perform an audit or independent verification of this information, we have reviewed this information for reasonableness. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information.

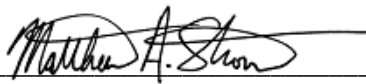
All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, the results presented also comply with Chapter 3307 of the Ohio Revised Code, and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board. The undersigned are independent actuaries. Both are Fellows of the Society of Actuaries, Enrolled Actuaries, and Members of the American Academy of Actuaries, and both are experienced in performing valuations for large public retirement systems. They both meet the Qualification Standards of the American Academy of Actuaries.

Respectfully submitted,

Segal Consulting, a Member of the Segal Group

By: 

Kim Nicholl, FSA, MAAA, EA
Senior Vice President and Actuary



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Vice President and Actuary

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VALUATION HIGHLIGHTS

1. Effective with the July 1, 2017 actuarial valuation, the STRS Ohio Board adopted several assumption changes, including changes to:
 - Inflation assumption lowered from 2.75% to 2.50%;
 - Investment return assumption lowered from 7.75% to 7.45%;
 - Total salary increases rates lowered by decreasing the merit component of the individual salary increases, as well as by 0.25% due to lower inflation;
 - Payroll growth assumption lowered to 3.00%;
 - Updated the healthy and disabled mortality assumption to the “RP-2014” mortality tables with generational improvement scale MP-2016 ;
 - Rates of retirement, termination and disability were modified to better reflect anticipated future experience.

In addition, effective July 1, 2017, the COLA was reduced to zero.

The net impact of these changes was to lower the liability estimate by \$5.9 billion and to lower the funding period by 5.0 years.

2. The employer contribution rate for the fiscal year beginning July 1, 2017, is equal to 14% of payroll, of which the entire amount is allocated to pension and survivor benefits. The effective amortization period to fully amortize the unfunded actuarial accrued liability is 18.4 years.
3. The funded ratio based on the actuarial value of assets over the actuarial accrued liability as of July 1, 2017 is 75.1%, compared to 69.6% as of July 1, 2016. This ratio is a measure of funded status, and its history is a measure of funding progress.
4. For the year ended June 30, 2017, Segal has determined that the asset return on a market value basis was 14.06%. After gradual recognition of investment gains and losses under the actuarial smoothing method, the actuarial rate of return was 9.03%. This represents an experience gain when compared to the assumed rate of 7.75% for the fiscal year ended June 30, 2017. As of June 30, 2017, the actuarial value of assets (\$72.2 billion) represented 99.8% of the market value (\$72.4 billion).
5. The portion of deferred investment gains and losses recognized during the calculation of the July 1, 2017, actuarial value of assets contributed to a gain of \$857 million. The demographic and liability experience resulted in a \$411 million gain.

SECTION 1: Actuarial Valuation Summary as of July 1, 2017, for the State Teachers Retirement System of Ohio

6. As page 13 of this report indicates, the total investment gain not yet recognized as of June 30, 2017, is \$155 million. These unrecognized gains will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years, to the extent they are not offset by recognition of losses derived from future experience. This means that earning the assumed rate of investment return of 7.45% per year (net of investment expenses) on a market value basis will result in investment gains on the actuarial value of assets in the next few years.
7. As mentioned above, the current method used to determine the actuarial value of assets yields an amount that is 99.8% of the market value of assets as of June 30, 2017. Guidelines in Actuarial Standard of Practice No. 44 (Selection and Use of Asset Valuation Methods for Pension Valuations) recommend that asset values fall within a reasonable range around the corresponding market value. The actuarial asset method complies with this guideline.
8. The System's cash flow (contributions minus benefit payments, refunds, and expenses) as a percentage of the market value of assets is -5.7% as of June 30, 2017, compared to -6.6% as of June 30, 2016. The increase in net cash flow is primarily due to the growth of the asset base from investment gains in fiscal 2017.
9. This actuarial valuation report as of July 1, 2017, is based on financial data as of that date. Changes in the value of assets subsequent to that date are not reflected.
10. When measuring pension liability for GASB purposes, the same actuarial cost method (Entry Age Normal) is used to determine the funded status of the System, the actuarially determined contribution rate, and the effective amortization period. In addition, the GASB blended discount rate calculation results in the same discount rate (expected return on assets) as used for funding purposes (7.45%). This means that the Total Pension Liability (TPL) measure for financial reporting shown in this report is determined on the same basis as the Actuarial Accrued Liability (AAL) measure for funding. We note that the same is true for the Normal Cost component of the annual plan cost for funding and financial reporting.
11. The Net Pension Liability (NPL) is equal to the difference between the TPL and the Plan's Fiduciary Net Position. The Plan's Fiduciary Net Position is equal to the market value of assets and therefore, the NPL measure is the same as the Unfunded Actuarial Accrued Liability on a market value basis. The NPL decreased from \$33.5 billion as of June 30, 2016, to \$23.8 billion as of June 30, 2017.

SECTION 1: Valuation Summary for the State Teachers Retirement System of Ohio

Summary of Key Valuation Results (\$ in thousands)

	2017			2016
	Defined Benefit	Combined	Total	Total
Membership Data				
1. Number of Members				
a. Active Members				
(i) Defined Benefit	162,056	6,076	168,132	169,212
(ii) Defined Contribution	9,330	-	9,330	9,182
b. Reemployed Retirees	25,009	-	25,009	26,228
c. Inactive Members				
(i) Eligible for Allowances	17,874	529	18,403	17,627
(ii) Eligible for Refunds Only	137,967	1,566	139,533	135,738
d. Retirees and Beneficiaries	<u>157,713</u>	<u>326</u>	<u>158,039</u>	<u>157,938</u>
e. Total	509,949	8,497	518,446	515,925
2. Annualized Salaries (for period beginning July 1)	\$10,309,717	\$358,464	\$10,668,181	\$10,475,294
3. Membership Payroll				
a. STRS Defined Benefit Plan Members	\$10,122,174	\$337,532	\$10,459,706	\$10,069,268
b. STRS Defined Contribution Plan Members	392,619	-	392,619	358,345
c. Alternative Retirement Plan Members	<u>704,822</u>	<u>-</u>	<u>704,822</u>	<u>671,994</u>
d. Total	\$11,219,615	\$337,532	\$11,557,147	\$11,099,607
4. Annual Allowances	\$6,953,082	\$2,227	\$6,955,309	\$6,896,162
Valuation Results				
5. Actuarial Accrued Liability				
a. Active Members	\$23,033,718	\$207,522	\$23,241,241	\$23,667,431
b. Reemployed Retirees	420,386	-	420,386	401,617
c. Inactive Members	1,478,055	10,846	1,488,902	1,371,477
d. Retirees and Beneficiaries				
(i) Annuity and Pension Reserve Fund	68,584,991	25,257	68,610,248	73,126,032
(ii) Survivors' Benefit Fund	<u>1,113,146</u>	<u>-</u>	<u>1,113,146</u>	<u>1,156,560</u>
(iii) Subtotal	69,698,136	25,257	69,723,394	74,282,592
e. Total	\$94,630,296	\$243,626	\$94,873,922	\$99,723,117
6. Defined Contribution Account Balances	<u>1,252,519</u>	<u>-</u>	<u>1,252,519</u>	<u>1,033,305</u>
7. Total Actuarial Accrued Liability	\$95,882,815	\$243,626	\$96,126,440	\$100,756,422

SECTION 1: Valuation Summary for the State Teachers Retirement System of Ohio

Summary of Key Valuation Results (continued) (\$ in thousands)

	2017			2016
	Defined Benefit	Combined	Total	Total
Valuation Results				
8. Total Actuarial Accrued Liability	\$95,882,815	\$243,626	\$96,126,440	\$100,756,422
9. Actuarial Value of Pension Assets			<u>72,216,212</u>	<u>70,114,637</u>
10. Unfunded Actuarial Accrued Liability			\$23,910,228	\$30,641,786
11. Funding Period			18.4 years	26.6 years
12. Funded Status			75.1%	69.6%
13. Normal Cost Rate	10.65%	4.73%	10.45%	10.58%
14. Member Contribution Rate	14.00%	2.00%	13.61%	13.63%
Allocation of Employer Contribution Rate				
15. Employer Contribution Rate				
a. Normal Cost	-3.35%	2.73%	-3.16%	-3.05%
b. Unfunded Actuarial Accrued Liability	<u>17.35%</u>	<u>11.27%</u>	<u>17.16%</u>	<u>17.05%</u>
c. Total Pension	14.00%	14.00%	14.00%	14.00%
d. Health Care	0.00%	0.00%	0.00%	<u>0.00%</u>
e. Total	14.00%	14.00%	14.00%	14.00%

Note: numbers may not add due to rounding.

SECTION 1: Valuation Summary for the State Teachers Retirement System of Ohio

Summary of Key Valuation Results – Before and After Changes (\$ in thousands)

	2017		
	Old Assumptions	New Assumptions	New Assumptions / No COLA
Valuation Results			
1. Actuarial Accrued Liability – Defined Benefit Plan			
a. Active Members (including Reemployed Retirees)	\$25,150,003	\$26,447,596	\$23,454,104
b. Inactive Members	1,474,845	1,520,909	1,478,055
c. Retirees and Beneficiaries	<u>73,862,989</u>	<u>79,013,748</u>	<u>69,698,136</u>
d. Total	\$100,487,837	\$106,982,253	\$94,630,296
2. Actuarial Accrued Liability – Combined Plan			
a. Active Members	\$211,558	\$209,255	\$207,522
b. Inactive Members	9,963	10,846	10,846
c. Retirees	<u>23,846</u>	<u>25,257</u>	<u>25,257</u>
d. Total	\$245,367	\$245,359	\$243,626
3. Actuarial Accrued Liability – Defined Benefit and Combined Plans	\$100,733,205	\$107,227,613	\$94,873,922
4. Defined Contribution Account Balances	<u>1,252,519</u>	<u>1,252,519</u>	<u>1,252,519</u>
5. Total Actuarial Accrued Liability	\$101,985,724	\$108,480,131	\$96,126,440
6. Actuarial Value of Pension Assets	<u>72,216,212</u>	<u>72,216,212</u>	<u>72,216,212</u>
7. Unfunded Actuarial Accrued Liability	\$29,769,511	\$36,263,919	\$23,910,228
8. Funding Period	23.4 years	50.4 years	18.4 years
9. Funded Status	70.8%	66.6%	75.1%
10. Normal Cost Rate			
a. Normal Cost Rate – Defined Benefit Plan	10.65%	11.92%	10.65%
b. Normal Cost Rate – Combined Plan	<u>4.54%</u>	<u>4.77%</u>	<u>4.73%</u>
c. Normal Cost Rate – Total	10.44%	11.68%	10.45%
11. Member Contribution Rate	13.61%	13.61%	13.61%
Allocation of Employer Contribution Rate			
12. Employer Contribution Rate			
a. Employer Normal Cost Rate	-3.17%	-1.93%	-3.16%
b. Unfunded Actuarial Accrued Liability Rate	<u>17.17%</u>	<u>15.93%</u>	<u>17.16%</u>
c. Total Pension Rate	14.00%	14.00%	14.00%
d. Health Care Rate	<u>0.00%</u>	<u>0.00%</u>	<u>0.00%</u>
e. Total Employer Contribution Rate	14.00%	14.00%	14.00%

SECTION 1: Valuation Summary for the State Teachers Retirement System of Ohio

Important Information About Actuarial Valuations

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

In order to prepare a valuation, Segal Consulting (“Segal”) relies on a number of input items. These include:

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

SECTION 1: Valuation Summary for the State Teachers Retirement System of Ohio

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

- The actuarial valuation is prepared at the request of STRS Ohio's Board. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is an estimate of the System's assets and liabilities at a specific date under a specific set of assumptions. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the System will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- If STRS Ohio's Board is aware of any event or trend that was not considered in the valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the System's provisions, but they may be subject to alternative interpretations. STRS Ohio should look to their other advisors for expertise in these areas.
- The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; 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); and changes in plan provisions or applicable law.

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

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

A. MEMBER DATA

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active members, retirees, and beneficiaries.

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

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

A historical perspective of how the population has changed over past valuations can be seen in this chart.

CHART 1
Member Population: 2008 – 2017

Year Ended June 30	Active Members*	Reemployed Retirees	Inactive Members Eligible for Allowances	Inactive Members Eligible for Refunds Only	Retirees and Beneficiaries	Ratio of Actives to Retirees and Beneficiaries
2017	168,132	25,009	18,403	139,533	158,039	1.06
2016	169,212	26,228	17,627	135,738	157,938	1.07
2015	164,925	24,806	17,453	135,215	158,116	1.04
2014	169,295	25,156	17,036	134,844	152,208	1.11
2013	169,945	24,228	17,081	136,105	149,221	1.14
2012	173,044	23,879	17,325	134,974	143,256	1.21
2011	177,897	23,156	16,990	134,301	138,088	1.29
2010	175,842	23,651	17,377	135,721	133,103	1.32
2009	174,807	22,189	17,980	133,561	129,659	1.35
2008	173,327	21,467	18,300	123,259	126,506	1.37

**Excludes defined contribution only members.*

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Active Members

Plan costs are affected by the age, years of service, and compensation of active members. In this year's valuation, there were 168,132 active members with an average age of 43.5 and 12.3 average years of service. The 169,212 active members in the prior valuation had an average age of 43.2 and 11.9 average years of service.

Inactive Members

In this year's valuation, there were 18,403 participants with a vested right to a deferred benefit.

In addition, there were 139,533 participants entitled to a return of their employee contributions

CHART 2
Distribution of Active Members by Age as of June 30, 2017*

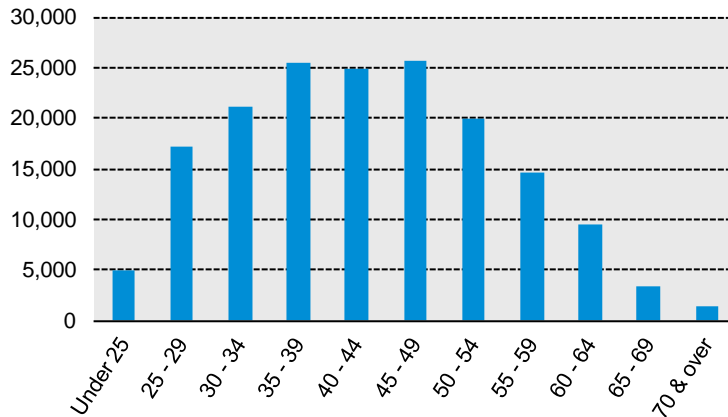
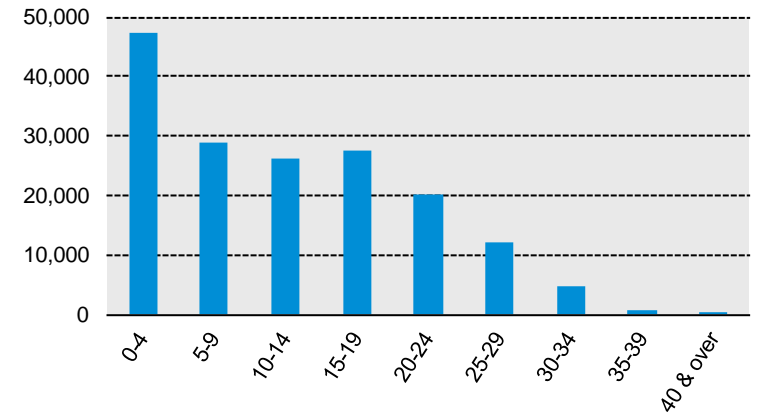


CHART 3
Distribution of Active Members by Years of Service as of June 30, 2017*



* Excludes defined contribution only members.

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

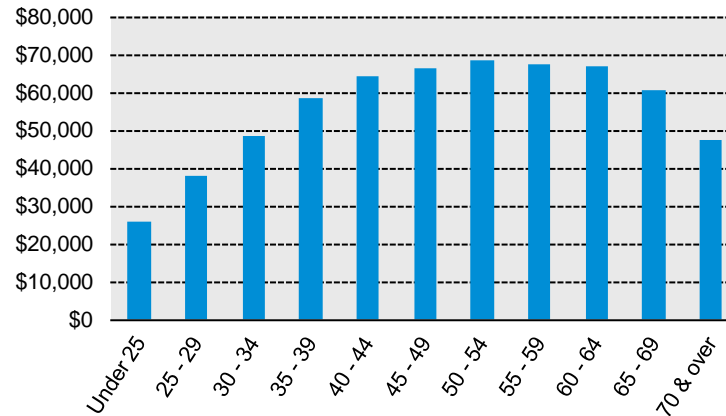
Distribution of Active Members by Age and Average Compensation*

In this year's valuation, there were 168,132 active members with an average compensation of \$58,540. The 169,212 active members in the prior valuation had an average compensation of \$56,510.

These charts show a distribution of active members by age and by average compensation.

CHART 4

Distribution of Active Members by Age and Average Compensation as of June 30, 2017



* Excludes defined contribution only members.

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Retirees and Beneficiaries

As of June 30, 2017, 140,944 retirees and 17,095 beneficiaries were receiving total annual benefits of \$6,955,308,807. For comparison, in the previous valuation, there were 141,278 retirees and 16,660 beneficiaries receiving annual benefits of \$6,896,162,167.

These charts show the distribution of the current retirees and beneficiaries based on their age and annual amount, by type of pension.

CHART 5
Distribution of Retirees and Beneficiaries by Type and by Annual Amount as of June 30, 2017

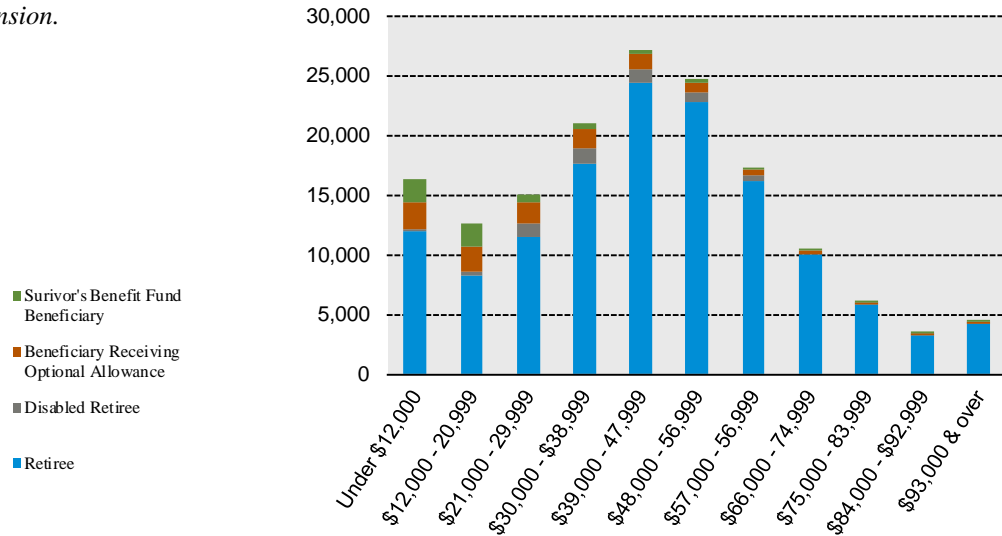
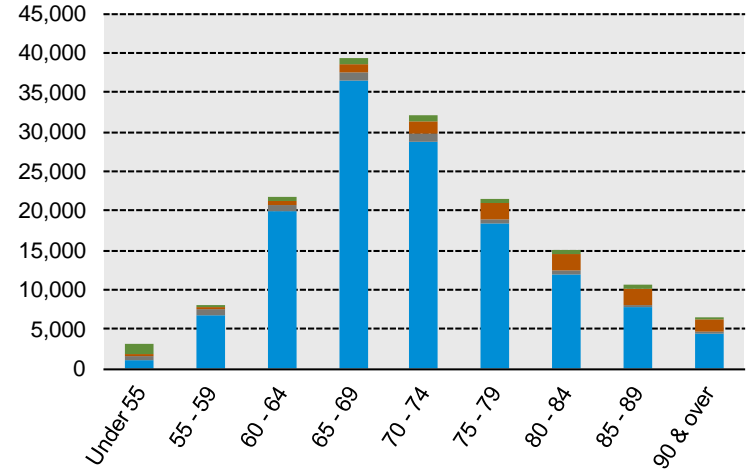


CHART 6
Distribution of Retirees and Beneficiaries by Type and Age as of June 30, 2017



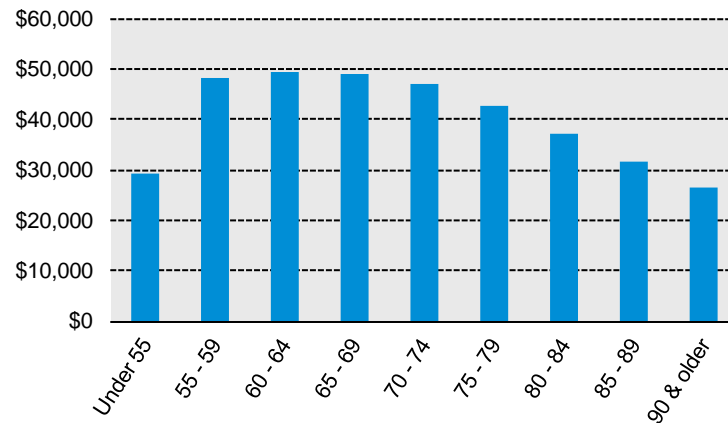
SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Distribution of Retirees and Beneficiaries by Age and Average Monthly Benefit Amount

As of June 30, 2017, the average annual benefit amount among 140,944 retirees and 17,095 beneficiaries was \$44,010. In the previous valuation, the average annual benefit amount among 141,278 retirees and 16,660 beneficiaries was \$43,664.

These charts show a distribution of retirees and beneficiaries by age and by annual amount.

CHART 7
Distribution of Retirees and Beneficiaries by Age and Average Annual Amount as of June 30, 2017



SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

B. FINANCIAL INFORMATION

It is desirable to have level and predictable plan costs from one year to the next. For this reason, STRS Ohio’s Board utilizes an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative.

Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

This chart shows the determination of the actuarial value of assets as of the valuation date.

CHART 8
Determination of Actuarial Value of Assets for Years Ended June 30, 2017 and June 30, 2016
(\$ in thousands)

			2017		2016
1. Market value of Defined Benefit and Combined Plan assets			\$71,118,707		\$66,250,103
2. Calculation of unrecognized return*	<u>Original Amount**</u>	<u>% Not Recognized</u>		<u>% Not Recognized</u>	
(a) Year ended June 30, 2017	\$3,843,661	75%	\$2,882,746		
(b) Year ended June 30, 2016	-4,778,548	50%	-2,389,274	75%	-\$3,583,911
(c) Year ended June 30, 2015	-1,353,832	25%	-338,458	50%	-676,916
(d) Year ended June 30, 2014	5,718,392	0%	<u>0</u>	25%	1,429,598
(e) Year ended June 30, 2013	3,511,028			0%	<u>0</u>
(f) Total unrecognized return			\$155,014		-\$2,831,229
3. Actuarial value of Defined Benefit Plan assets: (1) – (2f)			<u>\$70,963,693</u>		<u>\$69,081,332</u>
4. Adjustment for 91% /109% corridor			0		0
5. Adjusted actuarial value of Defined Benefit Plan assets			70,963,693		69,081,332
6. Defined Contribution Plan assets			<u>1,252,519</u>		<u>1,033,305</u>
7. Total Actuarial Value of Assets: (5) + (6)			<u>\$72,216,212</u>		<u>\$70,114,637</u>
8. Market Value of Assets – total fund excluding health care assets			\$72,371,226		\$67,283,408
9. Actuarial value as a percent of market value: (7) ÷ (8)			<u>99.8%</u>		<u>104.2%</u>

* Recognition at 25% per year over four years

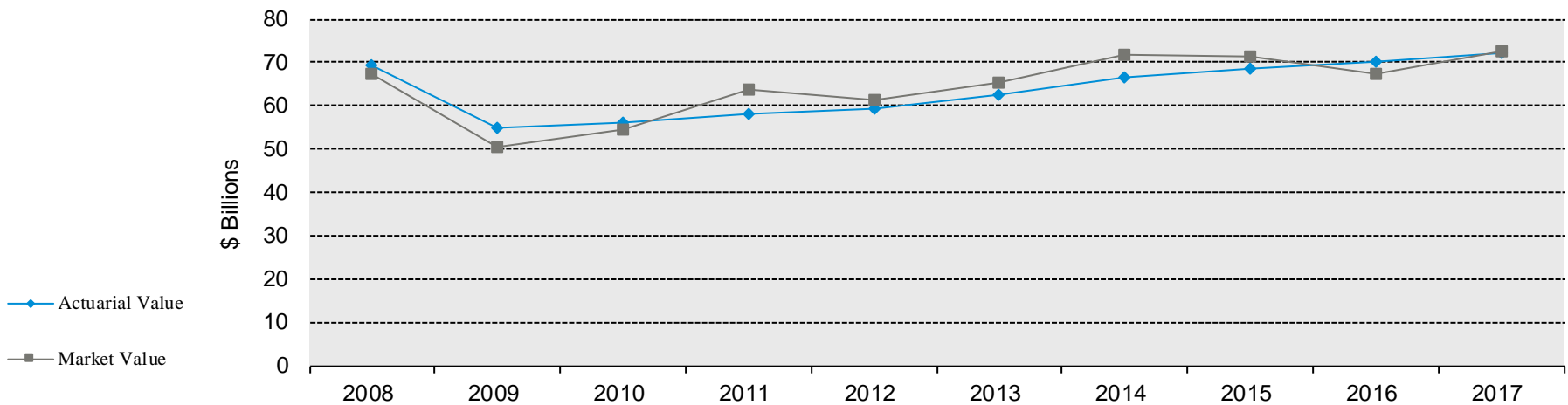
**Actual market return minus expected return on actuarial value of assets

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Both the actuarial value and market value of assets are a representation of the STRS Ohio's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because STRS Ohio's liabilities are compared to these assets to determine what portion, if any, remains unfunded.

CHART 9

Actuarial Value of Assets vs. Market Value of Assets as of June 30, 2008 - 2017



SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Investment Rate of Return

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the STRS Ohio's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets for the Plan Year ended June 30, 2017 is 7.75% (changed to 7.45%, effective July 1, 2017). The actual rate of return on an actuarial basis for the Plan Year ended June 30, 2017, was 9.03%.

Since the actual return for the year on an actuarial basis was greater than the assumed return, the STRS Ohio experienced an actuarial gain during the year ended June 30, 2017, with regard to its investments.

This chart shows the portion of the gain due to investment experience.

CHART 10

**Actuarial Value Investment Experience for the Year Ended June 30, 2017
(\$ in thousands)**

1. Net investment income	\$6,049,736
2. Average actuarial value of assets	66,997,645
3. Rate of return: (1) ÷ (2)	9.03%
4. Assumed rate of return	7.75%
5. Expected net investment income: (2) x (4)	\$5,192,317
6. Actuarial gain: (1) – (5)	<u>\$857,418</u>

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

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

CHART 11
Investment Return

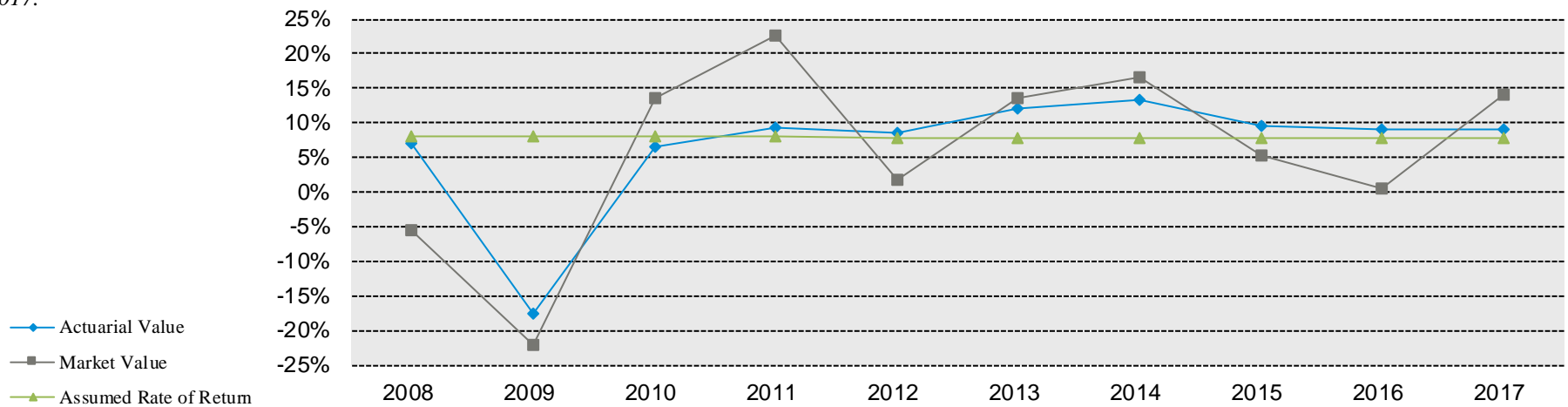
Year Ended June 30	Market Value	Actuarial Value
2017	14.1%	9.0%
2016	0.4	8.9
2015	5.2	9.5
2014	16.5	13.3
2013	13.5	12.1
2012	1.7	8.5
2011	22.5	9.2
2010	13.5	6.6
2009	-22.0	-17.7
2008	-5.6	7.0
2007	20.6	18.4
2006	13.5	11.0
2005	11.9	5.7
2004	17.2	9.4
2003	1.8	1.6
2002	-8.3	-7.8
2001	-6.5	6.7
2000	10.3	13.1
1999	12.5	13.4
1998	14.2	14.3
Average Returns		
Last 5 years:	9.7%	10.5%
Last 10 years:	5.2%	6.3%
Last 15 years:	7.7%	7.2%
Last 20 years:	6.7%	7.3%

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

The actuarial asset valuation method gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.

This chart illustrates how this leveling effect has actually worked over the years 2008 – 2017.

CHART 12
Market Value and Actuarial Rates of Return for Years Ended June 30, 2008 - 2017



SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Cash Flow

Cash flow is the difference between contributions and benefit payments, refunds, and expenses. Negative cash flow indicates that the payments made from the System exceed contributions made to the System.

CHART 13

History of Cash Flow (\$ in thousands)

Year Ending June 30,	Disbursements or Expenditures				Total Disbursement	Net Cash Flow for the Year ²	Market Value of Assets	Net Cash Flow as Percent of Market Value
	Contributions ¹	Benefit Payments	Refunds	Administrative Expenses				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2017	\$3,128,545	(\$6,989,166)	(\$221,841)	(\$63,652)	(\$7,274,659)	(\$4,146,114)	\$72,371,226	-5.7%
2016	2,917,135	(7,085,042)	(232,069)	(67,066)	(7,384,177)	(4,467,042)	67,283,408	-6.6%
2015	2,853,929	(6,662,232)	(228,630)	(61,183)	(6,952,046)	(4,098,117)	71,377,579	-5.7%
2014	2,702,249	(6,504,675)	(220,341)	(60,991)	(6,786,007)	(4,083,758)	71,843,596	-5.7%
2013	2,491,122	(6,152,335)	(206,491)	(59,450)	(6,418,277)	(3,927,155)	65,392,510	-6.0%
2012	2,511,482	(5,741,042)	(183,768)	(58,760)	(5,983,569)	(3,472,088)	61,261,323	-5.7%
2011	2,566,848	(5,244,407)	(166,020)	(58,701)	(5,469,128)	(2,902,280)	63,635,912	-4.6%
2010	2,537,505	(4,900,418)	(126,981)	(59,284)	(5,086,684)	(2,549,179)	54,524,225	-4.7%
2009	2,481,032	(4,613,751)	(129,290)	(58,935)	(4,801,976)	(2,320,944)	50,392,731	-4.6%
2008	2,411,593	(4,338,618)	(142,918)	(59,707)	(4,541,242)	(2,129,649)	67,144,639	-3.2%

¹ Column (2) includes employee and employer contributions, as well as any purchased service credits during the year.

² Column (7) = Column (2) + Column (6).

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include, but are not limited to:

- payroll growth different than assumed,
- salary/service increases different than assumed,
- retirement experience (earlier or later than expected),
- the extent of turnover among the participants,
- mortality (more or fewer deaths than expected), and
- new entrants.

The net gain from this other experience for the year ended June 30, 2017, amounted to \$411 million, which is approximately 0.4% of the actuarial accrued liability.

This chart shows elements of experience gain/(loss) for the most recent year.

CHART 14

Experience Due to Changes in Demographics for Year Ended June 30, 2017 (\$ in thousands)

1. Payroll growth	\$7,091
2. Salary/service increases	279,058
3. Retirement experience	-36,321
4. Plan reselection	-1,403
5. Retiree mortality	27,307
6. Impact of reducing COLA to zero in 2017	415,862
7. New entrants	-36,437
8. Miscellaneous	<u>-244,164</u>
9. Total	<u>\$410,993</u>

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

C. DEVELOPMENT OF ACTUARIALLY DETERMINED CONTRIBUTION

The amount of Actuarially Determined Contribution is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability. This total amount is then divided by the projected payroll for active members to determine the Actuarially Determined Contribution of 6.94% of payroll.

Under the Board’s funding policy, effective July 1, 2015, the amortization of the unfunded actuarial accrued liability was set to 30 years and declines by one year in each subsequent valuation. As of July 1, 2017, the amortization period has 28 years remaining,

CHART 15
Actuarially Determined Contribution (% of Payroll)

	Year Beginning July 1	
	2017	2016
1. Total normal cost rate	10.45%	10.58%
2. Less: member contribution rate	<u>-13.61</u>	<u>-13.63</u>
3. Employer normal cost rate	(3.16%)	(3.05%)
4. Amortization of unfunded actuarial accrued liability	<u>10.10</u>	<u>13.12</u>
5. Actuarially Determined Contribution: (3) + (4)	6.94%	10.07%
6. Statutory Employer Contribution	<u>14.00</u>	<u>14.00</u>
7. Contribution Sufficiency/(Deficiency): (6) - (5)	7.06%	3.93%

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

D. 10-YEAR HISTORY OF PRINCIPAL FINANCIAL RESULTS

Net Gain (Loss)

The results of the valuation as of July 1, 2017, determine the net gain or loss for the year ended June 30, 2017. The net gain due to plan experience during the prior year is \$1,268 million.

This chart shows a 10-year history of the net gains or losses.

Chart 16

Ten-Year History of Gains or (Losses) (\$ in millions)

Fiscal Year Ended June 30	Net Gain or (Loss)
2017	\$1,268
2016	290
2015	(232)
2014	3,178
2013	2,092
2012	(3,982)
2011	181
2010	(279)
2009	(17,801)
2008	(894)

SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Funding Period

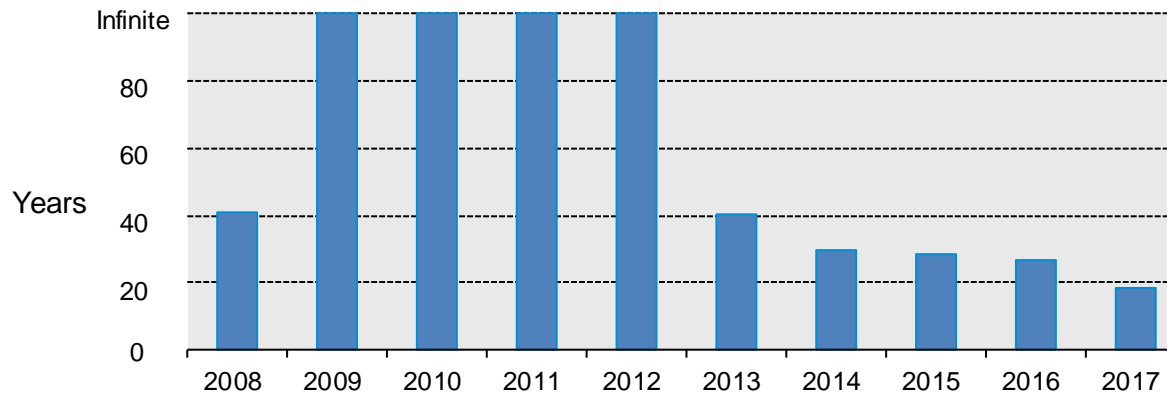
The funding period is the number of years required to liquidate the unfunded actuarial accrued liability.

The following table shows a ten-year history of the funding period along with the member and employer contribution rates:

Valuation as of July 1	Funding Period Years	Contribution Rate	
		Member	Employer
2017	18.4	14.00%	14.00%
2016	26.6	14.00%	14.00%
2015	28.4	13.00%	14.00%
2014	29.5	12.00%	14.00%
2013	40.2	11.00%	14.00%
2012	Infinite	10.00%	14.00%
2011	Infinite	10.00%	14.00%
2010	Infinite	10.00%	14.00%
2009	Infinite	10.00%	14.00%
2008	41.2	10.00%	14.00%

CHART 17

Funding Period, Years Ended June 30



SECTION 2: Actuarial Valuation Results as of July 1, 2017, for the State Teachers Retirement System of Ohio

Funded Ratio

The System’s funded status is measured by comparing the actuarial value of assets with the actuarial accrued liability. The actuarial accrued liability is the present value of benefits accumulated to date under the System’s funding method and reflects future pay increases for active employees.

On this basis, the System’s funded ratio is 75.1% as of July 1, 2017. The funded ratio is based on the actuarial value of assets of \$72.2 billion and an actuarial accrued liability of \$96.1 billion.

Valuation as of July 1	Actuarial Accrued Liability (\$ in millions)	Actuarial Value of Assets (\$ in millions)	Unfunded Actuarial Accrued Liability (\$ in millions)	Funded Ratio
2017	\$96,126.4	\$72,216.2	\$23,910.2	75.1%
2016	100,756.4	70,114.6	30,641.8	69.6%
2015	99,014.7	68,656.0	30,358.7	69.3%
2014	96,167.1	66,657.2	29,509.9	69.3%
2013	94,366.7	62,590.8	31,775.9	66.3%
2012	106,301.8	59,489.5	46,812.3	56.0%
2011	98,766.2	58,110.5	40,655.7	58.8%
2010	94,720.7	55,946.3	38,774.4	59.1%
2009	91,441.0	54,902.9	36,538.1	60.0%
2008	87,432.3	69,198.0	18,234.3	79.1%

CHART 18
Actuarial Accrued Liability and Actuarial Value of Assets, Years Ended June 30

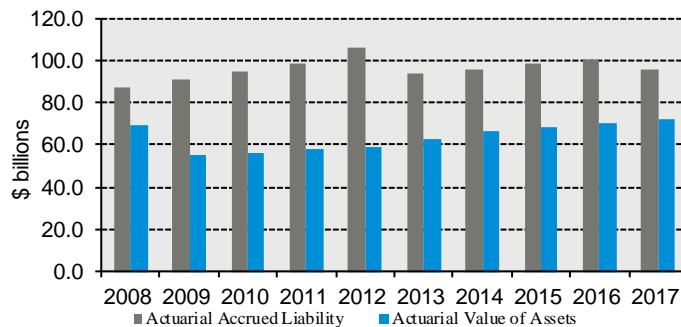
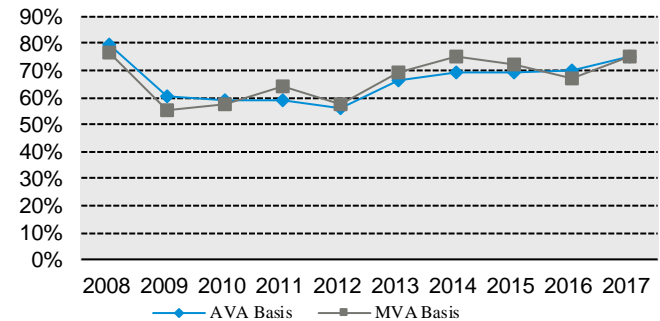


CHART 19
Funded Ratio, Years Ended June 30



SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

MEMBERSHIP DATA*

Membership data was provided on electronic files sent by the STRS Ohio staff. Data for active members includes gender, birth date, service, salary for the prior fiscal year, and accumulated contributions. Data for inactive members was similar, but also includes account balances. For retired members, data includes status (service retiree, disabled retiree or beneficiary), gender, birth date, pension amount, date of retirement, form of payment, and beneficiary gender and birth date if applicable.

While not verifying the correctness of the data at the source, we performed various tests to ensure the internal consistency of the data and its overall reasonableness.

Membership statistics are summarized in Exhibit A. Exhibits B-1, B-2 and B-3 summarize the age/service distribution of active members of the Defined Benefit and Combined Plans. Exhibits C-1 and C-2 show the distribution of retirees by gender, age and by benefit amount. Exhibit D summarizes the 10-year history of benefit recipients added to and removed from the rolls. Exhibit E summarizes 10-year history of membership data. Exhibit F shows 10-year payout projection of benefit payments. Exhibit G shows a reconciliation of the member data from last year's valuation to this year's valuation.

The number of active members decreased by 0.6% since last year, from 169,212 to 168,132. Note that normally the actual number of members employed during the year will be somewhat higher than the valuation count.

Total payroll increased 3.9% since last year (excluding defined contribution and alternative retirement plan (ARP) participants). For all comparative purposes, payroll is the amount supplied by the STRS Ohio staff.

Average salary increased by 3.6%, from \$56,510 to \$58,540. This includes the impact of replacing more highly paid members who retire with new teachers. The average increase in salary for the 153,684 continuing members (members active in both this valuation and the preceding valuation) was 5.1%.

The average age of active members increased from 43.2 years to 43.5 years, and their average service increased from 11.9 to 12.3.

* Excludes defined contribution only members.

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

The table below shows additional information about the active membership this year and last year. Grandfathered members are those who are eligible to retire as of July 1, 2015.

In addition, this table shows the number of members who are non-vested, those who are vested but not eligible for retirement, and those eligible for a service retirement benefit. As of the valuation date, 17,526 members were eligible for either reduced or unreduced retirement.

Active Statistics		
	July 1, 2017	July 1, 2016
Plan Eligibility		
a. Grandfathered	11,463	13,430
b. Non-grandfathered	<u>156,669</u>	<u>155,782</u>
c. Total	168,132	169,212
Benefit Eligibility		
a. Non-Vested	47,468	49,953
b. Vested, Not Eligible for Retirement	103,138	102,434
c. Service Retirement	<u>17,526</u>	<u>16,825</u>
d. Total	168,132	169,212

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT A

Summary of Membership Data as of July 1, 2017 (\$ in thousands)

	Male	Female	Total
1. Defined Benefit Plan Active Members			
Number of Members	46,131	115,925	162,056
Annual Salaries (for period ending June 30, 2017)	\$2,913,921	\$6,600,162	\$9,514,083
Average Age	44.41	43.25	43.58
Average Service	12.39	12.42	12.41
2. Combined Plan Active Members			
Number of Members	1,322	4,754	6,076
Annual Salaries (for period ending June 30, 2017)	\$78,265	\$250,040	\$328,305
Average Age	43.20	40.88	41.38
Average Service	7.93	8.35	8.26
3. Total Defined Benefit and Combined Plan Active Members			
Number of Members	47,453	120,679	168,132
Annual Salaries (for period ending June 30, 2017)	\$2,992,186	\$6,850,202	\$9,842,388
Average Age	44.38	43.15	43.50
Average Service	12.26	12.26	12.26
4. Defined Benefit Inactive Members			
Eligible for Allowances	4,382	13,492	17,874
Eligible for Refunds Only	49,995	87,972	137,967
Total	54,377	101,464	155,841
5. Combined Benefit Inactive Members			
Eligible for Allowances	98	431	529
Eligible for Refunds Only	419	1,147	1,566
Total	517	1,578	2,095
6. Total Inactive Members			
Eligible for Allowances	4,480	13,923	18,403
Eligible for Refunds Only	50,414	89,119	139,533
Total	54,894	103,042	157,936

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT A

Summary of Membership Data as of July 1, 2017 (continued) (\$ in thousands)

	Male	Female	Total
7. Retirees			
Number of Members	45,465	89,981	135,446
Annual Allowance	\$2,426,515	\$3,849,700	\$6,276,215
Average Allowance (in dollars)	\$53,371	\$42,783	\$46,337
8. Disabled Retirees			
Number of Members	1,702	3,796	5,498
Annual Allowance	\$71,578	\$138,504	\$210,082
Average Allowance (in dollars)	\$42,055	\$36,487	\$38,211
9. Beneficiaries Receiving Optional Allowances			
Number of Members	2,821	8,314	11,135
Annual Allowance	\$64,729	\$278,210	\$342,939
Average Allowance (in dollars)	\$22,945	\$33,463	\$30,798
10. Survivors' Benefit Fund Beneficiaries			
Number of Members	2,655	3,305	5,960
Annual Allowance	\$49,317	\$76,755	\$126,072
Average Allowance (in dollars)	\$18,575	\$23,224	\$21,153
11. Total Retirees and Beneficiaries			
Number of Members	52,643	105,396	158,039
Annual Allowance	\$2,612,139	\$4,343,170	\$6,955,309
Average Allowance (in dollars)	\$49,620	\$41,208	\$44,010

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT B-1

Active Membership Data as of July 1, 2017 – Number and Average Annual Salary

Age	Defined Benefit and Combined Plans									
	Years of Service									
	Total	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & over
Under 25	4,924	4,924	-	-	-	-	-	-	-	-
	\$25,675	\$25,675	-	-	-	-	-	-	-	-
25 - 29	17,192	13,570	3,621	1	-	-	-	-	-	-
	\$37,769	\$34,997	\$48,151	\$57,503	-	-	-	-	-	-
30 - 34	21,195	7,248	9,777	4,170	-	-	-	-	-	-
	\$48,596	\$36,453	\$52,356	\$60,885	-	-	-	-	-	-
35 - 39	25,526	5,706	4,789	9,847	5,183	1	-	-	-	-
	\$58,297	\$36,316	\$55,057	\$65,182	\$72,409	\$63,080	-	-	-	-
40 - 44	24,886	4,502	3,106	3,761	10,065	3,452	-	-	-	-
	\$63,999	\$32,643	\$55,041	\$66,482	\$74,793	\$78,776	-	-	-	-
45 - 49	25,724	3,990	2,731	3,013	4,771	8,676	2,543	-	-	-
	\$66,261	\$29,412	\$51,909	\$64,421	\$73,922	\$79,433	\$82,360	-	-	-
50 - 54	19,920	2,671	1,983	2,234	2,923	3,228	5,271	1,609	1	-
	\$68,482	\$28,576	\$49,266	\$64,059	\$74,142	\$80,051	\$82,913	\$83,765	\$90,470	-
55 - 59	14,625	2,031	1,396	1,731	2,592	2,467	2,192	1,975	241	-
	\$67,606	\$26,226	\$46,371	\$61,512	\$72,176	\$78,663	\$88,639	\$85,810	\$80,291	-
60 - 64	9,417	1,455	930	1,057	1,637	1,714	1,583	805	213	23
	\$66,856	\$21,685	\$41,957	\$58,169	\$70,994	\$78,095	\$89,448	\$102,674	\$100,672	\$76,521
65 & over	4,723	1,371	615	480	493	540	541	416	168	99
	\$56,933	\$13,441	\$27,952	\$46,955	\$74,191	\$82,064	\$96,201	\$109,396	\$128,334	\$108,414
Total	168,132	47,468	28,948	26,294	27,664	20,078	12,130	4,805	623	122
	\$58,540	\$31,951	\$51,170	\$63,647	\$73,647	\$79,281	\$85,278	\$89,992	\$100,231	\$102,401

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT B-2

Active Membership Data as of July 1, 2017 – Number and Average Annual Salary

Age	Defined Benefit Plan									
	Years of Service									
	Total	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & over
Under 25	4,621	4,621	-	-	-	-	-	-	-	-
	\$25,415	\$25,415	-	-	-	-	-	-	-	-
25 - 29	16,361	12,911	3,449	1	-	-	-	-	-	-
	\$37,656	\$34,835	\$48,209	\$57,503	-	-	-	-	-	-
30 - 34	20,366	6,952	9,412	4,002	-	-	-	-	-	-
	\$48,457	\$36,015	\$52,365	\$60,877	-	-	-	-	-	-
35 - 39	24,462	5,414	4,616	9,447	4,984	1	-	-	-	-
	\$58,231	\$35,742	\$54,993	\$65,243	\$72,369	\$63,080	-	-	-	-
40 - 44	24,048	4,279	2,958	3,614	9,789	3,408	-	-	-	-
	\$64,019	\$32,166	\$54,705	\$66,319	\$74,759	\$78,811	-	-	-	-
45 - 49	24,977	3,741	2,571	2,873	4,604	8,645	2,543	-	-	-
	\$66,537	\$28,920	\$51,673	\$64,301	\$73,852	\$79,430	\$82,360	-	-	-
50 - 54	19,325	2,493	1,891	2,100	2,754	3,206	5,271	1,609	1	-
	\$68,750	\$28,324	\$48,886	\$63,626	\$73,842	\$80,058	\$82,913	\$83,765	\$90,470	-
55 - 59	14,153	1,915	1,328	1,629	2,433	2,440	2,192	1,975	241	-
	\$67,918	\$25,821	\$46,410	\$61,302	\$72,035	\$78,655	\$88,639	\$85,810	\$80,291	-
60 - 64	9,119	1,387	884	991	1,533	1,700	1,583	805	213	23
	\$67,201	\$21,607	\$42,225	\$57,398	\$70,769	\$78,052	\$89,448	\$102,674	\$100,672	\$76,521
65 & over	4,624	1,335	596	452	478	539	541	416	168	99
	\$57,341	\$13,274	\$28,080	\$46,561	\$74,377	\$82,081	\$96,201	\$109,396	\$128,334	\$108,414
Total	162,056	45,048	27,705	25,109	26,575	19,939	12,130	4,805	623	122
	\$58,709	\$31,625	\$51,102	\$63,557	\$73,572	\$79,284	\$85,278	\$89,992	\$100,231	\$102,401

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT B-3

Active Membership Data as of July 1, 2017 – Number and Average Annual Salary

Age	Combined Plan									
	Years of Service									
	Total	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & over
Under 25	303	303	-	-	-	-	-	-	-	-
	\$29,634	\$29,634	-	-	-	-	-	-	-	-
25 - 29	831	659	172	-	-	-	-	-	-	-
	\$39,996	\$38,169	\$46,997	-	-	-	-	-	-	-
30 - 34	829	296	365	168	-	-	-	-	-	-
	\$52,015	\$46,728	\$52,131	\$61,081	-	-	-	-	-	-
35 - 39	1,064	292	173	400	199	-	-	-	-	-
	\$59,813	\$46,950	\$56,770	\$63,755	\$73,407	-	-	-	-	-
40 - 44	838	223	148	147	276	44	-	-	-	-
	\$63,431	\$41,791	\$61,754	\$70,490	\$76,028	\$76,140	-	-	-	-
45 - 49	747	249	160	140	167	31	-	-	-	-
	\$57,018	\$36,804	\$55,700	\$66,881	\$75,834	\$80,267	-	-	-	-
50 - 54	595	178	92	134	169	22	-	-	-	-
	\$59,755	\$32,102	\$57,082	\$70,848	\$79,030	\$79,043	-	-	-	-
55 - 59	472	116	68	102	159	27	-	-	-	-
	\$58,265	\$32,916	\$45,620	\$64,861	\$74,344	\$79,405	-	-	-	-
60 - 64	298	68	46	66	104	14	-	-	-	-
	\$56,290	\$23,266	\$36,803	\$69,752	\$74,319	\$83,330	-	-	-	-
65 & over	99	36	19	28	15	1	-	-	-	-
	\$37,881	\$19,613	\$23,926	\$53,305	\$68,253	\$73,194	-	-	-	-
Total	6,076	2,420	1,243	1,185	1,089	139	-	-	-	-
	\$54,033	\$38,007	\$52,683	\$65,565	\$75,469	\$78,857	-	-	-	-

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT C-1

**Retiree and Beneficiary Membership Data as of July 1, 2017 -
Number and Annual Retirement Allowance**

Group	Number	Annual Allowances as of July 1, 2017		
		Basic	Cost-of-Living Increases	Total
Retired Annuitants				
Males	45,465	\$1,890,554,310	\$535,960,560	\$2,426,514,870
Females	89,981	3,148,415,820	701,284,427	3,849,700,247
Subtotal	135,446	5,038,970,129	1,237,244,987	6,276,215,116
Beneficiaries Receiving Optional Allowances				
Males	2,821	47,177,366	17,551,531	64,728,897
Females	8,314	178,892,685	99,317,351	278,210,036
Subtotal	11,135	226,070,051	116,868,882	342,938,933
Survivors' Benefit Fund Beneficiaries				
Males	2,655	37,061,838	12,255,265	49,317,103
Females	3,305	52,172,839	24,582,402	76,755,241
Subtotal	5,960	89,234,677	36,837,667	126,072,344
Disability Retirees				
Males	1,702	49,704,297	21,873,832	71,578,129
Females	3,796	101,807,547	36,696,738	138,504,285
Subtotal	5,498	151,511,844	58,570,570	210,082,414
Grand Total	<u>158,039</u>	<u>\$5,505,786,701</u>	<u>\$1,449,522,106</u>	<u>\$6,955,308,807</u>

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT C-2

**Retiree And Beneficiary Membership Data as of July 1, 2017 -
Number And Annual Retirement Allowance**

Age Last Birthday	Number	Annual Allowance	Average Annual Allowance
Retired Annuitants			
Under 60	7,793	\$ 390,999,390	\$ 50,173
60 - 64	19,895	1,008,638,944	50,698
65 - 69	36,352	1,815,493,212	49,942
70 - 74	28,797	1,389,698,421	48,258
75 - 79	18,404	812,169,869	44,130
Over 79	<u>24,205</u>	<u>859,215,280</u>	<u>35,497</u>
Total	135,446	\$ 6,276,215,116	\$ 46,337
Beneficiaries Receiving Optional Allowances			
Under 60	481	\$ 12,763,227	\$ 26,535
60 - 64	476	17,977,998	37,769
65 - 69	1,021	39,455,175	38,644
70 - 74	1,535	56,781,603	36,991
75 - 79	1,862	65,025,501	34,922
Over 79	<u>5,760</u>	<u>150,935,429</u>	<u>26,204</u>
Total	11,135	\$ 342,938,933	\$ 30,798
Survivors' Benefit Fund Beneficiaries			
Under 60	1,620	\$ 23,080,493	\$ 14,247
60 - 64	550	13,919,452	25,308
65 - 69	878	23,090,796	26,299
70 - 74	900	22,946,252	25,496
75 - 79	716	16,824,630	23,498
Over 79	<u>1,296</u>	<u>26,210,721</u>	<u>20,224</u>
Total	5,960	\$ 126,072,344	\$ 21,153
Disability Retirees			
Under 60	1,254	\$ 48,253,970	\$ 38,480
60 - 64	885	34,512,118	38,997
65 - 69	1,139	47,544,334	41,742
70 - 74	960	38,723,834	40,337
75 - 79	573	20,753,566	36,219
Over 79	<u>687</u>	<u>20,294,592</u>	<u>29,541</u>
Total	5,498	\$ 210,082,414	\$ 38,211
Grand Total	158,039	\$ 6,955,308,807	\$ 44,010

SECTION 3: Supplemental Information for the State Teachers Retirement System of Ohio

EXHIBIT D

10-Year History of Benefit Recipients Added to and Removed from Rolls

Fiscal Year Ended	Beginning Number of Benefit Recipients	Beginning Annual Allowances (in thousands)	Benefit Recipients Added	Payments Added (in thousands)	Benefit Recipients Removed	Payments Removed (in thousands)	Ending Number of Benefit Recipients	Ending Annual Allowances (in thousands)
2017	157,938	\$6,896,162	3,254	\$155,702	3,153	\$96,555	158,039	\$6,955,309
2016	158,116	6,801,181	2,675	177,665	2,853	82,684	157,938	6,896,162
2015	152,208	6,397,535	9,027	490,598	3,119	86,952	158,116	6,801,181
2014	149,221	6,190,182	5,550	283,768	2,563	76,415	152,208	6,397,535
2013	143,256	5,815,407	8,493	441,942	2,528	67,167	149,221	6,190,182
2012	138,088	5,393,372	8,761	512,952	3,593	90,917	143,256	5,815,407
2011	133,103	4,957,960	7,744	501,900	2,759	66,488	138,088	5,393,372
2010	129,659	4,706,964	7,089	334,654	3,645	83,658	133,103	4,957,960
2009	126,506	4,418,799	6,675	366,645	3,522	78,480	129,659	4,706,964
2008	122,934	4,124,657	7,182	373,385	3,610	79,243	126,506	4,418,799

SECTION 3: Supplementary Information for the State Teachers Retirement System of Ohio

EXHIBIT E

10-Year History of Membership Data

Active Members					
Valuation as of July 1	Number of Active Members	Percentage Change in Membership	Total Annual Payroll (for Period Ending June 30th)	Average Annual Pay	Percentage Increase in Average Pay
2017	168,132	(0.6)%	\$ 9,842,387,599	\$ 58,540	3.6%
2016	169,212	2.6%	9,562,236,960	56,510	2.9%
2015	164,925	(2.6)%	9,057,095,357	54,916	1.6%
2014	169,295	(0.4)%	9,148,438,257	54,038	0.7%
2013	169,945	(1.8)%	9,118,035,483	53,653	(0.5)%
2012	173,044	(2.7)%	9,330,845,312	53,922	(0.2)%
2011	177,897	1.2%	9,609,723,360	54,018	(1.4)%
2010	175,842	0.6%	9,633,354,504	54,784	0.8%
2009	174,807	0.9%	9,502,701,044	54,361	2.6%
2008	173,327	(0.4)%	9,187,562,138	53,007	2.0%

Retirees and Beneficiaries					
Valuation as of July 1	Number	Percentage Change in Number of Recipients	Annual Allowances	Percentage Change in Allowances	Average Annual Annuity
2017	158,039	0.1%	\$ 6,955,308,807	0.9%	\$ 44,010
2016	157,938	(0.1)%	6,896,162,167	1.4%	43,664
2015	158,116	3.9%	6,801,180,628	6.3%	43,014
2014	152,208	2.0%	6,397,535,267	3.3%	42,032
2013	149,221	4.2%	6,190,182,158	6.4%	41,483
2012	143,256	3.7%	5,815,407,270	7.8%	40,594
2011	138,088	3.7%	5,393,372,046	8.8%	39,057
2010	133,103	2.7%	4,957,960,446	5.3%	37,249
2009	129,659	2.5%	4,706,964,923	6.5%	36,303
2008	126,506	2.9%	4,418,799,899	7.1%	34,930

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EXHIBIT F

10-Year Payout Projection of Benefit Payments (\$ in thousands)

Fiscal Year	Projected Annual Benefits During the Year
2018	\$7,126,808
2019	7,153,386
2020	7,168,874
2021	7,188,062
2022	7,201,181
2023	7,226,001
2024	7,251,336
2025	7,287,318
2026	7,332,737
2027	7,371,427

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EXHIBIT G

Reconciliation of Member Data by Status for the Year Ending June 30, 2017*

	Active Members	Reemployed Retirees	Inactive Members Eligible for Allowances	Inactive Members Eligible for Refunds Only	Retirees	Beneficiaries	Total
A. Number as of June 30, 2016	169,212	26,228	17,627	135,738	141,278	16,660	506,743
B. Additions and new hires	11,748	1,938	0	0	30	0	13,716
C. Participant movement							
1. Retirement	-2,516	22	-434	-8	2,936	0	0
2. Died with beneficiary	-56	0	-8	-3	-1,105	1,172	0
3. Died without beneficiary	-68	0	-31	-172	-2,203	-876	-3,350
4. Inactive member eligible for allowance	-2,435	0	2,435	0	0	0	0
5. Inactive member eligible for refunds only	-8,582	0	0	8,582	0	0	0
6. Refunds	-1,765	-3,222	-819	-5,291	0	0	-11,097
7. Rehired as active	2,634	0	-475	-2,144	-15	0	0
8. Net plan reselection	-38	0	0	0	0	0	-38
9. Expired benefits	0	0	0	0	0	-54	-54
D. Data adjustments	<u>-2</u>	<u>43</u>	<u>108</u>	<u>2,831</u>	<u>23</u>	<u>193</u>	<u>3,196</u>
E. Number as of June 30, 2017	168,132	25,009	18,403	139,533	140,944	17,095	509,116

* Excludes defined contribution only members

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EXHIBIT H

Statement of Change in Plan Net Assets for Year Ended June 30, 2017 (\$ in thousands)

	As of June 30		
	Defined Benefit and Combined Plans	Defined Contribution Plan	Total
A. Assets available at June 30, 2016	\$66,250,103	\$1,033,305	\$67,283,408
B. Revenue for the year			
1. Contributions			
Member	\$1,443,374	\$94,303	\$1,537,677
Employer	1,514,284	36,969	1,551,253
Transfers from Defined Contribution Plan	15,034	(15,034)	0
Retirement Incentive	-	-	-
Other Retirement systems	<u>39,615</u>	<u>-</u>	<u>39,615</u>
Total	\$3,012,308	\$116,237	\$3,128,545
2. Investment Income			
Net appreciation (depreciation) in fair value of investments	\$7,918,787	\$135,356	\$8,054,143
Interest, dividends, and other income	1,421,515	681	1,422,197
Investment expenses	<u>(241,732)</u>	<u>(677)</u>	<u>(242,409)</u>
Total	\$9,098,570	\$135,361	\$9,233,931
C. Expenditures for the year			
Benefits	\$6,989,166	\$ -	\$6,989,166
Refunds to members who have withdrawn	190,517	31,324	221,841
Administrative expenses	<u>62,592</u>	<u>1,060</u>	<u>63,652</u>
Total deductions	\$7,242,274	\$32,384	\$7,274,659
Net increase (decrease)	\$4,868,604	\$219,214	\$5,087,818
D. Market value of assets as of June 30, 2017	\$71,118,707	\$1,252,519	\$72,371,226
E. Estimated rate of return (as determined by Segal)	14.08%	12.48%	14.06%

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EXHIBIT I

Development of Unfunded Actuarial Accrued Liability (\$ in thousands)

	Year Ending June 30	
	2017	2016
1. Unfunded actuarial accrued liability at beginning of year	\$30,641,786	\$30,358,654
2. Normal cost at beginning of year	1,067,687	1,058,986
3. Total contributions*	3,012,308	2,812,188
4. Interest on:		
(a) Unfunded actuarial accrued liability and normal cost	\$2,457,484	\$2,434,867
(b) Total contributions	<u>116,727</u>	<u>108,972</u>
(c) Total interest: (4a) – (4b)	<u>2,340,757</u>	<u>2,325,895</u>
5. Expected unfunded actuarial accrued liability: (1) + (2) – (3) + (4c)	\$31,037,922	\$30,931,348
6. Changes due to (gain)/loss from:		
(a) Investments	-\$857,418	-\$774,260
(b) Demographics	<u>-410,993</u>	<u>484,698</u>
(c) Total changes due to (gain)/loss: (6a) + (6b)	-1,268,411	-289,562
7. Change in actuarial assumptions	6,494,408	0
8. Change due to COLA reduction	<u>-12,353,691</u>	<u>0</u>
9. Unfunded actuarial accrued liability at end of year: (5) + (6c) + (7) + (8)	<u>\$23,910,228</u>	<u>\$30,641,786</u>

* Excluding contribution to the Defined Contribution Plan.

SECTION 3: Supplementary Information for the State Teachers Retirement System of Ohio

EXHIBIT J

Definitions of Pension Terms

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

Actuarial Accrued Liability

For Actives:

The equivalent of the accumulated normal costs allocated to the years before the valuation date.

Actuarial Accrued Liability

For Pensioners:

The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

Actuarial Cost Method:

A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the Actuarially Defined Contribution (ADC).

Actuarial Gain or Actuarial Loss:

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., STRS Ohio's assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

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Actuarially Equivalent:	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	<p>The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is:</p> <ol style="list-style-type: none">Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)Multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, andDiscounted according to an assumed rate (or rates) of return to reflect the time value of money.
Actuarial Present Value of Future Plan Benefits:	<p>The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.</p>
Actuarial Valuation:	<p>The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).</p>
Actuarial Value of Assets:	<p>The value of the System's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.</p>

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- Actuarially Determined:** Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
- Amortization Method:** A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
- Amortization Payment:** The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
- Actuarially Determined Contribution (ADC):** The employer's periodic actuarially determined contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under GASB. The ADC consists of the Employer Normal Cost and the Amortization Payment.
- Assumptions or Actuarial Assumptions:** The estimates on which the cost of the System is calculated including:
- (a) Investment return - the rate of investment yield that the System will earn over the long-term future;
 - (b) Mortality rates - the death rates of employees and pensioners; life expectancy is based on these rates;
 - (c) Retirement rates - the rate or probability of retirement at a given age;
 - (d) Turnover rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement;
 - (e) Salary increase rates - the rates of salary increase due to inflation and productivity growth

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Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period or Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.
Funding Period or Amortization Period:	The term "Funding Period" is used in two ways. First, it is the period used in calculating the Amortization Payment as a component of the ARC. Second, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

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GASB:	Governmental Accounting Standards Board.
GASB 67 and GASB 68:	Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
Investment Return:	The rate of earnings of the System from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the System. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Margin:	The difference, whether positive or negative, between the statutory employer contribution rate and the Actuarially Defined Contribution (ADC).
Net Pension Liability (NPL):	The Net Pension Liability is equal to Total Pension Liability minus Plan Fiduciary Net Position.
Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability, or retirement.

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Plan Fiduciary Net Position:	Market value of assets.
Total Pension Liability (TPL):	The actuarial accrued liability based on the blended discount rate as described in GASB 67/68.
Unfunded Actuarial Accrued Liability (UAAL):	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

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EXHIBIT I

Schedule of Employer Contributions (\$ in thousands)

Fiscal Year ended June 30	Actuarially Determined Contribution*	Percentage Contributed
2017	\$ 1,054,862	144%
2016	1,178,129	125%
2015	1,368,602	106%
2014	1,489,734	89%
2013	2,910,537	46%
2012	3,248,651	41%
2011	2,715,523	51%
2010	2,623,624	52%
2009	1,502,240	89%

**Prior to FY 2014, the ADC is the same as the GASB ARC determined under GASB 25.*

The information presented above was determined as part of the actuarial valuation as of one year prior to the dates indicated (e.g., the contribution determined by the valuation completed as of July 1, 2016, was contributed in the fiscal year ending June 30, 2017).

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EXHIBIT I (CONTINUED)

Schedule of Employer Contributions (\$ in thousands)

Fiscal Year	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency (Excess)	Actual Covered Employee Payroll*	Contributions as a Percentage of Covered Employee Payroll
2017	\$1,054,862	\$1,514,284	(\$459,422)	\$10,459,706	14.48%
2016	1,178,129	1,466,938	(288,809)	10,069,268	14.57%
2015	1,368,602	1,449,165	(80,563)	9,985,181	14.51%
2014	1,489,734	1,324,448	165,286	9,833,028	13.47%
2013	2,910,537	1,327,863	1,582,674	9,917,910	13.39%

**Excludes payroll from the Defined Contribution and Alternative Retirement plans.*

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EXHIBIT II

Schedule of Funding Progress (\$ in thousands)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Valuation Date	Actuarial Value of Assets (AVA)	Actuarial Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) – (2)	Funded Ratio (2) / (3)	Covered Payroll*	UAAL as a % of Payroll (4) / (6)
07/01/2017	\$72,216,212	\$96,126,440	\$23,910,228	75.1%	\$11,557,147	207%
07/01/2016	70,114,637	100,756,422	30,641,786	69.6%	11,099,607	276%
07/01/2015	68,655,999	99,014,654	30,358,654	69.3%	10,948,586	277%
07/01/2014	66,657,175	96,167,057	29,509,882	69.3%	10,725,329	275%
07/01/2013	62,590,786	94,366,694	31,775,907	66.3%	10,765,635	295%
07/01/2012	59,489,508	106,301,841	46,812,333	56.0%	10,879,075	430%
07/01/2011	58,110,495	98,766,204	40,655,709	58.8%	11,097,598	366%
07/01/2010	55,946,259	94,720,669	38,774,410	59.1%	11,057,260	351%
07/01/2009	54,902,859	91,440,955	36,538,096	60.0%	10,800,817	338%

*Includes payroll from the Defined Contribution and Alternative Retirement plans.

Note: numbers may not add due to rounding.

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EXHIBIT III

Solvency Test

Valuation as of July 1	Actuarial Accrued Liability for:			Valuation Assets*	Portion of Actuarial Accrued Liability Covered by Valuation Assets		
	(1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active Member (Employer Financed Portion)		(1)	(2)	(3)
2017	\$ 13,668,833,692	\$ 69,723,393,671	\$ 12,734,213,099	\$ 72,216,212,217	100%	84%	0%
2016	12,498,468,597	74,282,591,981	13,975,361,911	70,114,636,939	100%	78%	0%
2015	11,473,308,775	74,340,699,010	13,200,645,959	68,655,999,478	100%	77%	0%
2014	11,477,457,258	69,776,258,511	14,913,341,335	66,657,175,329	100%	79%	0%
2013	10,962,886,085	68,075,440,331	15,328,367,303	62,590,786,268	100%	76%	0%
2012	10,985,246,152	68,111,174,550	27,205,420,328	59,489,507,736	100%	71%	0%
2011	10,907,610,852	62,441,600,645	25,416,992,764	58,110,495,261	100%	76%	0%
2010	10,641,166,707	57,754,654,376	26,324,848,105	55,946,259,276	100%	78%	0%
2009	10,295,816,001	54,909,045,630	26,236,093,324	54,902,858,958	100%	81%	0%
2008	9,737,925,927	51,874,103,109	25,820,318,938	69,198,008,279	100%	100%	29%

* Excludes health care assets.

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EXHIBIT IV

Net Pension Liability

	June 30, 2017	June 30, 2016
The components of the net pension liability:		
Total pension liability	\$96,126,440,462	\$100,756,422,489
Plan fiduciary net position	<u>(72,371,226,119)</u>	<u>(67,283,408,184)</u>
Net pension liability	\$23,755,214,343	\$33,473,014,305
Plan fiduciary net position as a percentage of the total pension liability	75.3%	66.8%

Plan provisions. The plan provisions used in the measurement of the net pension liability are the same as those used in the actuarial valuation as of July 1, 2017.

Actuarial assumptions. The total pension liability was measured by an actuarial valuation as of July 1, 2017, used the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Salary increases	12.50% at age 20 to 2.50% at age 65
Investment rate of return	7.45%, net of investment expenses, including inflation
Cost-of-living adjustments	0%, effective July 1, 2017

For active and inactive members, mortality rates were based on the RP-2014 Employee Mortality Table, projected generationally using mortality improvement scale MP-2016. For healthy retirees, mortality rates were based on the RP-2014 Healthy Annuitant Table with 50% of rates through age 69, 70% of rates between ages 70 and 79, 90% of rates between ages 80 and 84, and 100% of rates thereafter, projected generationally using mortality improvement scale MP-2016. For disabled retirees, mortality rates were based on the RP-2014 Disabled Mortality Table with 90% of rates for males and 100% of rates for females, projected generationally using mortality improvement scale MP-2016.

The actuarial assumptions were based on the results of an actual experience study for the period July 1, 2011, through June 30, 2016. They are the same as the assumptions used in the July 1, 2017, funding actuarial valuation.

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Discount rate: The discount rate used to measure the total pension liability was 7.45% as of June 30, 2017. The projection of cash flows used to determine the discount rate assumes that member and employer contributions will be made at rates equal to those based on this July 1, 2017, Actuarial Valuation Report. For this purpose, only employer contributions that are intended to fund benefits of current plan members and their beneficiaries are included. Projected employer contributions that are intended to fund the service costs of future plan members and their beneficiaries, as well as projected contributions from future plan members, are not included.

Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments for current plan members as of June 30, 2017. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability as of June 30, 2017.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability as of June 30, 2016 and June 30, 2017, calculated using the discount rate of 7.75% and 7.45%, respectively, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower or 1-percentage-point higher than the specified rate:

	1% Decrease	Specified Discount Rate	1% Increase
Net pension liability as of June 30, 2016	\$44,482,916,097	\$33,473,014,305	\$24,185,513,176
Net pension liability as of June 30, 2017	\$34,052,291,326	\$23,755,214,343	\$15,081,470,411

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EXHIBIT V

Schedules of Changes in Net Pension Liability

	2017	2016
Total pension liability		
Service cost	\$1,067,687,383	\$1,058,986,394
Interest	7,611,942,025	7,472,169,049
Change of benefit terms	(12,353,691,031)	0
Differences between expected and actual experience	(239,322,183)	527,724,561
Changes of assumptions	6,494,407,977	0
Benefit payments, including refunds of employee contributions	<u>(7,211,006,198)</u>	<u>(7,317,111,259)</u>
Net change in total pension liability	(\$4,629,982,027)	\$1,741,768,745
Total pension liability – beginning	100,756,422,489	99,014,653,744
Total pension liability – ending (a)	<u>\$96,126,440,462</u>	<u>\$100,756,422,489</u>
Plan fiduciary net position		
Contributions – employer, including retirement incentive	\$1,551,253,291	\$1,501,101,600
Contributions – employee	1,537,676,856	1,372,032,885
Contributions – other	39,614,809	44,000,962
Net investment income	9,233,931,483	372,871,012
Benefit payments, including refunds of employee contributions	(7,211,006,198)	(7,317,111,259)
Administrative expense	<u>(63,652,306)</u>	<u>(67,065,752)</u>
Net change in plan fiduciary net position	\$5,087,817,935	(\$4,094,170,552)
Plan fiduciary net position – beginning	67,283,408,184	71,377,578,736
Plan fiduciary net position – ending (b)	<u>\$72,371,226,119</u>	<u>\$67,283,408,184</u>
Net pension liability – ending (a) – (b)	<u>\$23,755,214,343</u>	<u>\$33,473,014,305</u>
Plan fiduciary net position as a percentage of the total pension liability	75.3%	66.8%
Actual covered employee payroll	\$11,557,146,918	\$11,099,606,506
Plan net pension liability as percentage of covered employee payroll	205.5%	301.6%

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Changes in the collective net pension liability from the beginning of the year to the end of the year arise from the net difference between changes in the total pension liability and plan fiduciary net position that occurred during the year. Changes in net pension liability will be recognized immediately as pension expense, or reported as deferred outflows of resources related to pensions or deferred inflows of resources related to pensions, depending on the nature of the change.

Differences between actual and expected investment-related experience are recognized over a closed five-year period. Differences between actual and expected non-investment-related experience and changes of assumptions are recognized over the average of the expected remaining service lives of all members who are provided with pensions through the pension plan (active employees and inactive employees). The amounts below that are not included in pension expense for the current year are included in deferred outflows of resources or deferred inflows of resources related to pensions.

EXHIBIT VI

Reconciliation of Collective Net Pension Liability

	Increase/(Decrease) For Fiscal Year Ending June 30, 2017		
	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) – (b)
Balances at beginning of year	\$100,756,422,489	\$67,283,408,184	\$33,473,014,305
Changes for the year			
Service cost	1,067,687,383		1,067,687,383
Interest	7,611,942,025		7,611,942,025
Differences between expected and actual experience	(239,322,183)		(239,322,183)
Contributions – employer		1,551,253,291	(1,551,253,291)
Contributions – member		1,537,676,856	(1,537,676,856)
Contributions – other		39,614,809	(39,614,809)
Net investment income		9,233,931,483	(9,233,931,483)
Benefit payments, including refunds of employee contributions	(7,211,006,198)	(7,211,006,198)	-
Changes in actuarial assumptions	6,494,407,977		6,494,407,977
Changes in benefit terms	(12,353,691,031)		(12,353,691,031)
Administrative expense	-	(63,652,306)	63,652,306
Net changes	(4,629,982,027)	5,087,817,935	(9,717,799,962)
Balances at end of year	<u>\$96,126,440,462</u>	<u>\$72,371,226,119</u>	<u>\$23,755,214,343</u>

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EXHIBIT VII

Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

	Year Established	Original Balance	Original Amortization Period	Amortization Amount	Outstanding Balance at June 30, 2017
Outflows					
Assumptions	2017	\$6,494,407,977	5*	\$1,298,881,595	\$5,195,526,382
Demographics	2016	527,724,561	5	105,544,912	316,634,737
Investments	2016	4,985,793,479	5	997,158,696	2,991,476,087
Demographics	2015	1,355,346,526	5	271,069,305	542,138,611
Investments	2015	1,734,151,476	5	346,830,295	693,660,591
Demographics	2014	292,707,662	5	58,541,532	58,541,534
Total outflows				\$3,078,026,335	\$9,797,977,942
Inflows					
Demographics	2017	\$239,322,183	5	\$47,864,437	\$191,457,746
Investments	2017	4,180,129,249	5	836,025,850	3,344,103,399
Investments	2014	5,624,915,576	5	1,124,983,115	1,124,983,116
Total inflows				\$2,008,873,402	\$4,660,544,261

* The average expected remaining service lives of all members is 5 years, determined as of July 1, 2016 (the beginning of the measurement period ending June 30, 2017). This amount is equal to the total expected remaining service of 2,521,780 years, divided by total employees that are provided with pensions through the plan of 494,799 (as shown in the table below), rounded to the nearest integer year.

	Expected Remaining Service	Counts	Average of the Expected Remaining Service
Actives Members	2,521,780	178,394	14.14
Inactive Members	-	157,104	-
Retirees and Beneficiaries	-	159,301	-
Total Employees	2,521,780	494,799	5.10

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EXHIBIT VII (continued)

Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

At June 30, 2017, deferred outflows of resources and deferred inflows of resources related to pensions are:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience	\$917,314,882	\$191,457,746
Changes in actuarial assumptions	5,195,526,382	-
Net differences between projected and actual earnings on pension plan investments	-	783,949,837
Total	<u>\$6,112,841,264</u>	<u>\$975,407,583</u>

Deferred outflows of resources and deferred inflows of resources related to pensions will be recognized as follows:

Year Ended June 30	Deferred Outflows of Resources	Deferred Inflow of Resources	Net Deferred Outflows/(Inflows)
2018	\$3,078,026,337	(\$2,008,873,403)	\$1,069,152,934
2019	3,019,484,805	(883,890,287)	2,135,594,518
2020	2,401,585,203	(883,890,287)	1,517,694,916
2021	1,298,881,597	(883,890,284)	414,991,313
2022	-	-	-
Thereafter	-	-	-

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EXHIBIT VIII

Collective Pension Expense

	Fiscal Year Ending June 30, 2017	Fiscal Year Ending June 30, 2016
Components of pension expense		
Service cost	\$1,067,687,383	\$1,058,986,394
Interest on the total pension liability	7,611,942,025	7,472,169,049
Projected earnings on plan investments	(5,053,802,234)	(5,358,664,491)
Contributions – member	(1,537,676,856)	(1,372,032,885)
Administrative expense	63,652,306	67,065,752
Current year recognition of:		
Difference between expected and actual experience	387,291,312	435,155,749
Difference between projected and actual earnings on pension plan investments	(617,019,974)	219,005,876
Changes of actuarial assumptions	1,298,881,595	-
Changes of benefit terms	(12,353,691,031)	-
Total pension expense/(revenue)	<u>(\$9,132,735,474)</u>	<u>\$2,521,685,444</u>

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EXHIBIT IX

Summary of Assumptions and Methods

Rationale for Assumptions:

The information and analysis used in selecting each assumption that has a significant effect on this actuarial valuation is shown in the Actuarial Experience Review dated March 3, 2017.

Investment Return Rate:

7.45% per annum, compounded annually and net of all expenses.

Mortality Rates:

Post-Retirement:

RP-2014 Annuitant Mortality Table with 50% of rates through age 69, 70% of rates between ages 70 and 79, 90% of rates between ages 80 and 84, and 100% of rates thereafter, projected forward generationally using mortality improvement scale MP-2016. (Adopted effective July 1, 2017).

Sample 2014 mortality rates are as follows:

Age	Male	Female
50	0.20%	0.14%
55	0.29%	0.18%
60	0.39%	0.26%
65	0.55%	0.40%
70	1.17%	0.90%
75	1.88%	1.47%
80	4.02%	3.14%
85	7.75%	6.05%
90	13.59%	10.71%
95	21.86%	17.90%
100	31.40%	27.09%

Pre-Retirement:

RP-2014 Employee Mortality Table, projected forward generationally using mortality improvement scale MP-2016. (Adopted effective July 1, 2017).

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Post-Retirement Disabled:

RP-2014 Disabled Mortality Table with 90% of rates for males and 100% of rates for females, projected forward generationally using mortality improvement scale MP-2016. (Adopted effective July 1, 2017).

Sample 2014 mortality rates as follows.

Age	Male	Female
45	1.53%	0.90%
50	1.84%	1.19%
55	2.10%	1.45%
60	2.39%	1.70%
65	2.85%	2.09%
70	3.63%	2.82%
75	4.89%	4.10%

Salary Increase Rates:

Inflation rate of 2.50% plus merit and seniority increase, as shown below for selected ages. (Adopted effective July 1, 2017).

Age	Rate
20	12.50%
25	11.50%
30	7.75%
35	6.50%
40	5.25%
45	4.75%
50	4.00%
55	3.50%
60	2.75%
65	2.50%

Payroll Growth Rate:

3.00% per annum. (Adopted effective July 1, 2017).

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Percent Married:	For valuation purposes, 80% of male members and 60% of female members are assumed to be married. Male members are assumed to be three years older than their spouses, and female members are assumed to be one year younger than their spouses. (The assumed age difference adopted effective July 1, 2012 and reaffirmed effective July 1, 2017.)
Asset Valuation Method:	The actuarial value of assets is based on the market value of assets with a four-year phase-in of actual investment return in excess of (or less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the actuarial value of assets (adjusted for receipts and disbursements during the year). The actual investment return for this purpose is determined net of all investment and administrative expenses. The actuarial value is further adjusted, if necessary, to be within 9% of the market value.
Actuarial Cost Method:	Normal cost and actuarial accrued liability are calculated on an individual basis and are allocated by salary. Entry age is determined as the age at member's enrollment in STRS Ohio. The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability (UAAL) is the excess of the actuarial accrued liability over the actuarial value of assets.
Amortization Period and Method:	The actuarially determined contribution (ADC) is determined as the sum of (a) the employer normal cost rate, and (b) a level percentage of payroll required to amortize the unfunded actuarial accrued liability over the 30-year closed period that began July 1, 2015.
Census and Assets:	The valuation was based on members of the System as of July 1, 2017, and does not take into account future members. All census and asset data was supplied by the System.

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Active Retirement Rates: The following rates of retirement are assumed for members eligible to retire. (Adopted effective July 1, 2017).

Defined Benefit Plan – Grandfathered Male Rates				
Age	Under 25 Years of Service	25-29 Years of Service	30-34 Years of Service	35 or More Years of Service
<53	0%	0%	20%	30%
53	0%	0%	20%	30%
54	0%	0%	20%	40%
55	0%	6%	20%	40%
56	0%	6%	20%	40%
57	0%	6%	20%	40%
58	0%	6%	20%	40%
59	0%	7%	20%	40%
60	10%	7%	20%	40%
61	10%	7%	20%	40%
62	12%	8%	20%	40%
63	12%	8%	25%	35%
64	12%	12%	25%	25%
65	20%	20%	25%	25%
66	20%	20%	25%	25%
67	15%	20%	25%	25%
68	15%	20%	25%	20%
69	15%	20%	25%	20%
70	15%	20%	25%	20%
71	15%	20%	25%	20%
72	15%	20%	25%	20%
73	15%	20%	25%	20%
74	15%	20%	25%	20%
75	100%	100%	100%	100%

Defined Benefit Plan – Grandfathered Female Rates				
Age	Under 25 Years of Service	25-29 Years of Service	30-34 Years of Service	35 or More Years of Service
<53	0%	0%	20%	35%
53	0%	0%	20%	35%
54	0%	0%	20%	40%
55	0%	9%	20%	40%
56	0%	9%	20%	40%
57	0%	9%	20%	40%
58	0%	9%	20%	40%
59	0%	10%	25%	40%
60	10%	10%	30%	45%
61	10%	10%	30%	45%
62	10%	12%	30%	45%
63	10%	12%	35%	45%
64	15%	20%	35%	45%
65	25%	30%	35%	45%
66	20%	30%	35%	45%
67	20%	20%	35%	45%
68	20%	20%	35%	45%
69	20%	20%	35%	45%
70	20%	20%	35%	40%
71	20%	20%	35%	40%
72	20%	20%	35%	40%
73	20%	20%	35%	40%
74	20%	20%	35%	40%
75	100%	100%	100%	100%

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Active Retirement Rates (continued):

Defined Benefit Plan – Non-grandfathered Male Rates				
Age	Under 25 Years of Service	25-29 Years of Service ¹	30-34 Years of Service ²	35 or More Years of Service ²
<53	0%	3%	20%	20%
53	0%	3%	20%	20%
54	0%	3%	20%	20%
55	0%	3%	20%	20%
56	0%	3%	20%	20%
57	0%	3%	20%	20%
58	0%	3%	20%	20%
59	0%	5%	20%	20%
60	5%	5%	20%	25%
61	6%	6%	20%	25%
62	7%	7%	20%	25%
63	8%	8%	25%	25%
64	10%	10%	25%	25%
65	20%	20%	25%	25%
66	20%	20%	25%	25%
67	20%	20%	25%	25%
68	20%	20%	25%	20%
69	20%	20%	25%	20%
70	20%	20%	25%	20%
71	20%	20%	25%	20%
72	20%	20%	25%	20%
73	20%	20%	25%	20%
74	20%	20%	25%	20%
75	100%	100%	100%	100%

Defined Benefit Plan – Non-grandfathered Female Rates				
Age	Under 25 Years of Service	25-29 Years of Service ¹	30-34 Years of Service ²	35 or More Years of Service ²
<53	0%	5%	20%	20%
53	0%	5%	20%	20%
54	0%	5%	20%	20%
55	0%	5%	20%	20%
56	0%	5%	20%	20%
57	0%	5%	20%	20%
58	0%	5%	20%	20%
59	0%	5%	25%	25%
60	10%	10%	30%	30%
61	10%	10%	30%	30%
62	10%	10%	30%	30%
63	10%	10%	35%	35%
64	15%	15%	35%	35%
65	30%	30%	35%	35%
66	30%	30%	35%	35%
67	20%	20%	35%	35%
68	20%	20%	35%	35%
69	20%	20%	35%	35%
70	20%	20%	35%	30%
71	20%	20%	35%	30%
72	20%	20%	35%	30%
73	20%	20%	35%	30%
74	20%	20%	35%	30%
75	100%	100%	100%	100%

¹ Rates prior to age 60 are zero if retirement eligibility requirements are not met

² Use two times 25-29 Years of Service rates if not eligible for unreduced retirement (prior to age 65)

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

Active Retirement Rates (continued):

Age	Combined Plan	
	Male	Female
60	13%	22%
61	7%	9%
62	7%	9%
63	7%	9%
64	9%	15%
65	17%	20%
66	15%	13%
67	12%	13%
68	12%	12%
69	12%	12%
70	12%	12%
71	12%	12%
72	12%	12%
73	12%	12%
74	12%	12%
75	100%	100%

Inactive Vested Retirement Rates: 5% at each early retirement age through age 64 and 100% at age 65, or the first age at which unreduced benefits are available.

Disability Rates: Shown below for selected ages. (Adopted effective July 1, 2017).

Age	Unisex Rates
Under 30	0.01%
30	0.01%
35	0.03%
40	0.05%
45	0.10%
50	0.18%
55	0.22%
60	0.25%
65 and Over	0.25%

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

Termination Rates:

Termination rates based on service, for causes other than death, disability, or retirement. (Adopted effective July 1, 2017).

Vested Terminations*		
Age	Male	Female
20	11.25%	13.25%
25	11.25%	12.50%
30	2.75%	3.75%
35	2.00%	2.00%
40	1.75%	1.50%
45	1.75%	1.25%
50	2.00%	1.75%
55	3.25%	3.00%
60	0.00%	0.00%

** Termination rates cut out at first retirement eligibility*

Non-Vested Terminations		
Service	Male	Female
Under 1 Year	30.00%	25.00%
1 to 2 Years	20.00%	20.00%
2 to 3 Years	15.00%	10.00%
3 to 5 Years	10.00%	10.00%

Percent Electing a Deferred Termination Benefit:

50% of terminating members of the Defined Benefit Plan are assumed to elect deferred termination benefit. Termination benefits are assumed to commence at age 60 or the first age at which unreduced benefits are available, if earlier.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

Assumption Changes Since Prior Valuation:

- Inflation assumption lowered from 2.75% to 2.50%;
- Investment return assumption lowered from 7.75% to 7.45%;
- Total salary increases rates lowered by decreasing the merit component of the individual salary increases, as well as by 0.25% due to lower inflation;
- Payroll growth assumption lowered to 3.00%;
- Updated the healthy and disabled mortality assumption to the “RP-2014” mortality tables with generational improvement scale MP-2016 ;
- Rates of retirement, termination and disability were modified to better reflect anticipated future experience.

See the July 1, 2016 actuarial valuation report for the details of actuarial assumptions used for the prior valuation.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

EXHIBIT X

Summary of Plan Provisions

DEFINED BENEFIT PLAN

Eligibility for Membership

Immediate upon commencement of employment.

Service Retirement

Eligibility

Age 60 with five years of service, or age 55 with 25 years of service, or 30 years of service regardless of age. Age and service requirements for retirement increased effective August 1, 2015.

Effective August 1, 2015, service credit requirements for retirement with an unreduced benefit increased as follows:

Unreduced Benefit for Retirement Between:	Minimum Age and Years of Service
Through 7/1/2015	Any age and 30 years; or age 65 and 5 years
8/1/2015–7/1/2017	Any age and 31 years; or age 65 and 5 years
8/1/2017–7/1/2019	Any age and 32 years; or age 65 and 5 years
8/1/2019–7/1/2021	Any age and 33 years; or age 65 and 5 years
8/1/2021–7/1/2023	Any age and 34 years; or age 65 and 5 years
8/1/2023–7/1/2026	Any age and 35 years; or age 65 and 5 years
8/1/2026	Age 60 and 35 years; or age 65 and 5 years

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Amount

Prior to July 1, 2015, annual amount equal to the greater of (a) 2.2% of final average salary for the three highest years of earnings, multiplied by years of total Ohio service credit, or 2.5% of final average salary for the three highest paid years if the member has 35 or more years of service credit multiplied by years of total Ohio service credit, except that for years of Ohio contributing service credit in excess of 30, the following percentages will apply:

Year	Percentage
31	2.5%
32	2.6
33	2.7
34	2.8
35	2.9
36	3.0
37	3.1
38	3.2
39	3.3

Or b) \$86 multiplied by years of service credit.

Effective August 1, 2015, annual amount equal to 2.2% of final average salary for the five highest years of earnings, multiplied by all years of service.

For members who are eligible to retire on July 1, 2015, annual amount is greater of (a) the benefit amount calculated upon retirement under the new benefit formula, or (b) the benefit amount as of July 1, 2015 under the current formula.

Annual salary is subject to the limit under Section 401(a)(17).

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Prior to July 1, 2015, if the member has less than 30 years of service at retirement and is younger than age 65, the following reduction factors apply:

Attained Age	or	Years of Ohio Service Credit	% of Base Amount
58		25	75%
59		26	80
60		27	85
61			88
		28	90
62			91
63			94
		29	95
64			97
65		30 or more	100

Effective August 1, 2015, the service credit requirements for an actuarially reduced benefit are as follows:

Actuarially Reduced Benefit for Retirement Between:	Minimum Age and Years of Service
Through 7/1/2015	Age 55 and 25 years; or age 60 and 5 years
8/1/2015–7/1/2017	Any age and 30 years; or age 55 and 26 years; or age 60 and 5 years
8/1/2017–7/1/2019	Any age and 30 years; or age 55 and 27 years; or age 60 and 5 years
8/1/2019–7/1/2021	Any age and 30 years; or age 55 and 28 years; or age 60 and 5 years
8/1/2021–7/1/2023	Any age and 30 years; or age 55 and 29 years; or age 60 and 5 years
8/1/2023	Any age and 30 years; or age 60 and 5 years

The actuarially reduced benefit reflects a reduction for each year that the member retires before meeting eligibility for an unreduced benefit.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Disability Retirement

Eligibility Membership before July 30, 1992, and election of this benefit, completion of five or more years of service, under age 60 and permanently incapacitated for the performance of duty.

Amount

- 1) Annuity with a reserve equal to the member's accumulated contributions, plus
- 2) The difference between (1) and the greater of 2% of the average salary during the three highest paid years or \$86 times total service plus years and months from date of disability to age 60. Maximum allowance is 75% of final average salary. Minimum allowance is 30% of final average salary.

Disability Allowance

Eligibility Membership after July 29, 1992, or membership before July 30, 1992, and election of this benefit, completion of five or more years of qualifying service and permanently incapacitated for the performance of duty. For membership on or after July 1, 2013, completion of 10 years of qualifying service and permanently incapacitated for the performance of duty.

Amount The greater of 2.2% of the average salary during the three highest paid years or \$86 times total service. Maximum allowance is 60% of final average salary. Minimum allowance is 45% of final average salary. The disability allowance payment terminates at age 65 (or later if payment begins after age 60). After termination of the disability allowance, the member may apply for service retirement.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Death after Retirement

Lump sum payment of \$1,000 upon death after service or disability retirement.

Survivor's Benefit

Eligibility

Upon death after at least 1½ years of credit for Ohio service with at least 1/4 year of such service in the 2½ years preceding death or upon death of a disability retiree. For membership on or after July 1, 2013, upon death after at least five years of credit for Ohio service and died not later than one year after the date service terminated.

Qualified survivors will receive the highest benefit from among the following for which they are eligible: dependent-based benefit, service-based benefit, and retirement-based benefit.

Qualified beneficiaries are the spouse, dependent children, and/or dependent parents over age 65.

Dependent-based benefit

Monthly survivor benefits are determined according to the number of qualified survivors. These benefits are payable as a percentage of final average salary. The percentages are as follows:

Number of Qualified Dependents	% of Final Average Salary	Minimum Annual Benefit
1	25%	\$1,152
2	40	2,232
3	50	2,832
4	55	2,832
5 or more	60	2,832

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Service-based benefit

If a member has 20 or more years of service before death, monthly survivor benefits are determined according to the number of years of service credit. These benefits are payable as a percentage of final average salary. The percentages are as follows:

Years of Service	% of Final Average Salary
20	29%
21	33
22	37
23	41
24	45
25	48
26	51
27	54
28	57
29 or more	60

Retirement-based benefit

If a member dies after meeting service retirement eligibility, the monthly survivor benefit is determined as if the member had actually retired and provided the maximum joint and survivor benefit to the qualified survivor (Option 1). Early retirement reduction applies if the member is not eligible for unreduced benefit.

The primary beneficiary may withdraw the deceased member's account in lieu of receiving monthly benefits if there are no children who are qualified survivors.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Lump Sum Withdrawal Option

In lieu of any other pension or survivor benefits, a member who leaves the System can receive his/her member contributions with interest in a lump sum according to the following schedule:

<u>Credit Service</u>	<u>Lump Sum</u>
Less than 3 Years	Member Contributions with 2% Interest
3 or More Years and Less than 5 Years	Member Contributions with 3% Interest
5 Years or More	150% of Member Contributions with 3% Interest

The Board has the authority to modify the interest credited to member contributions.

Plans of Payment

There are four basic plans of payment:

Plan I – Single Life Annuity: if a member chooses this plan at retirement and later marries, he/she may change the plan to a Joint and Survivor Annuity with his/her spouse as beneficiary within the first year of the marriage.

Plan II – Joint and Survivor Annuity: there are four options under this plan of payment:

- Options 1, 2 and 3 apply to a single primary beneficiary
- Option 4 applies to multiple primary beneficiaries

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Plan III – Annuity Certain: if a death occurs before the guaranteed period ends, a beneficiary receives the same monthly benefit until the guaranteed period expires. If a member name more than one beneficiary, a lump sum payment, representing the present value of the remaining payments is divided equally and paid to the beneficiaries. If all beneficiaries die before the expiration of the certain period, the present value of all remaining payments is to be paid to the estate of the beneficiary last receiving payments

Plan IV – Partial Lump-Sum Option Plan: allows a member to take an amount from six to 36 times the monthly Single Life Annuity benefit in a lump sum at retirement. The remainder of a member's lifetime benefits will be paid based on member's selected plan of payment: Single Life Annuity, Joint and Survivor Annuity or Annuity Certain.

Optional Forms of Benefit

Option 1 - 100% joint and survivorship. Reduced retirement allowance payable to the member, continuing after the member's death, for life to the member's sole beneficiary named at retirement.

Option 2 - A joint and survivorship annuity payable during the lifetime of the member, with the member's sole beneficiary named at retirement to receive some other portion of the member's annuity after the member's death.

Option 3 - The sole member's reduced retirement allowance provided under Option 1 or Option 2 is to be paid after the member's death for life to the member's sole beneficiary named at retirement, except that in the event of the death of the sole beneficiary or termination of marriage between the retiree and the sole beneficiary, the retiree may elect to return to his single lifetime benefit equivalent, which would be available for an actuarially computed charge as determined by the Board. In the case of termination of marriage, the election may be made with the written consent of the beneficiary or by court order.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED BENEFIT PLAN (continued)

Option 4 – Members who retire November 1, 2006, or later may elect a reduced benefit to provide continuing lifetime benefits for up to four primary beneficiaries under a Joint and Survivor Annuity. A member may specify percentages of his/her benefit or a flat dollar amount for each beneficiary; however, the total benefit amount payable to all beneficiaries cannot exceed the amount payable to the member.

Cost-of-Living Benefits

The basic benefit is increased each year by 2% of the original base benefit. For members retiring August 1, 2013 or later, the 2% COLA is paid on the fifth anniversary of the retirement benefit. Future annual increases are calculated on the original benefit and are not compounded.

Members who retired before July 1, 2013 did not receive a COLA during the 2014 fiscal year. Members who retired effective July 1, 2013 did not receive a COLA on July 1, 2014. After missing one COLA, retirees resume COLA at 2% per year.

Effective July 1, 2017, the COLA has been reduced to zero.

Health Care

Retirees, their spouses and dependents are eligible for a comprehensive medical expense health care plan as may be offered by the Retirement Board, subject to changes in terms and conditions from time to time.

Contribution

By Members

14% of salary;

By Employers

14% of salaries of their employees who are members.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

COMBINED PLAN

Eligibility for Membership

New members hired on or after July 1, 2001, may elect in writing to participate in the Combined Plan.

Service (Normal) Retirement

Eligibility

Age 60 with five years of service.

Amount

The balance in the member's defined contribution account plus an annual amount equal to 1% of final average salary for the three highest paid years multiplied by years of total Ohio service credit.

Effective August 1, 2015, final average salary will be average of the member's five highest salary years.

Annual salary is subject to the limit under Section 401(a)(17).

Vesting

Eligibility

Completion of five years of service for the defined benefit portion. Member contributions and earnings are 100% vested at all times.

Amount

A member who terminates with 5 or more years of service credit can receive the actuarial equivalent present value of the defined benefit formula. Prior to age 50, a withdrawal must include both the defined benefit and defined contribution portions of the account.

Early Retirement

Eligibility

Before age 60 with five years of service

Amount

The normal retirement benefit commencing at age 60. At age 50 or after, a member who elects to withdraw the full value of the member's defined contribution account may receive the withdrawal value of the formula benefit in a single sum, or leave the formula benefit on account for a benefit payable at age 60. The member may withdraw the defined benefit portion of the account only if he or she is also withdrawing the defined contribution account.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

COMBINED PLAN (continued)

Late Retirement

Eligibility

After age 60 with five years of service.

Amount

The formula benefit described in the normal retirement section based on service credit and final average salary at termination without any actuarial adjustments.

Disability Allowance

Eligibility

Completion of five or more years of service and permanently incapacitated for the performance of duty. For membership on or after July 1, 2013, completion of 10 years of qualifying service credit with STRS Ohio.

Amount

Members have the option of receiving disability benefits under the disability allowance program of the Defined Benefit Plan. All contributions and investment gains in the member's defined contribution account are used to fund the benefit. At age 65, the disability allowance converts to a service retirement benefit with a 2.2% formula. Alternatively, the member's defined contribution account is available.

Survivor's Benefit

Eligibility

Upon death after at least 1½ years of credit for Ohio service with at least 1/4 year of such service in the 2½ years preceding death or upon death of a disability retiree. For membership on or after July 1, 2013, upon death at least five years of qualifying service credit.

Qualified survivors have the option of receiving dependent-based, service-based or retirement-based benefits described under the Defined Benefit Plan. Both employer contributions and the member's contributions and any investment gains in the member's defined contribution account are used to fund the benefit. Survivors also have the option to withdraw the defined contribution and defined benefit portions of the Combined Plan account.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

COMBINED PLAN (continued)

**Optional Forms of Payment
Of Defined Benefit Portion**

A lump sum of the actuarial equivalent of the defined benefit formula benefit. If a member withdraws the member's defined contribution account prior to age 50, the formula benefit is paid in a lump sum.

Joint and Survivorship Options - Options 1 through 4 described in the Defined Benefit Plan provisions are available. All alternative forms of payment are the actuarial equivalent of the single life annuity benefit payable at age 60.

**Optional Forms of Payment
Of Member's Defined
Contribution Account**

The actuarial equivalent of the member's defined contribution account can be paid on or after age 50 as a lifetime annuity. Options 1 through 4, described in the Defined Benefit Plan Provisions, are also available. The monthly annuity must be \$100 or more to receive the member's defined contribution account in the form of an annuity.

The vested amount of the member's defined contribution account upon termination of employment can be paid as a single lump sum. If a member takes a lump sum of the defined benefit formula benefit, the member must simultaneously withdraw the lump sum value of the member's contribution account in a single lump sum.

Cost-of-Living Benefits

Not available on the service retirement benefit. For disability and survivor benefits, the basic benefit is increased by the increase in the Consumer Price Index each year, but not to exceed 2% of the original base benefit.

Changes to the cost of living adjustment are described under the Defined Benefit Plan section.

Health Care

Retirees, their spouses and dependents eligible for a comprehensive medical expense health care plan as may be offered by the Retirement Board, subject to changes in terms and conditions from time to time.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

COMBINED PLAN (continued)

Contribution

By Members

14% of salary;

12.0% of salary is deposited into the member's defined contribution account and 2.0% is applied to the defined benefit portion of the Combined Plan.

By Employers

14% of salaries is used to fund the defined benefit formula.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED CONTRIBUTION PLAN

Eligibility for Membership

New members hired on or after July 1, 2001, may elect in writing to participate in the Defined Contribution Plan.

Service (Normal) Retirement

Eligibility

Termination after age 50.

Amount

The balance in the member's defined contribution account.

Vesting

Eligibility

Employer contributions and earnings on the member's account are vested after the first anniversary of membership. Effective July 1, 2013, members vest 20% per year in employer contributions and all gains and losses on those contributions. Member contributions and earnings are 100% vested immediately.

Amount

The balance in the member's defined contribution account.

Early Retirement

Eligibility

Termination before age 50.

Amount

The balance in the member's defined contribution account.

Disability Allowance

Eligibility

Permanently incapacitated for the performance of duty and termination of employment.

Amount

The balance in the member's defined contribution account. At age 50, other payment options are available, but employment must first be terminated.

Survivor's Benefit

Eligibility

Upon death.

Amount

The balance in the member's defined contribution account. A spouse may either continue to manage the member's defined contribution account or withdraw the account.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

DEFINED CONTRIBUTION PLAN (continued)

Optional Forms of Payment	The actuarial equivalent of the member's defined contribution account can be paid on or after age 50 as a lifetime annuity. Plans of payments described in the Defined Benefit Plan Provisions are also available. The monthly annuity must be \$100 or more to receive the member's defined contribution account in the form of an annuity.
Cost-of-Living Benefits	Not available
Health Care	Not available.
Contribution	
<i>By Members</i>	14% of salary is deposited into the member's defined contribution account.
<i>By Employers</i>	Effective July 1, 2017, 9.53% of salary is deposited into the member's defined contribution account. 4.47% of salaries is used to amortize the unfunded actuarial accrued liability of the defined benefit plan.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

EXHIBIT XI

Summary of Plan Changes

2017 Plan Design Change

1. Effective July 1, 2017, the COLA has been reduced to zero.

2012 Pension Reform Legislation

1. Member Contributions will increase from 10% to 14%, phased in 1% per year beginning July 1, 2013, through July 1, 2016.
2. Service credit requirements for retirement with an unreduced benefit will increase from 30 years to 35 years of service by August 1, 2023. Beginning August 1, 2026, a minimum age of 60 is required. This change will be phased in beginning August 1, 2015, when eligibility for unreduced benefits increases to 31 years of service. The service credit requirement increases by one year every other year (e.g., the eligibility requirement is 32 years at August 1, 2017, 33 years at August 1, 2019, etc.). An unreduced retirement benefit continues to be available at age 65 with a minimum of five years of service.
3. Service credit requirements for an actuarially reduced benefit will increase from age 55 with 25 years of service to 30 years of service by August 1, 2023. This change will be phased in beginning August 1, 2015, when eligibility for a reduced benefit increases to age 55 with 26 years of service or any age with 30 years of service. The service credit requirement increases by one year every other year (e.g., the eligibility requirement is age 55 with 27 years of service at August 1, 2017, age 55 with 28 years of service August 1, 2019, etc.). A retirement benefit continues to be available at age 60 with a minimum of five years of service; however, the benefit will be actuarially reduced beginning August 1, 2015.
4. Final average salary is changed to be the average of five highest years of earnings beginning August 1, 2015.
5. The current 35-year enhanced benefit formula will be eliminated after July 1, 2015. The new benefit formula is 2.2% for all years of service.

SECTION 4: Reporting Information for the State Teachers Retirement System of Ohio

2012 Pension Reform Legislation (continued)

6. Members who retire before July 1, 2013, will not receive a cost-of-living adjustment (COLA) during the 2014 fiscal year. Members who retire effective July 1, 2013, will not receive a COLA on July 1, 2014. After missing one COLA, retirees will resume a COLA of 2% per year. Members retiring after July 1, 2013, will receive a 2% COLA, but it will not begin until the fifth anniversary of retirement.
7. Members who are eligible to retire on July 1, 2015, will continue to maintain retirement eligibility if they continue working, and the benefit will be the greater of (a) the benefit calculated upon retirement under the new formula, or (b) the benefit as of July 1, 2015, under the current formula.

This law also provides the STRS Ohio Retirement Board with authority to make future adjustments to the member contribution rate, retirement age and service requirements and the COLA, depending on the retirement System's funding progress.

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