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State Teachers Retirement System of Ohio

Legislative Analysis Report of House Bill 601

Produced by Cheiron

May 2022

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VIA ELECTRONIC MAIL

May 17, 2022

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

Dear Members of the Board:

As required under the Ohio Revised Code section 3307.51 (D) the Board must have a report by an actuary on the potential financial impact of any proposed legislation. This report is intended to comply with 3307.51(D) and contains a

- summary of House Bill 601;
- description of the actuarial assumptions and methods used in the report;
- description of the participant groups included in the report;
- statement of the financial impact of the legislation including
  - the increase in the employer normal cost percentage;
  - the increase in actuarial liabilities; and
  - the per cent of payroll that would be required to amortize the increase in actuarial liabilities as a level per cent of payroll over thirty years;
- statement of whether the scheduled contribution to the system after the proposed change is enacted are expected to be sufficient to satisfy the funding objectives by the board

The results of this analysis rely on future plan experience conforming to the underlying assumptions and methods outlined in this report. To the extent that the actual plan experience deviates from the underlying assumptions and methods, or there are any changes in plan provisions or applicable laws, the results would vary accordingly.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared for STRS Ohio for the purposes described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron

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SECTION I –SUMMARY OF PROPOSED LEGISLATION

House Bill No. 601 (HB 601) proposes to amend sections 3307.28, 3307.58, 3307.67, and 3307.49 of the Revised Code regarding increasing contributions to the State Teachers Retirement System (STRS or System) and School Employees Retirement System, establishing minimum amounts for certain STRS cost-of-living (COLA) adjustments, and eliminating an age-related eligibility criterion for retirement in STRS.

Here is a summary of the HB 601 proposed changes:

1. The legislation grants the board the authority to increase the employer contribution to 18% - phased-in at 0.5% per year starting July 2023,
2. Eliminates the age 60 requirement for unreduced retirement that was previously slated to go into effective August 1, 2026,
3. Through June 30, 2023, requires a one-time 2% COLA to those eligible,
4. On and after July 1, 2023, requires a 2% COLA on the first $30,000 of a benefit to those eligible,
5. The bill maintains the exception in 3307.67(E), wherein the board may adjust the increase payable if the actuary determines that an adjustment does not materially impair the fiscal integrity of the system or is necessary to preserve the fiscal integrity of the system. However, the bill adds new language prohibiting the board from paying anything less than a 1% COLA on the first $30,000. Additionally, the bill indicates nothing in that section prevents the board from paying a COLA on any portion of a benefit that exceeds the first $30,000.

In the current law, the "base" benefit is increased each year by 2% of the original benefit. For members retiring on or after August 1, 2013, 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. Effective July 2017 through June 30, 2022, the COLA has been reduced to zero.

At its March 17, 2022 Board meeting, prior to the issuance of HB 601, the Board approved a one-time 3% COLA effective July 1, 2022 for those eligible and eliminated the age 60 requirement to receive unreduced retirement that was scheduled to go into effect August 1, 2026. As such, the analysis included in this report does not reflect a "cost" associated with items 2 and 3 above. These changes are incorporated into the "Baseline" figures.

SECTION II – ANALYSIS OF FINANCIAL IMPACT

In order to assess the financial impact of House Bill 601 on the System we have developed a Baseline scenario as of June 30, 2022. This Baseline scenario incorporates recently adopted plan and assumption changes that will first be reported in the June 30, 2022 valuation of the System. This Baseline scenario was developed based on a roll forward of the June 30, 2021 valuation results using generally recognized and accepted actuarial practices and principles and assuming no experience gains or losses. Please refer to Section IV and Appendix A for a description of the changes incorporated herein.

The table below shows the expected impact of HB 601 on the Total Actuarial Accrued Liability, Unfunded Actuarial Liability, Total Normal Cost, and Employer Normal Cost rate. It also includes a measurement of per cent of payroll required to amortize the increase over 30 years.

Assessment of the Financial Impact of Proposed Legislation HB 601			
	Projected June 30, 2022 Valuation Results		
	Baseline	After HB601	Increase
Valuation Results			
Defined Benefit Plan Valuation Payroll	$ 12,339,076,889	$ 12,339,076,889	$ -
Total Actuarial Accrued Liability	$ 101,837,668,927	$ 109,064,251,966	$ 7,226,583,039
Actuarial Value of Pension Assets	84,739,041,844	84,739,041,844	0
Unfunded Actuarial Liability (UAL)	$ 17,098,627,083	$ 24,325,210,122	$ 7,226,583,039
30-year Amortization of Increase in UAL			$ 410,266,723
DB Plan Rate to Amortize Increase			3.32%
ADC Funding Policy Amortization Period	23	23	
Amortization Payment	$ 1,132,807,099	$ 1,611,577,969	$ 478,770,870
Offset for DC & ARP Contributions	40,745,960	40,745,960	
UAL Amortization from DB Plan	$ 1,092,061,139	$ 1,570,832,009	
Defined Benefit Plan Rate to Amortize UAL	8.85%	12.73%	3.88%
Total Normal Cost	$ 1,282,372,034	$ 1,342,181,435	$ 59,809,402
Normal Cost Rate	10.55%	11.04%	0.49%
Member Contribution Rate	13.53%	13.53%	0.00%
Employer Normal Cost Rate	(2.98%)	(2.49%)	0.49%
Actuarially Determined Contribution Rate	5.87%	10.24%	4.37%

SECTION II – ANALYSIS OF FINANCIAL IMPACT

Ohio Revised Code section 3307.51 (D) also calls for a statement of whether the scheduled contributions to the system after the proposed change is enacted are expected to be sufficient to satisfy the funding objectives established by the board. The Board's funding objectives include:

1. 100% Funding
2. Manage the risk of unanticipated benefit changes
3. Intergenerational equity, to the extent consistent with other funding objectives
4. Transparency and accountability

In addition to these four objectives, the Board has established a funding policy to assess if the objectives are being met. Under this policy the UAL is to be amortized over a closed 30-year period that began July 1, 2015, as a level percent of pay, assuming a 3.00% annual payroll growth. As of June 30, 2022, the remaining amortization period is 23 years. An Actuarially Determined Contribution (ADC) is developed using this amortization period and compared to the 14.00% of payroll employers are currently contributing for members of the Defined Benefit and Combined Plans.

1. 100% Funding:

The Board funding objective requirement of 100% funding does not state an explicit time period over which this metric is targeted to be achieved. However, as already mentioned, the Board's current ADC policy uses a closed 30-year period beginning June 1, 2015, which we believe is a reasonable timeline for purposes of this measurement. Based on the Projected June 30, 2022 results detailed in the table above, the contribution rate schedule proposed in HB 601 currently exceeds the ADC policy contribution and as such, continues to meet this objective of the Board funding policy.

2. Manage the risk of unanticipated benefit changes:

We interpret "unanticipated benefit changes": as unanticipated benefit reductions. Under the existing revised statutes, the Board has the authority to reduce or eliminate the annual COLA. This authority requires an actuarial determination that adjusting the COLA does not materially impair the fiscal integrity of the retirement system or is necessary to preserve the fiscal integrity of the Retirement System. Under HB601 this Board's authority to reduce COLA's is limited to be no less than 1% of the first $30,000 of benefits.

Since under the existing statute the Board already has the authority to reduce COLA's to 1%, the only impact of HB 601 when it comes to the risk of benefit cuts, has to do with limiting the Board's authority to cut no lower than 1%.

The need to reduce benefits to maintain the fiscal integrity of the system will almost always be a result of the System experiencing poor investment returns. A key metric that Cheiron has opined on in the past to demonstrate fiscal integrity, is to compare actual contributions to "tread water" contributions, where tread water contributions are the sum of the system's normal cost (value of benefit being earned in a year) plus interest on the unfunded actuarial liability (UAL).

SECTION II – ANALYSIS OF FINANCIAL IMPACT

In the chart below we present various metrics on the retirement system before HB601 (baseline) and after HB601. In the after HB601, there are two scenarios; the first scenario has employer contributions fixed at 14%, and the second HB601 scenario increases employer contributions by 0.50% per year up to a maximum of 18% beginning July 1, 2023. This latter scenario, which is allowed under HB601, demonstrates in our opinion, that the risk of unanticipated benefits reductions is minimal when compared to the baseline scenario, as long as the Board increases the employer contribution rate to the maximum amount permissible under HB601.

In the gold columns in the chart below, we show two important tread water metrics, the first being how many years following a major market downturn (in this case a negative 19% return) does it take for actual contributions to the System to exceed the tread water contribution level. Under this metric, contributions under HB601 takes only three years longer to get back to tread water when compared to the baseline scenario.

The second gold column presents the probability (using a stochastic analysis) that the System's contributions will exceed the tread water contribution level in 10 years following the major market downturn. As the chart shows, after HB601, assuming that the employer contribution will increase to the extent allowed up to 18%, the odds that System's contributions exceed tread water contributions in 2032 are only 2% less than under the baseline scenario.

We conclude that the risk of unanticipated benefit reductions can be managed under HB601 because of the provision allowing employer contributions to escalate to a maximum of 18%.

		Deterministic				Stochastic
Description	**Employer contribution**	**2022 Funded Ratio**	**Year fully funded**	**2022 contributions exceed tread water?**	**Years to exceed tread water after -19% return**	**Probability of exceeding tread water in 10 years**
2022 Baseline	**14%**	**89.1%**	**2028**	**Yes +10.70%**	**4**	**79%**
HB601	**14%**	**83.2%**	**2033**	**Yes +6.11%**	**17**	**66%**
HB601	**up to 18%**	**83.2%**	**2032**	**Yes +6.11%**	**7**	**77%**

3. Intergenerational Equity:

The term intergenerational equity typically implies that one generation of the retirement systems' membership is fully paying for the benefits that generation will be receiving in retirement, without passing on the cost of those benefits to a future generation. Intergenerational equity also applies to the taxpayers of the State who ultimately pay the bill owed to STRS Ohio.

Starting with the current membership, as shown in the table on page 2 of this report, since member contributions are at 13.53% of payroll, and the total normal cost after HB601 is 11.04%, we can state that in our opinion, HB601 meets the objective of intergenerational equity.

When analyzing the taxpayer intergenerational equity, one must look at the UAL and whether that cost is being passed on to future generations. The table above shows that the UAL is expected to be paid off by 2032 even after HB601. We believe a 10-year period to fully pay off the UAL also meets the objective of intergenerational equity.

SECTION II – ANALYSIS OF FINANCIAL IMPACT

4. Transparency and Accountability:

We interpret transparency and accountability in the context of HB601 as this legislation along with this report contains sufficient information that would enable an outside independent actuary to understand the elements of HB601, evaluate the findings we have arrived at in this report, and confirm the accuracy of our calculations.

We believe this report meets the transparency and accountability objective of the Board.

SECTION III – MEMBERSHIP INFORMATION

Table III-1
Summary of Membership Data as of June 30, 2021 ($ in thousands)

		Male	Female	Total
1.	**Defined Benefit Plan Active Members**			
	Number of Members	44,247	115,321	159,568
	Annual Salaries (for period ending June 30, 2021)	$ 3,162,389	$ 7,477,668	$ 10,640,057
	Average Age	45.29	43.94	44.31
	Average Service	13.90	13.69	13.75
2.	**Combined Plan Active Members**			
	Number of Members	1,522	5,337	6,859
	Annual Salaries (for period ending June 30, 2021)	$ 103,238	$ 327,699	$ 430,937
	Average Age	43.52	41.25	41.75
	Average Service	9.20	9.81	9.67
3.	**Total Defined Benefit and Combined Plan Active Members**			
	Number of Members	45,769	120,658	166,427
	Annual Salaries (for period ending June 30, 2021)	$ 3,265,627	$ 7,805,368	$ 11,070,995
	Average Age	45.23	43.82	44.21
	Average Service	13.74	13.52	13.58
4.	**Defined Benefit Inactive Members**			
	Eligible for Allowances	4,808	15,005	19,813
	Eligible for Refunds Only	51,042	91,046	142,088
	Total	55,850	106,051	161,901
5.	**Combined Benefit Inactive Members**			
	Eligible for Allowances	136	564	700
	Eligible for Refunds Only	410	1,210	1,620
	Total	546	1,774	2,320
6.	**Total Inactive Members**			
	Eligible for Allowances	4,944	15,569	20,513
	Eligible for Refunds Only	51,452	92,256	143,708
	Total	56,396	107,825	164,221

SECTION III – MEMBERSHIP INFORMATION

Table III-1
Summary of Membership Data as of June 30, 2021 (continued) ($ in thousands)

		Male	Female	Total
7.	**Retirees**			
	Number of Members	43,024	90,508	133,532
	Annual Allowance	$ 2,330,235	$ 3,937,424	$ 6,267,659
	Average Allowance (in dollars)	$ 54,161	$ 43,504	$ 46,938
8.	**Disabled Retirees**			
	Number of Members	1,439	3,350	4,789
	Annual Allowance	$ 61,358	$ 123,559	$ 184,917
	Average Allowance (in dollars)	$ 42,639	$ 36,883	$ 38,613
9.	**Beneficiaries Receiving Optional Allowances**			
	Number of Members	3,628	9,202	12,830
	Annual Allowance	$ 89,654	$ 342,936	$ 432,590
	Average Allowance (in dollars)	$ 24,712	$ 37,268	$ 33,717
10.	**Survivors' Benefit Fund Beneficiaries**			
	Number of Members	2,685	3,085	5,770
	Annual Allowance	$ 49,707	$ 74,548	$ 124,255
	Average Allowance (in dollars)	$ 18,513	$ 24,165	$ 21,535
11.	**Total Retirees and Beneficiaries**			
	Number of Members	50,776	106,145	156,921
	Annual Allowance	$ 2,530,954	$ 4,478,467	$ 7,009,421
	Average Allowance (in dollars)	$ 49,845	$ 42,192	$ 44,668

SECTION III – MEMBERSHIP INFORMATION

Table III-2
Benefit Payments by Type as of June 30, 2021

Age Last Birthday	Number		Annual Allowance (in thousands)		Average Annual Allowance
Retirees					
Under 60	4,262	$	224,386	$	52,648
60-64	11,762		566,211		48,139
65-69	28,119		1,357,452		48,275
70-74	37,722		1,875,942		49,731
75-79	23,662		1,126,714		47,617
Over 79	28,005		1,116,954		39,884
Total	**133,532**	**$**	**6,267,659**	**$**	**46,938**
Disabled Retirees					
Under 60	1,004	$	35,971	$	35,828
60-64	622		24,287		39,047
65-69	712		29,981		42,108
70-74	1,030		43,577		42,308
75-79	704		27,779		39,459
Over 79	717		23,322		32,527
Total	**4,789**	**$**	**184,917**	**$**	**38,613**
Beneficiaries Receiving Optional Allowances					
Under 60	17	$	648	$	38,118
60-64	119		5,039		42,345
65-69	572		24,200		42,308
70-74	1,583		66,198		41,818
75-79	1,996		79,980		40,070
Over 79	8,543		256,525		30,028
Total	**12,830**	**$**	**432,590**	**$**	**33,717**
Survivors' Benefit Fund Beneficiaries					
Under 60	1,340	$	17,299	$	12,910
60-64	369		7,938		21,512
65-69	704		17,059		24,232
70-74	945		24,789		26,232
75-79	813		20,326		25,001
Over 79	1,599		36,844		23,042
Total	**5,770**	**$**	**124,255**	**$**	**21,535**
Grand Total	**156,921**	**$**	**7,009,421**	**$**	**44,668**

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

A. Actuarial Assumptions Adopted Effective June 30, 2022

1. Mortality Rates

Post-Retirement: Pub-2010 Teachers Healthy Annuitant Mortality Table, adjusted 110% for males, projected forward generationally using mortality improvement scale MP-2020 (Updated effective June 30, 2022).

Sample mortality rates prior to improvements are as follows:

Age	Male	Female
50	0.11%	0.07%
55	0.25%	0.19%
60	0.39%	0.29%
65	0.65%	0.45%
70	1.18%	0.77%
75	2.23%	1.46%
80	4.23%	2.82%
85	7.96%	5.39%
90	14.59%	10.09%
95	24.55%	18.03%
100	35.87%	28.16%

Pre-Retirement: Pub-2010 Teachers Employee Table adjusted 95% for females, projected forward generationally using mortality improvement scale MP-2020 (Updated effective June 30, 2022).

Post-Retirement Disabled: Pub-2010 Teachers Disabled Annuitant Table projected forward generationally using mortality improvement scale MP-2020 (Updated effective June 30, 2022).

Sample mortality rates prior to improvement are as follows:

Age	Male	Female
45	1.01%	0.99%
50	1.61%	1.48%
55	2.11%	1.74%
60	2.50%	1.96%
65	3.04%	2.26%
70	3.90%	2.86%
75	5.19%	4.00%

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

2. Active Retirement Rates

The following rates of retirement are assumed for members eligible to retire with a reduced benefit (Updated effective June 30, 2022).

Defined Benefit Plan – Reduced Rates						
Age	Male	Female		Age	Male	Female
50-51	2.0%	2.0%		59	11.0%	10.0%
52	3.0%	3.0%		60	6.5%	9.0%
53	5.0%	5.0%		61	8.0%	10.0%
54	9.0%	9.0%		62	8.0%	11.0%
55	12.0%	13.0%		63	10.0%	12.0%
56-57	10.0%	11.0%		64	15.0%	25.0%
58	8.0%	10.0%				

The following rates of retirement are assumed for members once they are eligible to retire with an unreduced benefit (Updated effective June 30, 2022).

Defined Benefit Plan – Unreduced Rates						
Age	Male	Female		Age	Male	Female
55	23%	18%		66	23%	28%
56	20%	20%		67	22%	26%
57	18%	20%		68	20%	25%
58	22%	22%		69	21%	25%
59	23%	26%		70-71	22%	25%
60	21%	28%		72	24%	25%
61-62	20%	28%		73	20%	25%
63	20%	30%		74	23%	28%
64	24%	30%		75+	100%	100%
65	28%	36%				

Combined Plan Retirement Rates		
Age	Male	Female
60	10%	10%
61-63	10%	15%
64	18%	20%
65	25%	30%
66	10%	25%
67	10%	15%
68	10%	15%
69-74	15%	15%
75	100%	100%

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

3. 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.

4. Disability Rates

Select rates are shown below (Updated Rates effective June 30, 2022):

Age	Unisex Rates
Under 30	0.007%
30	0.007%
35	0.021%
40	0.035%
45	0.070%
50	0.126%
55	0.154%
60	0.175%
65 and Over	0.175%

5. Termination Rates

Termination rates based on service, for causes other than death, disability, or retirement (Updated Rates effective June 30, 2022).

Vested Terminations*		
Age	Male	Female
20	6.00%	6.00%
25	6.00%	6.00%
30	2.70%	3.55%
35	2.05%	2.00%
40	1.75%	1.40%
45	1.60%	1.25%
50	1.95%	1.60%
55	4.00%	3.60%
60	4.00%	3.60%

*Termination rates stop at first retirement eligibility.

Non-Vested Terminations		
Service	Male	Female
Under 1 Year	40.00%	35.00%
1 to 2 Years	16.00%	15.00%
2 to 3 Years	12.00%	8.00%
3 to 5 Years	9.00%	8.00%

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

6. Percent Electing a Deferred Termination Benefit

80% of future terminating members of the Defined Benefit Plan are assumed to elect a deferred termination benefit. The remaining 20% are assumed to take an immediate lump-sum. (Updated effective June 30, 2022).

95% of current terminated vested members of the Defined Benefit Plan are assumed to elect a deferred termination benefit. The remaining 5% are assumed to take a lump-sum on the valuation date. (Updated effective June 30, 2022).

7. 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 June 30, 2017 and reaffirmed effective June 30, 2022.)

8. Dependents for Survivor's Benefit

The spouse is the only assumed beneficiary for the survivor's benefit.

9. Missing Data

Where data was missing, the field was populated with the prior year's data, if available, or the average value of similar members.

10. Investment Return Rate

7.00% per annum, compounded annually and net of all expenses.

11. Salary Increase Rates

Total salary increases, as shown below for selected attained service (Updated effective June 30, 2022).

Service	Rate
<1	8.50%
1	8.20%
2	8.00%
3	7.00%
4	6.50%
5	6.30%
10	5.50%
15	4.50%
20	3.50%
25	3.00%
30+	2.50%

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

12. Payroll Growth Rates

3.00% per annum (Adopted effective June 30, 2017 and reaffirmed effective June 30, 2022).

13. Defined Contribution Plan

The Defined Contribution account balance is added to the Actuarial Liability and the Actuarial Value of Assets. If a member retires and elects to have the Defined Contribution Account balance paid as an annuity, then the account balance is transferred to the Defined Benefit Plan and the annuity is valued as part of the Defined Benefit Plan.

14. Changes in Assumptions Since Last Valuation

Demographic and economic assumptions were reviewed and updated as part of an Experience Study performed, with changes going into effect June 30, 2022. For more information on the specific changes, please refer to the Experience Study Report, dated March 11. 2022.

15. Rationale for Assumptions

The updated assumptions were adopted by the Board of Trustees at their February 17, 2022 meeting. The demographic assumptions adopted are based on an experience study covering the period from July 1, 2015 through June 30, 2021.

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Actuarial Value of Assets

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.

2. Actuarial Funding Method

The funding method for the valuation of liabilities used for this valuation is the Entry Age Normal (EAN) method. Under this funding method, a normal cost rate is determined as a level percentage of pay for each active participant. The normal cost rate multiplied by payroll equals the total normal cost for each participant. The normal cost contributions (Employer and Participant) will pay for projected benefits at retirement for each active participant.

The Actuarial Liability is the difference between the Present Value of Future Benefits and the Present Value of Future Normal Costs. The difference between this Actuarial Liability and the Actuarial Value of Assets is the Unfunded Actuarial Liability (UAL).

The portion of the actuarial liability in excess of plan assets, the UAL, is amortized to develop an additional cost that is added to each year's employer normal cost. Under this funding method, actuarial gains and losses are directly reflected in the size of the Unfunded Actuarial Liability. The amortization method is described below.

3. Amortization 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.

4. Disclosure Regarding Modeling

Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate the liabilities, Normal Costs and projected benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have a basic understanding of it and have used ProVal in accordance with its original intended purpose. We are not aware of any material inconsistencies, unreasonable output resulting from the aggregation of assumptions, material limitations or known weaknesses that would affect this report.

SECTION IV – SUMMARY OF ASSUMPTIONS AND METHODS

Projections in this report were developed using P-scan, our proprietary tool for the intended purpose of developing projections. The projections shown in this report cover multiple individual scenarios and the variables are not necessarily correlated. We are not aware of any material inconsistencies, unreasonable output resulting from aggregation of assumptions, material limitations or known weaknesses that would affect the projections shown in this report.

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

Defined Benefit Plan

1. Eligibility for Membership

Immediate upon commencement of employment

2. Service Retirement

Eligibility: Age 65 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 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 and later	Any age and 35 years; or age 65 and 5 years

Amount: For members eligible to retire on or before July 1, 2015 (i.e., age 60 with 5 years of service, age 55 with 25 years of service, or 30 years of service regardless of age), the annual amount is 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 years of earnings if the member has 35 or more years of service credit, multiplied by years of total Ohio service credit up to 30 years of service. For years of Ohio contributing service credit in excess of 30 years, the following percentages will apply:

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

For members who were eligible to retire on July 1, 2015, the annual amount is greater of:

a. the benefit amount calculated upon retirement under the new benefit formula, or
b. the benefit amount the member would have received if he/she retired on July 1, 2015.

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

For retirements prior to August 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

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For retirements on or after August 1, 2015, the age and 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 and later	Any age and 30 years; or age 60 and 5 years

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

The benefits as a percentage of final average salary, which reflect the early retirement reduction, are shown in the booklet entitled *Service Retirement and Plans of Payment for members enrolled in the Defined Benefit Plan 2017/2018.*

3. 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 years of earnings 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.

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4. 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 and after July 1, 2013, completion of ten years of qualifying service and permanently incapacitated for the performance of duty.

Amount: The greater of 2.2% of the average salary 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.

5. Death after Retirement

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

6. Survivor's Benefit

Eligibility: Upon death after at least 1½ years of service 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 service 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
1	25%
2	40
3	50
4	55
5 or more	60

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

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 a 100% Joint and Survivor benefit to the qualified survivor. 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.

7. 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:

Credit Service	Lump-Sum
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.

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8. Plans of Payments

Benefits can be paid under the following forms of payment:

- Single Life Annuity;
- Joint and Survivor Annuity -100%, 50% or other; with or without pop-up; with one or multiple beneficiaries;
- Annuity certain and;
- Partial lump-sum option – from six to 36 times the monthly Single Life Annuity as a lump-sum with the remainder as an annuity.

9. Cost-of-Living Benefits

Cost of living increases are governed by Ohio Revised Code 3307.67. The "base" benefit is increased each year by 2% of the original COLA. For members retiring on or after August 1, 2013, 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.

Effective July 2017, the COLA has been reduced to 0%.

Effective July 2022, a one-time 3% COLA has been provided to those eligible.

10. Contributions

By Members:	14% of salary.
By Employers:	14% of salaries of their employees who are members.
Rehired Retirees:	Rehired retirees who return to employment after retirement and their employers both contribute to the System. These contributions fund an additional benefit payable after termination of employment. The contributions and interest are paid as a lump-sum or converted to an additional annuity.

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

Combined Plan

1. Eligibility for Membership

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

2. 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 IRC Section 401(a)(17).

3. Early Retirement

Eligibility:	Before age 60 with five years of service
Amount:	The normal retirement benefit commencing at age 60. At age 50 or later, 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.

4. Vesting

Eligibility:	Completion of five years of service credit for the Defined Benefit portion. Member contributions and earnings are 100% vested at all times.
Amount:	A member who terminates with five 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.

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

5. 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.

6. 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 ten 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 based on the 2.2% formula. Alternatively, the member can withdraw his/her defined contribution account in lieu of receiving the disability allowance.

7. 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.
Amount:	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 in lieu of receiving a monthly benefit.

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

8. Forms of Payment of Defined Benefit Portion

If the member withdraws his/her defined contribution account prior to age 50, then the formula defined benefit must be paid in a lump-sum. If the member is at least age 50, then the benefit can be paid as a Single Life Annuity, a Joint and Survivor Annuity as described under the Defined Benefit Plan, or as a lump-sum. All alternative forms of payment are the actuarially equivalent of the Single Life Annuity benefit payable at age 60.

9. Forms of Payment of Member's Defined Contribution Account

If the member withdraws his/her defined contribution account prior to age 50, then the account must be paid in a lump-sum. If the member is at least age 50, then the member can elect that the actuarial equivalent of the Defined Contribution account be paid as a Single Life Annuity or a Joint and Survivor Annuity as described under the Defined Benefit plan.

10. 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. Effective July 2022, the COLA has been increased to 3%, for one year only.

11. Contributions

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 salary is used to fund the defined benefit formula.

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

Defined Contribution Plan

1. Eligibility for Membership

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

2. Service (Normal) Retirement

Eligibility:	Termination after age 50.
Amount:	The balance in the member's defined contribution account.

3. Early Retirement

Eligibility:	Termination before age 50.
Amount:	The balance in the member's defined contribution account.

4. Vesting

Eligibility:	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.

5. 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.

6. 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.

APPENDIX A – SUMMARY OF OHIO REVISED CODE PLAN PROVISIONS

7. Optional Forms of Payment

The actuarial equivalent of the member's defined contribution account can be paid on or after age 50 as a Single Life Annuity or as a Joint and Survivor Annuity as described in the Defined Benefit Plan.

8. Cost-of-Living Benefits

Not available.

9. Contributions

By Members:	14% of salary is deposited into the member's defined contribution account.
By Employers:	Effective July 1, 2017, 9.53% of salary is deposited into the member's defined contribution account. 4.47% of salaries are used to amortize The Unfunded Actuarial Liability of the Defined Benefit Plan. Effective July 1, 2022, 11.09% of salary is deposited into the member's defined contribution account. 2.91% of salaries are used to amortize The Unfunded Actuarial Liability of the Defined Benefit Plan.

10. Alternative Retirement Plan Employer Contributions

Effective July 1, 2017, 4.47% of salary of the salaries of Alternative Retirement Plan members is used to fund the Unfunded Actuarial Liability of the Defined Benefit Plan.

Effective July 1, 2022, 2.91% of salary of the salaries of Alternative Retirement Plan members is used to fund the Unfunded Actuarial Liability of the Defined Benefit Plan.

APPENDIX B – GLOSSARY OF TERMS

Funding

1. **Actuarial Assumptions**

   Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

2. **Actuarial Cost Method**

   A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a normal cost and an Actuarial Liability.

3. **Actuarial Gain/(Loss)**

   A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular actuarial cost method.

4. **Actuarial Liability**

   The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

5. **Actuarial Present Value (Present Value)**

   The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe $100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you will not be obligated to pay him. If the assumed investment return is 10%, the Actuarial Present Value is:

Amount		Probability of Payment		1/(1+Investment Return)	
$100	x	(1 - .01)	x	1/(1+.1)	= $90

6. **Actuarial Valuation**

   The determination, as of a specified date, of the normal cost, Actuarial Liability, Actuarial Value of Assets, and related \ for a pension plan.

7.

7. **Actuarial Value of Assets**

   The value of cash, investments and other property belonging to a pension plan as used by the actuary for the purpose of an actuarial valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

APPENDIX B – GLOSSARY OF TERMS

8. Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of actuarial assumptions.

9. Amortization Payment

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

10. Entry Age Normal Actuarial Cost Method

A method under which the Actuarial Present Value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between Entry Age and assumed exit ages.

11. Funded Percentage

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

12. Investment Return Assumption

The assumed interest rate used for projecting dollar related values in the future.

13. Mortality Table

A set of percentages which estimate the probability of death at a particular point in time. Typically, the rates are annual and based on age and sex.

14. Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses, which is allocated to a valuation year by the actuarial cost method.

15.

15. Projected Benefits

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of actuarial assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

16. Unfunded Actuarial Liability

The excess of the Actuarial Liability over the Actuarial Value of Assets.

APPENDIX B – GLOSSARY OF TERMS

GASB

1. **Actuarially Determined Contribution**

   A target or recommended contribution for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.

2. **Actuarial Valuation Date**

   The date as of which an actuarial valuation is performed. This date may be up to 24 months prior to the measurement date and up to 30 months prior to the employer's reporting date.

3. **Deferred Inflow of Resources**

   An acquisition of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience gains on the Total Pension Liability, assumption changes reducing the Total Pension Liability, or investment gains that are recognized in future reporting periods.

4. **Deferred Outflow of Resources**

   A consumption of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience losses on the Total Pension Liability, assumption changes increasing the Total Pension Liability, or investment losses that are recognized in future reporting periods.

5.

5. **Entry Age Actuarial Cost Method**

   The actuarial cost method required for GASB 67 and 68 calculations. Under this method, the Actuarial Present Value of the Projected Benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between Entry Age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the service cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future service costs is called the Total Pension Liability.

6. **Measurement Date**

   The date as of which the Total Pension Liability and Plan Fiduciary Net Position are measured. The Total Pension Liability may be projected from the actuarial valuation date to the measurement date. The measurement date must be the same as the reporting date for the Plan.

APPENDIX B – GLOSSARY OF TERMS

7. Net Pension Liability

The liability of employers and nonemployer contributing entities for employees for benefits provided through a defined benefit pension plan. It is calculated as the Total Pension Liability less the Plan Fiduciary Net Position.

8. Plan Fiduciary Net Position

The fair or Market Value of Assets.

9. Reporting Date

The last day of the Plan or employer's fiscal year.

10. Service Cost

The portion of the Actuarial Present Value of Projected Benefit payments that is attributed to the current period of employee service in conformity with the requirements of GASB 67 and 68. The service cost is the normal cost calculated under the Entry Age actuarial cost method.

11. Total Pension Liability

The portion of the Actuarial Present Value of Projected Benefit payments that is attributed to past periods of employee service in conformity with the requirements of GASB 67 and 68. The Total Pension Liability is the Actuarial Liability calculated under the Entry Age actuarial cost method. This measurement generally is not appropriate for estimating the cost to settle the Plan's liabilities.