Wisconsin Retirement System

Fortieth Annual Actuarial Valuation and Gain/Loss Analysis

December 31, 2020

Outline of Contents

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May 28, 2021

Employee Trust Funds Board
Wisconsin Department of Employee
Trust Funds
4822 Madison Yards Way
Madison, Wisconsin 53705

Ladies and Gentlemen:

The results of the December 31, 2020 **annual actuarial valuations of non-retired members covered by the Wisconsin Retirement System** are presented in this report. The valuations establish contribution rates for the 2022 calendar year in conformance with Chapter 40 of the Wisconsin Statutes. This report should not be relied upon for any other purpose. This report may be distributed to parties other than the ETF Board and Staff only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different. The change in the total normal cost rates from last year are shown below:

General and Executive/Elected	Protective with SS	Protective without SS
-0.5%	0.0%	-0.2%

The valuations are based upon our understanding of the main plan provisions related to General, Executive and Elected, and Protective Occupation employment with and without Social Security coverage. The plan provisions evaluated are summarized in Section G of this report. Please advise us of any material misstatements in the summary and do not rely on this report until such are resolved.

The individual member statistical data required for the valuations was furnished by the Department of Employee Trust Funds (DETF), together with pertinent data on financial operations. The cooperation of DETF staff in furnishing these materials is acknowledged with appreciation. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by others.

Actuarial valuations are based upon assumptions regarding future activity in specific risk areas including the rates of investment return and payroll growth, eligibility for the various classes of benefits, and longevity among retired lives. The Board adopts these assumptions after considering the advice of the actuary and other professionals. Each actuarial valuation takes into account all prior differences between actual and assumed experience in each risk area and adjusts the contribution rates as needed. The December 31, 2020 valuations were based upon assumptions that were recommended in connection with a study of experience during 2015-2017 and benefit provisions in effect on December 31, 2020.

Future actuarial measurements may differ significantly from those presented in this report due to such factors as experience differing from that anticipated by actuarial assumptions, changes in plan provisions, actuarial assumptions/methods or applicable law. Due to the limited scope of this assignment, we did not perform an analysis of the potential range of future measurements.

This report includes various risk factors, but does not include an assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. However, an additional assessment of risk including stress testing for the Wisconsin Retirement System was conducted in the fall of 2019 in conjunction with the State of Wisconsin Investment Board and a separate study commissioned in the fall of 2020 by the Department of Employee Trust Funds. Additional discussion of various risk factors is included on pages B-9 to B-12 of this report.

This report reflects the impact of COVID-19 experience through December 31, 2020. It does not reflect the ongoing impact of COVID-19, which is likely to influence demographic and economic experience, at least in the short-term. We will continue to monitor these developments and their impact on the Wisconsin Retirement System. Actual future experience will be reflected in each subsequent annual valuation, as experience emerges.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

To the best of our knowledge, this report is complete and accurate and was made in accordance with generally recognized actuarial methods. Brian B. Murphy, Mark Buis, and James D. Anderson are Members of the American Academy of Actuaries (MAAA), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor.

The valuations were completed by qualified actuaries in accordance with accepted actuarial procedures as prescribed by the Actuarial Standards Board. It is our opinion that the Wisconsin Retirement System is operating in accordance with actuarial principles of level percent-of-payroll financing.

Respectfully submitted,

Brian B. Murphy, FSA, EA, FCA, MAAA, PhD

Mark Buis, FSA, EA, FCA, MAAA

James D. Anderson, FSA, EA, FCA, MAAA

BBM/MB/JDA:sc

SECTION A

EXECUTIVE SUMMARY

Executive Summary

1. Required Employer Contributions to Support Retirement System Benefits

	General, Executive & Elected Officials		Protective Occupation With Soc. Sec.		Protective Occupation Without Soc. Sec.		Average
	2022	2021	2022	2021	2022	2021	2022
Employer Normal Cost	6.50%	6.75%	12.00%	11.75%	16.40%	16.35%	7.20%
Participant Normal Cost	6.50%	6.75%	6.50%	6.75%	6.50%	6.75%	6.50%
Total Normal Cost	**13.0%**	**13.5%**	**18.5%**	**18.5%**	**22.9%**	**23.1%**	**13.70%**

All employers are required to contribute the employer normal cost shown above. Certain employers are required to make additional contributions to fund their "Frozen Initial Liability" which are liabilities that they either brought on when they joined the WRS, or when they increased their prior service percentage. Related information is provided on page B-2.

Under Section 40.05 of the Wisconsin statutes updated for Acts 10 and 32 of 2011, contribution rates are split evenly between the employer normal cost and the participant normal cost for both General Participants and Executive and Elected Officials. For protective occupations, the participant normal cost is set equal to the participant normal cost for General Participants.

Contributions to support the Section 40.65 Duty Disability Program and the Accumulated Sick Leave Conversion Credit Program are in addition to the WRS rates shown above.

2. Reasons for Change

There are three general reasons why contribution rates change from one valuation to the next. The first is a change in the benefits or eligibility conditions of the plan. The second is a change in the valuation assumptions used to project future occurrences. The third is the difference during the year between the plan's actual experience and what the assumptions predicted.

In Wisconsin, there is a fourth reason. When the contribution rate changes for any of the first three reasons, the effect of the change is split evenly between employers and participants, except for protective occupation participants. When the participant normal cost changes, projected future participant account balances also change. By statute, the value of the participant retirement benefits must be at least equal to twice the account balance at retirement. This then changes the value of the retirement benefit, which then changes the total normal cost, which is then split between employers and participants. This final effect on normal cost is referred to as the "Money Purchase Effect."

In total, changes in the contribution rate are illustrated on the following chart. Additional detail on gains and losses can be found in Section D of this report.

	General, Executive & Elected Officials	Protective with Soc. Sec.	Protective without Soc. Sec.
2020 Normal Cost Rate	13.50%	18.50%	23.10%
Effect of Benefit Change	0.00%	0.00%	0.00%
Effect of Assumption Change	0.00%	0.00%	0.00%
Effect of Asset Performance	(0.52)%	(0.70)%	(1.03)%
Effect of Salary Experience	0.13%	0.72%	0.61%
Effect of Money Purchase Benefit	(0.15)%	(0.05)%	(0.01)%
Demographic and Other Experience	0.04%	0.03%	0.23%
2021 Normal Cost Rate	13.00%	18.50%	22.90%

Although the investment income is allocated proportionately to each group, the effect on the contribution rate will be different because the ratio of assets to payroll is different for each group.

3. General Comments

Based upon this valuation, normal cost contribution rates decreased by 0.5% for the General/Executive & Elected group, decreased by 0.2% for the Protective without Social Security group and remained level for the Protective with Social Security group. Since asset gains and losses are phased-in over a five-year period in the Market Recognition Account, the 15.0% (see page C-7) market value return translates to a 10.5% return on an actuarial basis, which considers past assets gains and losses. While the excess return above the 7.0% assumption serves to put downward pressure on contribution rates, all of the groups had unfavorable demographic experience including higher pay increases than expected. This results in a net gain during calendar year 2020 for the General and Protective without Social Security groups and a net loss during calendar year 2020 for the Protective with Social Security group (see section D for additional details) which serves to put downward pressure on contribution rates for the General and Protective without Social Security groups.

In total, during 2020, investment return was above the assumed 2020 level of 7.00% on a market value basis. Under the asset valuation method (using the MRA), gains and losses are phased-in over a five-year period, resulting in a 10.5% return on an Actuarial Value of Assets basis in the Core Fund. The Market Value of Assets exceeds the Actuarial Value of Assets by approximately 10.2% as of the valuation date. The statutory asset valuation method will recognize all of the differences between actuarial value and market value of $11.1 billion over four future years putting downward pressure on future contribution rates, given that all assumptions are realized.

Conclusion. Based upon the results of the December 31, 2020 regular annual actuarial valuation, it is our opinion that ***the Wisconsin Retirement System continues to operate in accordance with actuarial principles of level percent-of-payroll financing.***

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.00% on the actuarial value of assets), it is expected that:

(1) The normal cost as a percentage of pay will decrease to the level of the entry age normal cost as time passes.
(2) The unfunded liability will decrease in dollar amount until it is fully funded.
(3) The funded status of the plan will remain very close to a 100% funded ratio.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded ratio measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
(2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amount of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon actuarial assumptions. A funded ratio measurement in this report of 100% is not synonymous with no required future contributions. If the funded ratio were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

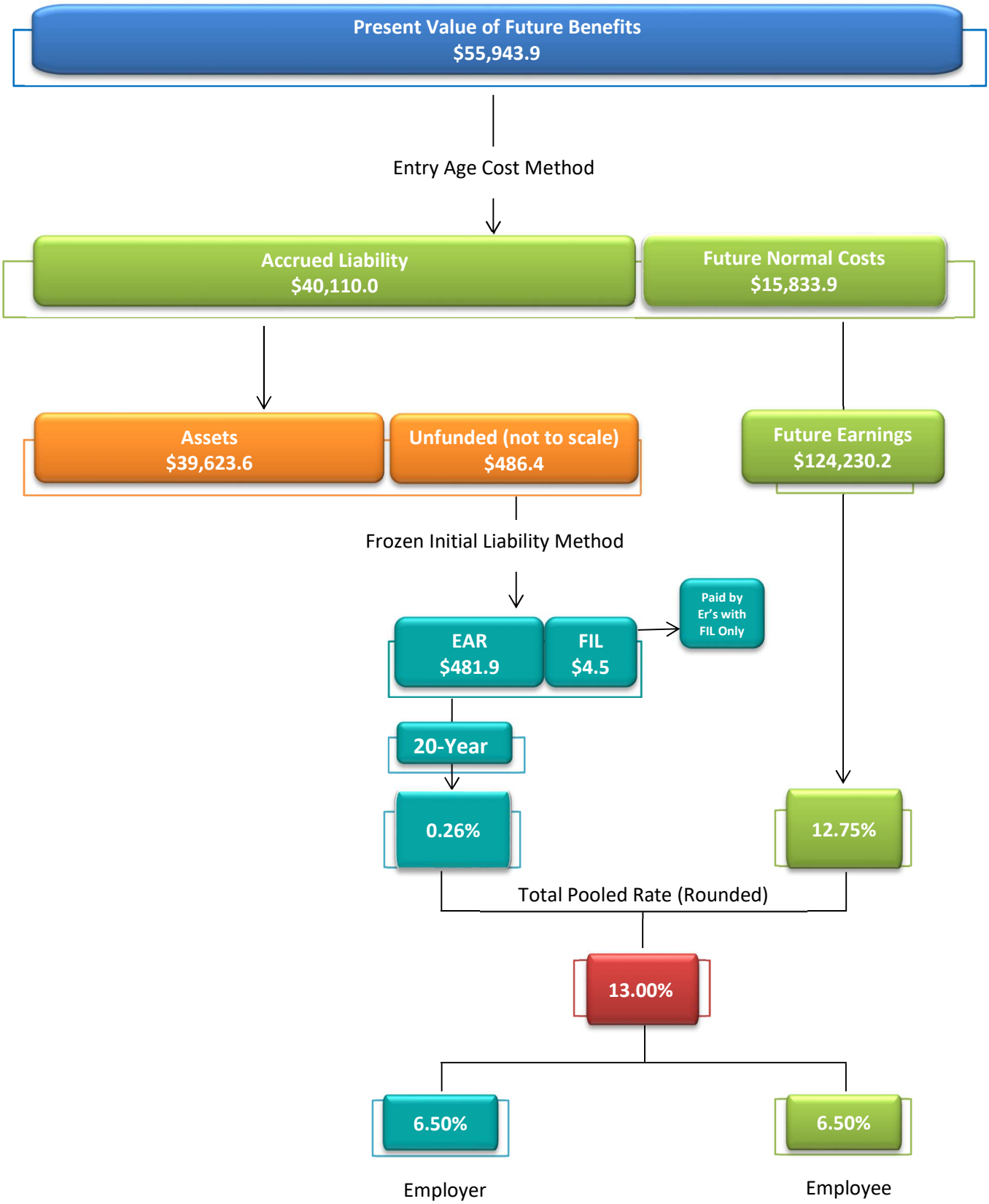
Limitation of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

SECTION B

VALUATION RESULTS

Actuarial Valuation Process
(Illustration for General/Elected Group)
$ Millions -- %'s of Payroll

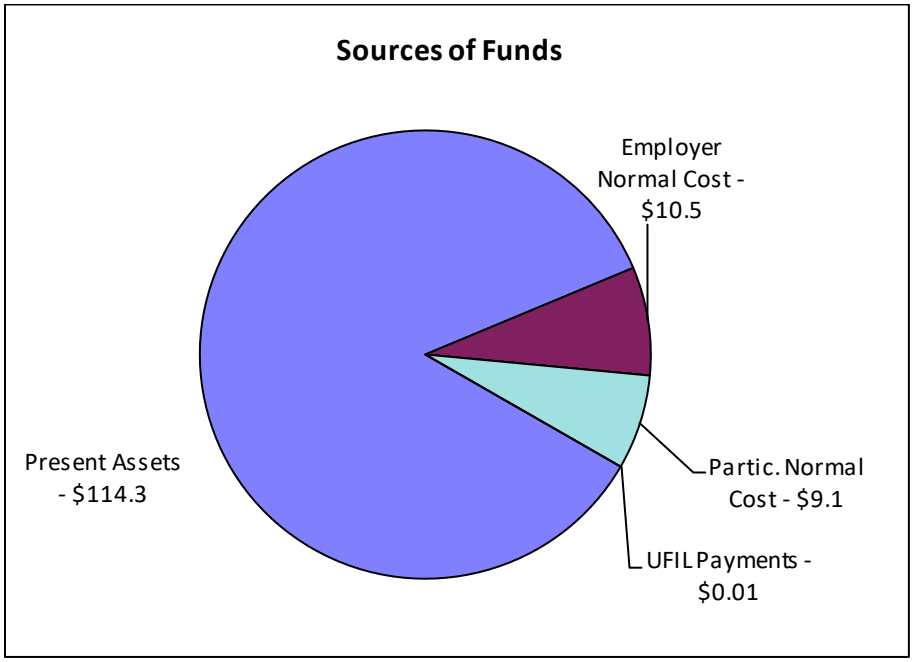


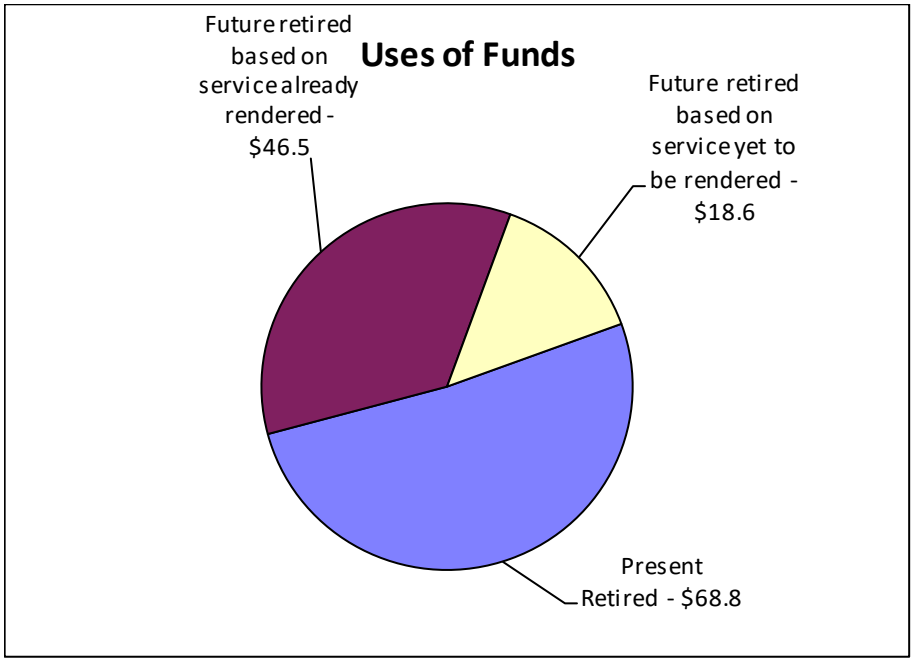
Wisconsin Retirement System
December 31, 2020 **Valuation Overview**

		$ Millions					
		Non-Retired					
			Protective		Unallocated		
		General, Executives & Elected Officials	With Soc. Sec.	Without Soc. Sec.	Add 'l Contribs	Retired	Total/Average
1	Number of People						
	a. Active	235,908	19,676	2,754			258,338
	b. Inactive, not retired	161,570	7,340	256			169,166
	c. Total	397,478	27,016	3,010		222,723	650,227
2	Current Earnings	$13,411.1	$1,414.6	$240.0			$15,065.7
3	**Present Values of**						
	Future Benefits for						
	a. Active	$47,652.6	$6,548.2	$1,551.4			$55,752.2
	b. Inactive, not retired	$7,132.0	$656.3	$59.4			$7,847.7
	c. Variable Adjustment	$1,159.3	$110.6	$23.2			$1,293.1
	d. Total	$55,943.9	$7,315.1	$1,634.0	$234.3	$68,759.8	$133,887.1
4	Future Entry Age Normal Costs	$15,833.9	$2,282.1	$520.8			$18,636.8
5	Future Earnings	$124,230.2	$14,076.0	$2,471.0			$140,777.2
6	**Pooled Entry Age Normal Cost (4/5)**	**12.75%**	**16.21%**	**21.08%**			**13.24%**
7	Entry Age Accrued Liability (3d-4)	$40,110.0	$5,033.0	$1,113.2	$234.3	$68,759.8	$115,250.3
8	Assets	$39,623.6	$4,587.7	$1,053.8	$234.3	$68,759.8	$114,259.2
9	**Total Entry Age Unfunded Liability (7-8)**	**$486.4**	**$445.3**	**$59.4**	**$0.0**	**$0.0**	**$991.1**
10	Frozen Initial Liability Portion	$4.5	$0.9	$0.4	$0.0	$0.0	$5.8
11	Pooled Unfunded Liability (EAR) (9-10)	$481.9	$444.4	$59.0	$0.0	$0.0	$985.3
12	20-year amortization factor	13.7930	13.7930	13.7930			13.7930
13	**Pooled Amortization % (11/12/2)**	**0.26%**	**2.28%**	**1.78%**			**0.47%**
14	**Total Pooled Rate Rounded (6+13)**	**13.0%**	**18.5%**	**22.9%**			**13.7%**
15	**2022 F-I-L Normal Cost Rates**						
16	**Participant (0.5x14 (Gen'l))**	**6.50%**	**6.50%**	**6.50%**			**6.50%**
17	**Employer (14-16)**	**6.50%**	**12.00%**	**16.40%**			**7.20%**
18	**Total (16+17)**	**13.0%**	**18.5%**	**22.9%**			**13.70%**
19	Entry Age Funded Ratio (8/7)	98.8%	91.2%	94.7%	100.0%	100.0%	99.1%

	Unfunded Frozen Initial Liability (UFIL)			
		Protective		
	General, Executives & Elected Officials	With Soc. Sec.	Without Soc Sec	Total
Balance January 1, 2020	$4,240,180	$1,143,218	$2,652,991	$8,036,389
New Employers	$0	$0	$0	$0
Adjustments	$0	$0	$0	$0
Payments	$(2,429)	$(287,906)	$(2,297,222)	$(2,587,557)
Interest	$296,642	$59,872	$24,904	$381,418
Balance December 31, 2020	**$4,534,393**	**$915,184**	**$380,673**	**$5,830,250**
WRS Average UFIL Contribution	**0.00%**	**0.02%**	**0.96%**	**0.02%**

Financing $133.9 Billion* of Benefit Promises for Present Active and Retired Participants December 31, 2020

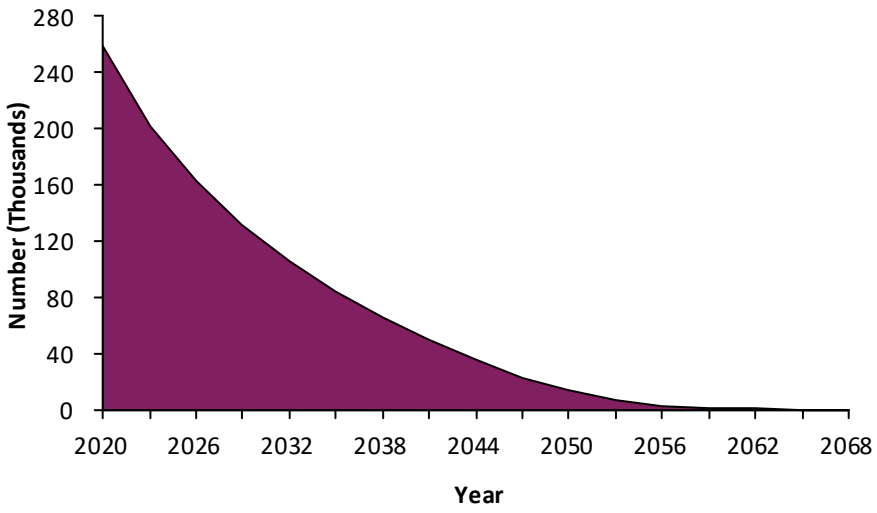




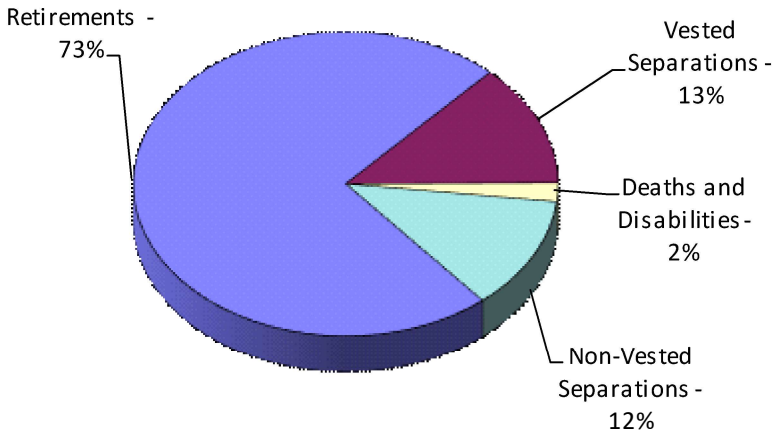
* *Present value of future benefits; all divisions combined.*

Expected Development of Present Population
December 31, 2020

Closed Group Active Population Projection



Expected Terminations from Active Employment for Current Active Members



The charts above show the expected future development of the present population in simplified terms. The retirement system presently covers 258,338 active members. Eventually, 12% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for a monthly benefit. About 86% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by retiring from vested deferred status. The remaining 2% of the present population is expected to become eligible for death-in-service or disability benefits. Within 10 years, over half of the covered membership is expected to consist of new hires.

Comparative Statement of Computed Contribution Rates

Valuation 12/31	Rate Effective 1/1	General				Executive and Elected			
		Participant	Benefit Adj. Contr.	Employer[1]	Total	Participant	Benefit Adj. Contr.	Employer[1]	Total
1996	1998	5.00 %	1.20 %	6.10 %	12.30 %	4.70 %	0.00 %	11.20 %	15.90 %
1997	1999	5.00 %	0.80 %	5.80 %	11.60 %	4.30 %	0.00 %	10.80 %	15.10 %
1998	2000	5.00 %	0.50 %	5.50 %	11.00 %	4.10 %	0.00 %	10.60 %	14.70 %
1999	2001	5.00 %	0.20 %	5.10 %	10.30 %	3.90 %	0.00 %	10.40 %	14.30 %
2000	2002	5.00 %	0.20 %	5.10 %	10.30 %	3.10 %	0.00 %	9.60 %	12.70 %
2001 [2]	2003	5.00 %	0.40 %	5.23 %	10.63 %	2.60 %	0.00 %	9.06 %	11.66 %
2002	2004	5.00 %	0.60 %	5.22 %	10.82 %	2.60 %	0.00 %	8.91 %	11.51 %
2003	2005	5.00 %	0.80 %	4.70 %	10.50 %	2.80 %	0.00 %	8.40 %	11.20 %
2004	2006	5.00 %	0.90 %	4.73 %	10.63 %	2.90 %	0.00 %	8.47 %	11.37 %
2005	2007	5.00 %	1.00 %	4.81 %	10.81 %	3.00 %	0.00 %	8.56 %	11.56 %
2006	2008	5.00 %	1.00 %	4.79 %	10.79 %	3.00 %	0.00 %	8.56 %	11.56 %
2007	2009	5.00 %	0.90 %	4.68 %	10.58 %	3.00 %	0.00 %	8.55 %	11.55 %
2008	2010	5.00 %	1.20 %	4.95 %	11.15 %	3.20 %	0.00 %	8.75 %	11.95 %
2009	2011	5.00 %	1.50 %	5.22 %	11.72 %	3.90 %	0.00 %	9.45 %	13.35 %
2010	2012	5.00 %	1.60 %	5.30 %	11.90 %	4.30 %	0.00 %	9.80 %	14.10 %
2011 [3]	2013	6.65 %	N/A	6.75 %	13.40 %	7.00 %	N/A	7.00 %	14.00 %
2012	2014	7.00 %	N/A	7.00 %	14.00 %	7.75 %	N/A	7.75 %	15.50 %
2013	2015	6.80 %	N/A	6.80 %	13.60 %	7.70 %	N/A	7.70 %	15.40 %
2014	2016	6.60 %	N/A	6.60 %	13.20 %	7.80 %	N/A	7.80 %	15.60 %
2015 [4]	2017	6.80 %	N/A	6.87 %	13.67 %	6.80 %	N/A	6.87 %	13.67 %
2016	2018	6.70 %	N/A	6.73 %	13.43 %	6.70 %	N/A	6.73 %	13.43 %
2017	2019	6.55 %	N/A	6.57 %	13.12 %	6.55 %	N/A	6.57 %	13.12 %
2018	2020	6.75 %	N/A	6.79 %	13.54 %	6.75 %	N/A	6.79 %	13.54 %
2019	2021	6.75 %	N/A	6.78 %	13.53 %	6.75 %	N/A	6.78 %	13.53 %
2020	2022	6.50 %	N/A	6.50 %	13.00 %	6.50 %	N/A	6.50 %	13.00 %

1 Employer normal cost plus weighted average of unfunded Frozen Initial liability contribution rates.

2 Act 11 of 1999 was implemented in 2001.

3 Act 10 and Act 32 were implemented in 2011.

4 Contribution rates for General and Executive and Elected Officials groups were combined beginning with the 2015 valuation. Actual 2016 Participant and Employer contribution rates for the Executive and Elected Officials group were each 6.6% respectively.

Comparative Statement of Computed Contribution Rates

Valuation 12/31	Rate Effective 1/1	Protective with Social Security				Protective without Social Security			
		Participant	Benefit Adj. Contr.	Employer[1]	Total	Participant	Benefit Adj. Contr.	Employer[1]	Total
1996	1998	5.40 %	0.00 %	9.40 %	14.80 %	5.80 %		14.60 %	20.40 %
1997	1999	4.90 %	0.00 %	8.90 %	13.80 %	5.40 %		14.30 %	19.70 %
1998	2000	4.10 %	0.00 %	8.00 %	12.10 %	4.40 %		13.30 %	17.70 %
1999	2001	3.80 %	0.00 %	7.60 %	11.40 %	3.30 %		12.20 %	15.50 %
2000	2002	4.00 %	0.00 %	7.80 %	11.80 %	3.00 %		11.90 %	14.90 %
2001[2]	2003	4.00 %	0.00 %	7.68 %	11.68 %	2.40 %		11.28 %	13.68 %
2002	2004	4.50 %	0.00 %	8.02 %	12.52 %	3.20 %		11.81 %	15.01 %
2003	2005	4.90 %	0.00 %	8.10 %	13.00 %	3.30 %		11.30 %	14.60 %
2004	2006	5.00 %	0.00 %	8.19 %	13.19 %	3.30 %		11.11 %	14.41 %
2005	2007	5.10 %	0.00 %	8.28 %	13.38 %	3.40 %		11.16 %	14.56 %
2006	2008	5.10 %	0.00 %	8.27 %	13.37 %	3.40 %		11.17 %	14.57 %
2007	2009	5.00 %	0.00 %	8.15 %	13.15 %	3.20 %		10.89 %	14.09 %
2008	2010	5.50 %	0.00 %	8.64 %	14.14 %	3.90 %		11.56 %	15.46 %
2009	2011	5.80 %	0.00 %	8.94 %	14.74 %	4.80 %		12.46 %	17.26 %
2010	2012	5.90 %	0.00 %	9.00 %	14.90 %	4.90 %		12.60 %	17.50 %
2011[3]	2013	6.65 %	N/A	9.75 %	16.40 %	6.65 %		12.65 %	19.30 %
2012	2014	7.00 %	N/A	10.10 %	17.10 %	7.00 %		14.00 %	21.00 %
2013	2015	6.80 %	N/A	9.50 %	16.30 %	6.80 %		13.40 %	20.20 %
2014	2016	6.60 %	N/A	9.40 %	16.00 %	6.60 %		13.40 %	20.00 %
2015	2017	6.80 %	N/A	10.70 %	17.50 %	6.80 %		15.00 %	21.80 %
2016	2018	6.70 %	N/A	10.73 %	17.43 %	6.70 %		14.95 %	21.65 %
2017	2019	6.55 %	N/A	10.55 %	17.10 %	6.55 %		15.04 %	21.59 %
2018	2020	6.75 %	N/A	11.66 %	18.41 %	6.75 %		16.27 %	23.02 %
2019	2021	6.75 %	N/A	11.76 %	18.51 %	6.75 %		16.36 %	23.11 %
2020	2022	6.50 %	N/A	12.02 %	18.52 %	6.50 %		17.36 %	23.86 %

1 Employer normal cost plus weighted average of unfunded Frozen Initial liability contribution rates.

2 Act 11 of 1999 was implemented in 2001.

3 Act 10 and Act 32 were implemented in 2011.

Schedule of Funding Progress & Accrued Liabilities
($ Millions)

Frozen Initial Liability Method

Valuation Date Dec. 31	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Frozen Entry Age (b)	Unfunded AAL (UAAL) (b) - (a)	Funded Ratio (a)/(b)	Covered Payroll* (c)	UAAL as a Percent of Covered Payroll [(b) - (a)] / (c)
2011	$ 78,940.0	$ 79,039.3	$ 99.3	99.9 %	$ 12,855.6	0.8 %
2012	78,613.0	78,682.7	69.7	99.9 %	12,627.6	0.6 %
2013	85,276.1	85,328.7	52.6	99.9 %	12,884.8	0.4 %
2014	89,360.4	89,392.1	31.7	100.0 %	13,219.5	0.2 %
2015	91,502.4	91,526.5	24.1	100.0 %	13,530.5	0.2 %
2016	95,396.2	95,414.0	17.8	100.0 %	13,706.0	0.1 %
2017	100,802.5	100,819.3	16.8	100.0 %	13,943.1	0.1 %
2018	101,410.5	101,422.3	11.8	100.0 %	14,301.4	0.1 %
2019	106,524.4	106,532.4	8.0	100.0 %	14,832.5	0.1 %
2020	114,259.2	114,265.0	5.8	100.0 %	15,359.9	0.0 %

Entry Age Method

Valuation Date Dec. 31	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b) - (a)	Funded Ratio (a)/(b)	Covered Payroll* (c)	UAAL as a Percent of Covered Payroll [(b) - (a)] / (c)
2011	$ 78,940.0	$ 79,584.1	$ 644.1	99.2 %	$ 12,855.6	5.0 %
2012	78,613.0	80,225.3	1,612.3	98.0 %	12,627.6	12.8 %
2013	85,276.1	86,055.0	778.9	99.1 %	12,884.8	6.0 %
2014	89,360.4	89,794.0	433.6	99.5 %	13,219.5	3.3 %
2015	91,502.4	92,736.3	1,233.9	98.7 %	13,530.5	9.1 %
2016	95,396.2	96,351.2	955.0	99.0 %	13,706.0	7.0 %
2017	100,802.5	101,321.9	519.4	99.5 %	13,943.1	3.7 %
2018	101,410.5	102,823.3	1,412.8	98.6 %	14,301.4	9.9 %
2019	106,524.4	108,053.7	1,529.3	98.6 %	14,832.5	10.3 %
2020	114,259.2	115,250.3	991.1	99.1 %	15,359.9	6.5 %

** As reported by ETF staff. This figure is intended to represent the total pay upon which contributions were based during the year ended on the valuation date and does not necessarily match other figures in this report.*

Funding Metrics ($ Millions)

Frozen Initial Liability Method

Valuation Date Dec. 31	Actuarial Value of Assets	F-I-L Accrued Liability for				Percent Funded for			
		Annuitants and Beneficiaries	Member Contribs.	Active & Inactive Members	Total	Annuitants and Beneficiaries	Participant Contributions	Active & Inactive Members	Total
2011	$78,940.0	$43,609.4	$14,434.4	$20,995.5	$79,039.3	100.0%	100.0%	99.5%	99.9%
2012	78,613.0	44,055.5	14,401.1	20,226.1	78,682.7	100.0%	100.0%	99.7%	99.9%
2013	85,276.1	48,460.5	15,559.2	21,309.0	85,328.7	100.0%	100.0%	99.8%	99.9%
2014	89,360.4	51,131.1	16,259.3	22,001.7	89,392.1	100.0%	100.0%	99.9%	100.0%
2015	91,502.4	52,851.8	16,707.2	21,967.5	91,526.5	100.0%	100.0%	99.9%	100.0%
2016	95,396.2	55,764.0	17,361.7	22,288.3	95,414.0	100.0%	100.0%	99.9%	100.0%
2017	100,802.5	59,224.9	18,434.4	23,160.0	100,819.3	100.0%	100.0%	99.9%	100.0%
2018	101,410.5	60,242.9	18,455.6	22,723.9	101,422.3	100.0%	100.0%	99.9%	100.0%
2019	106,524.4	63,657.8	19,487.0	23,387.6	106,532.4	100.0%	100.0%	100.0%	100.0%
2020	114,259.2	68,759.8	20,884.4	24,620.8	114,265.0	100.0%	100.0%	100.0%	100.0%

Entry Age Method

Valuation Date Dec. 31	Actuarial Value of Assets	Entry Age Accrued Liability for				Percent Funded for			
		Annuitants and Beneficiaries	Member Contribs.	Active & Inactive Members	Total	Annuitants and Beneficiaries	Participant Contributions	Active & Inactive Members	Total
2011	$78,940.0	$43,609.4	$14,434.4	$21,540.3	$79,584.1	100.0%	100.0%	97.0%	99.2%
2012	78,613.0	44,055.5	14,401.1	21,768.7	80,225.3	100.0%	100.0%	92.6%	98.0%
2013	85,276.1	48,460.5	15,559.2	22,035.3	86,055.0	100.0%	100.0%	96.5%	99.1%
2014	89,360.4	51,131.1	16,259.3	22,403.6	89,794.0	100.0%	100.0%	98.1%	99.5%
2015	91,502.4	52,851.8	16,707.2	23,177.3	92,736.3	100.0%	100.0%	94.7%	98.7%
2016	95,396.2	55,764.0	17,361.7	23,225.5	96,351.2	100.0%	100.0%	95.9%	99.0%
2017	100,802.5	59,224.9	18,434.4	23,662.6	101,321.9	100.0%	100.0%	97.8%	99.5%
2018	101,410.5	60,242.9	18,455.6	24,124.8	102,823.3	100.0%	100.0%	94.1%	98.6%
2019	106,524.4	63,657.8	19,487.0	24,908.9	108,053.7	100.0%	100.0%	93.9%	98.6%
2020	114,259.2	68,759.8	20,884.4	25,606.1	115,250.3	100.0%	100.0%	96.1%	99.1%

Discussion of Risk/Maturity Measures

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. GRS investigates gains or losses due to economic and demographic experience explicitly as they arise each year in this Annual Actuarial Valuation and Gain/Loss Analysis Report. The results of each valuation report then serves as the underlying basis for the three-year experience study, which investigates and adjusts assumptions so that future gains and losses are minimized. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

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 due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements; because of the way most public retirement systems invest, this tends to be synonymous with investment risk;
3. **Contribution risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other demographic risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The contribution rates shown on page A-1 and A-2 may be considered as minimum contribution rates that comply with the Board's funding policy and statutes. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Discussion of Risk/Maturity Measures

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following: ratio of the market value of assets to total payroll, ratio of actuarial accrued liability to payroll, ratio of actives to retirees and beneficiaries, and the ratio of net cash flow to market value of assets.

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll. In the WRS, this volatility is mitigated by the extensive risk sharing features that are present in the plan.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. In the WRS, this volatility is mitigated by the extensive risk sharing features that are present in the plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time. The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

ADDITIONAL RISK ASSESSMENT

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. Additional assessment of risk including stress testing for the Wisconsin Retirement System was conducted in the fall of 2019 in conjunction with the State of Wisconsin Investment Board and a separate study commissioned in the fall of 2020 by the Department of Employee Trust Funds.

Risk/Maturity Measures

$ Millions									
Valuation Date	(1) Entry Age Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) (Overfunded)/ Unfunded AAL (1) - (2)	(4) Valuation Payroll	(5) Change in Valuation Payroll	(6) Funded Ratio (2)/(1)	(7) Annuitant Liabilities (AnnLiab)	(8) AnnLiab/ AAL (7)/(1)	(9) AAL/ Valuation Payroll (1)/(4)
2017	$101,321.9	$104,159.6	$(2,837.7)	$13,720.5	1.7%	102.8%	$59,224.9	58.5%	738.5%
2018	102,823.3	96,734.3	6,089.0	14,041.3	2.3%	94.1%	60,242.9	58.6%	732.3%
2019	108,053.7	112,098.6	(4,044.9)	14,583.7	3.9%	103.7%	63,657.8	58.9%	740.9%
2020	115,250.3	124,966.8	(9,716.5)	15,065.6	3.3%	108.4%	68,759.8	59.7%	765.0%

These Risk Measures were based on assumptions in place on the valuation date. For the current valuation, this includes 7.0% future investment return, Entry Age Normal accrued liabilities and Market Value of Assets.
The Risk/Maturity measures shown on this page and on the following page have been developed in response to Actuarial Standard of Practice ("ASOP") No. 51 entitled "Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions." In a maturing plan, the ratio of retiree liabilities to total liabilities increases, and the ratios of both assets and liabilities to payroll increases, and contribution rates tend to become increasingly volatile. The risk/maturity measures and associated commentary are intended to help keep stakeholders informed of some of the risks that the plan faces, and the potential contribution rate volatility. In the WRS, however, contribution volatility is mitigated by the extensive risk sharing features of the plan, including the dividend process, the Money Purchase Effect, the sharing of contribution rate changes, etc. Thus, these measures, while interesting, have somewhat less meaning for the WRS than they do for most systems.

Notes:

The measures shown above provide information in accordance with Actuarial Standard of Practice No. 51.

Columns (1) to (4). These columns provide various items for comparison in Columns 5 through 16.

Column (5). When payroll grows at or faster than the assumed rate of 3.0%, funding of unfunded accrued liabilities is likely to proceed at least at the scheduled rate. Payroll growing slower than the assumed rate can lead to underfunding of the plan because expected contributions for unfunded liability may not be received.

Column (6). The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

Columns (7) and (8). The ratio of Annuitant liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the investment policy may need to change. A ratio on the order of 50% indicates a maturing system. Ratios near or above 50% are common today.

Column (9). The ratio of liabilities to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll. In the WRS, this potential difficulty is mitigated by the many risk sharing features inherent in the plan design since liabilities are impacted by the dividend process and the impact on money purchase benefits.

Risk/Maturity Measures (Concluded)

$ Millions								
Valuation Date	(10) Assets/ Payroll (2)/(4)	(11) Core Trust Fund Portfolio StdDev	(12) Std Dev % of Pay (10)x(11)	(13) Unfunded/ Payroll (3)/(4)	(14) Net External Cash Flow (NECF)	(15) NECF/ Assets (14)/(2)	(16) Core Trust Fund NOF Return	(17) Ratio of Actives to Retirees
2017	759.2%	12.0%	91.1%	-	$(3,055.1)	-2.9%	15.8%	1.26
2018	688.9%	11.8%	81.3%	43.4%	(3,282.2)	-3.4%	-3.6%	1.18
2019	768.7%	11.8%	90.7%	-	(3,481.2)	-3.1%	16.8%	1.19
2020	829.5%	11.8%	97.9%	-	(3,484.9)	-2.8%	15.0%	1.16

Notes:

Column (10). The ratio of assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll. In the WRS, this potential difficulty is mitigated by the many risk sharing features inherent in the plan design.

Columns (11) and(12). The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability. In the WRS, the potential threat to sustainability is mitigated by the many risk sharing features inherent in the plan design. The portfolio standard deviation represents the standard deviation of the Core Trust Fund.

Column (13). The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

Columns (14) and (15). The ratio of Net External Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

Column (16). Investment return is probably the largest single risk that most systems face. The year by year return gives an indicator of the performance of the portfolio versus the system's assumed return.

Column (17). In the 1970's and 1980's it was common for the ratio of actives to retirees to be 3 or 4 to 1. As plans mature, this ratio can drop significantly. Ratios below 2 are common today. A ratio significantly below 1 usually indicates a closed plan, a shrinking workforce or other special situation.

Employer Contributions Required and Contributions Made

Year Ended December 31	Annual Required Contribution ($ millions)	Percent Contributed*
2011	$784.1	104.0%
2012	826.1	100.0%
2013	912.4	100.0%
2014	977.1	100.0%
2015	966.5	100.0%
2016	954.2	100.0%
2017	1,014.9	100.0%
2018	1,028.4	100.0%
2019	1,045.0	100.0%
2020	1,131.5	100.0%

* *Includes additional UAAL payments when amount is greater than 100%.*

SECTION C

FUND ASSETS

Total Valuation Assets
(Reserves)

	Valuation Assets at December 31	
	2020	2019
Non Retired		
Participant Statutory		
Core	$ 18,370,790,487	$ 17,215,817,163
Variable	2,279,305,344	2,056,205,539
Total Statutory	20,650,095,831	19,272,022,702
Additional*	234,282,851	215,046,558
Total Participant	20,884,378,682	19,487,069,260
Employer		
Core	22,335,663,804	21,323,351,723
Variable	2,279,305,344	2,056,205,539
Total Employer	24,614,969,148	23,379,557,262
Total Non Retired	**45,499,347,830**	**42,866,626,522**
Retired Assets		
Core	63,805,846,296	59,138,391,333
Variable	4,954,007,486	4,519,449,723
Total Retired Assets	**68,759,853,782**	**63,657,841,056**
Total Assets used in Valuation	**114,259,201,612**	**106,524,467,578**

	Valuation Assets at December 31	
	2020	2019
Core Assets	$ 104,729,606,191	$ 97,875,970,570
Variable Assets	9,529,595,421	8,648,497,008
Total Assets	114,259,201,612	106,524,467,578

** Includes employer, employee, and tax deferred additional contributions.*

Reserves for Non-Retired Participants
Balances by Valuation Group

	Reserve for Year Ended			
	December 31, 2020			December 31, 2019
	Participant (Statutory)	Employer	Total *	Total
General, Executives & Elected	$18,981,045,962	$20,642,574,149	$39,623,620,111	$37,334,543,601
Protective with Soc. Sec.	1,427,816,949	3,159,859,737	4,587,676,686	4,314,811,296
Protective w/o Soc. Sec.	241,232,920	812,535,262	1,053,768,182	1,002,225,018
Total	**$20,650,095,831**	**$24,614,969,148**	**$45,265,064,979**	**$42,651,579,915**

** Totals differ slightly from page C-1 due to rounding and additional contributions.*

The above schedule shows the distribution of Participant and Employer reserves among the valuation groups according to WRS accounting records. This separation of assets is needed because the valuation groups are separately experience rated. The assets are pooled for investment purposes.

Development of Participant and Employer Reserves During the Year

	Participant Accumulation			Employer Accumulation			
	Core	Variable	Total	Core	Variable	Total	Grand Total
Ending Balance December 31, 2019	$17,215,817,163	$2,056,205,539	$19,272,022,702	$21,323,351,674	$2,056,205,539	$23,379,557,213	$42,651,579,915
Closing Adjustments	62,067	54,215	116,282	2,534,988	54,215	2,589,203	2,705,485
Beginning Balance January 1, 2020	17,215,879,230	2,056,259,754	19,272,138,984	21,325,886,662	2,056,259,754	23,382,146,416	42,654,285,400
Revenues:							
Employer Contributions	-	-	-	1,045,712,627	89,136,137	1,134,848,764	1,134,848,764
Participant Contributions	950,892,924	89,359,290	1,040,252,214	-	-	-	1,040,252,214
Total Revenues	950,892,924	89,359,290	1,040,252,214	1,045,712,627	89,136,137	1,134,848,764	2,175,100,978
Expenditures							
Separations	36,431,605	2,153,554	38,585,159	-	-	-	38,585,159
Retirement Single Sums	44,935,982	1,859,588	46,795,570	45,094,822	1,844,286	46,939,108	93,734,678
Death Benefits	19,164,856	1,716,277	20,881,133	10,969,392	701,165	11,670,557	32,551,690
Disability Benefits	-	-	-	4,854	-	4,854	-
Total Expenditures	100,532,443	5,729,419	106,261,862	56,069,068	2,545,451	58,614,519	164,871,527
Transfers:							
Earnings Allocation	1,725,513,403	335,601,739	2,061,115,142	2,269,452,335	329,679,369	2,599,131,704	4,660,246,846
Annuities Awarded	(1,509,620,318)	(106,760,557)	(1,616,380,875)	(2,315,897,472)	(122,821,595)	(2,438,719,067)	(4,055,099,942)
Intra-Fund Transfers	(721,431)	(46,341)	(767,772)	(3,873,390)	49,240	(3,824,150)	(4,591,922)
Inter-Fund Transfers	89,379,122	(89,379,122)	-	89,277,207	(89,277,207)	-	-
Variable Equalization Transfer	-	-	-	(18,825,097)	18,825,097	-	-
Net Transfers	304,550,776	139,415,719	443,966,495	20,133,583	136,454,904	156,588,487	600,554,982
Ending December 31, 2020	**$18,370,790,487**	**$2,279,305,344**	**$20,650,095,831**	**$22,335,663,804**	**$2,279,305,344**	**$24,614,969,148**	**$45,265,069,833**
Internal Rate of Return	10.2%	16.8%	10.9%	11.0%	16.5%	11.5%	11.2%

This page does not include additional contributions.

Development of Retiree Reserves During the Year

	Core	Variable	Total
Balance December 31, 2019	$ 59,138,391,333	$ 4,519,449,723	$ 63,657,841,056
Closing Adjustments	2,375,400	(2,022,995)	352,405
Variable Terminations	118,946,689	(118,946,689)	-
Beginning Balance	59,259,713,422	4,398,480,039	63,658,193,461
Additions			-
Reserve transfers	$ 3,842,681,725	$ 230,931,873	$ 4,073,613,598
Earnings	6,083,367,317	755,696,057	6,839,063,374
Other	-	-	-
Total Additions	9,926,049,042	986,627,930	10,912,676,972
Subtractions			-
Annuities and Lump Sums	$ 5,378,188,196	$ 431,096,419	$ 5,809,284,615
Credit reestablishments	1,727,972	4,064	1,732,036
Other	-	-	-
Total Subtractions	5,379,916,168	431,100,483	5,811,016,651
Ending Balance December 31, 2020	$ 63,805,846,296	$ 4,954,007,486	$ 68,759,853,782

Statement of Net Plan Assets ($ Thousands)
(Market Value)

	2020	2019
Assets		
Cash and Cash Equivalents	$ 6,401,203	$ 4,668,015
Securities Lending Collateral	810,685	471,467
Prepaid Expenses	14,284	32,151
Total Short Term Assets	7,226,172	5,171,633
Receivables		
Contributions	221,908	147,815
Prior Service Contributions	6,909	10,850
Benefits Overpayment	2,185	2,242
Due from Other Trust Funds	2,811	1,189
Miscellaneous	(462)	7,976
Securities Lending	2,865	2,448
Interest and Dividends	387,889	386,662
Investment Sales	11,232,245	6,490,811
Total Receivables	11,856,350	7,049,993
Investments at Fair Value		
Fixed Income	42,352,502	36,504,305
Financial Futures Contracts	32,221	(29,913)
Preferred Securities	607,671	481,730
Convertible Securities	1,156	4,067
Stocks	72,347,227	65,975,055
Options	(8,402)	(6,029)
Limited Partnerships	16,889,530	14,729,545
Real Estate	1,379,939	1,374,070
Foreign Currency Contracts	15,131	8,316
Multi Asset Investments	5,967,126	5,353,262
Swaps	107,239	24,037
To Be Announced Securities	(652,174)	913,743
Total Investments	139,039,166	125,332,188
Capital Assets	2,671	3,532
Total Assets	**158,124,359**	**137,557,346**
Liabilities		
Core Investment Due Other Programs	4,407,220	3,981,572
Variable Investment Due Other Programs	22,115	20,256
Obligation Under Reverse Repo Agreement	10,658,824	9,844,991
Short Sell Obligations	6,479,968	4,464,308
Securities Lending Collateral Liability	810,685	471,467
Collateral Due to Counterparty	199,498	104,964
Benefits Payable	421,435	399,642
Unearned Revenue	14	19
Due to Other Trust Funds	9,624	7,639
Miscellaneous Payables	136,651	129,212
Investment Payables	10,011,503	6,034,661
Total Liabilities	**33,157,537**	**25,458,731**
Net Assets in Trust for Pension Benefits	**$124,966,822**	**$112,098,615**

Statement of Changes in Assets ($ Thousands)
(Market Value)

	Activity During Year	
	2020	**2019**
Additions:		
Contributions:		
Employer Contributions	$ 1,133,316	$ 1,046,941
Employee Contributions	1,053,243	987,662
Total Contributions	2,186,559	2,034,603
Investment Income:		
Net Appreciation (Depreciation) in Fair Value of Investments	15,892,746	18,124,357
Interest and Dividends	2,106,774	2,154,199
Securities Lending Income	33,499	41,981
Other	0	250,489
Less		
Current Income Distributed	(594,709)	(671,578)
SWIB Investment Expense	(741,562)	(839,819)
Investment Income Distributed to Securities Lending Rebates and Fees	1,791	(8,902)
Net Investment Income	16,698,539	19,050,727
Interest on Prior Service Receivable	381	526
Miscellaneous Income	64	240
Total Additions	18,885,543	21,086,096
Deductions:		
Benefits and Refunds:		
Retirement, Disability, and Beneficiary	5,939,366	5,646,264
Separation Benefits	38,857	44,100
Total Benefits and Refunds	5,978,223	5,690,364
ETF Administrative Expenses	32,844	33,799
Other Expenses	412	399
Total Deductions	6,011,479	5,724,562
Net Increase (Decrease)	12,874,064	15,361,534
Net Assets Held in Trust:		
Beginning of Year*	$112,092,758	$96,737,081
End of Year	$124,966,822	$112,098,616

** Report uses preliminary financial statements due to timing of valuation. Any change between the prior year ending balance and the current year beginning balance reflects differences between preliminary and final financial statements.*

The figures on this page do not always reconcile exactly to the amounts used in the valuation.

Core Investment Trust: Market Recognition Account

	For the Year Ended December 31						
	2018	2019	2020	2021	2022	2023	2024
Beginning of year							
a. Funding value	$96,763,496,611	$98,081,742,712	$101,741,893,719	$108,766,745,397	$112,157,082,718	$114,086,077,765	$118,063,814,630
b. Market value	100,036,600,775	93,165,775,399	107,454,203,938	119,837,457,366	119,837,457,366	119,837,457,366	119,837,457,366
End of year							
c. Market value	93,165,775,399	107,454,203,938	119,837,457,366				
d. Non-investment cash flow (contributions minus benefits)	(3,285,566,232)	(3,476,100,580)	(3,484,920,588)				
e. Investment income							
e1. Total investment income	(3,585,259,145)	17,764,529,119	15,868,174,017				
e2. Assumed rate	7.0%	7.0%	7.0%				
e3. Amount for immediate recognition	6,658,449,945	6,744,058,470	6,999,960,340	-	-	-	-
e4. Amount for phased-in recognition: e1-e3	(10,243,709,089)	11,020,470,649	8,868,213,677	-	-	-	-
f. Phased-in recognition of investment income							
f1. Current year: 0.2 x e4	(2,048,741,818)	2,204,094,130	1,773,642,735	-	-	-	-
f2. First prior year	1,461,342,274	(2,048,741,818)	2,204,094,130	1,773,642,735	-	-	-
f3. Second prior year	119,474,605	1,461,342,274	(2,048,741,818)	2,204,094,130	1,773,642,735	-	-
f4. Third prior year	(1,343,976,073)	119,474,605	1,461,342,274	(2,048,741,818)	2,204,094,130	1,773,642,735	-
f5. Fourth prior year	(242,736,599)	(1,343,976,073)	119,474,605	1,461,342,274	(2,048,741,818)	2,204,094,130	1,773,642,735
f6. Total MRA recognition	(2,054,637,612)	392,193,118	3,509,811,926	3,390,337,321	1,928,995,047	3,977,736,865	1,773,642,735
f7. Amount for MRA recognition	-	-	-	-	-	-	-
f8. Total recognized gain (loss)	(2,054,637,612)	392,193,118	3,509,811,926	3,390,337,321	1,928,995,047	3,977,736,865	1,773,642,735
g. Total recognized investment income: e3 + f8	4,603,812,333	7,136,251,587	10,509,772,266	3,390,337,321	1,928,995,047	3,977,736,865	1,773,642,735
h. Funding value end of year: a + d + e3 + f8	98,081,742,712	101,741,893,719	108,766,745,397	112,157,082,718	114,086,077,765	118,063,814,630	119,837,457,365
i. Difference between market and funding values	(4,915,967,313)	5,712,310,218	11,070,711,969	7,680,374,647	5,751,379,600	1,773,642,735	-
j. Recognized rate of return: g / (a + 0.5 * d)	4.8%	7.4%	10.5%				
k. Market rate of return (net of fee): e1 / (b + 0.5 * d)	-3.6%	19.4%	15.0%				

The Core Investment Trust includes all WRS core assets, as well as the assets of certain other programs. The Market Recognition Account is a statutory method applicable to all assets invested in the Core Trust. Considerable additional information would be required to reconcile these figures to other asset figures in this report. Note that the market rate of return is calculated by GRS and may differ from rates of return calculated by SWIB and ETF.

SECTION D

GAIN/LOSS

Active Member Gain/Loss Analysis

Purpose of Gain/Loss Analysis. Regular actuarial valuations provide information about the composite change in computed contribution rates and total liabilities -- whether or not the rates and related liabilities are increasing or decreasing, and by how much. However, valuations do not show the portion of the change attributable to each risk area within the Wisconsin Retirement System financial mechanism: the rate of recognized investment income on plan assets; the rates of withdrawal of active participants who leave covered employment; the rates of mortality; the rates of disability; the rates of salary increases; and the assumed ages at actual retirement. In an actuarial valuation, assumptions are made as to what these rates will be for the next year and for decades in the future.

Assumptions should be carefully chosen and continually monitored. A poor initial choice of assumptions or continued use of outdated assumptions can lead to understated costs resulting in either an inability to pay benefits when due, or sharp increases in required contributions at some point in the future or overstated costs resulting in either benefit levels that are kept below the level that could be supported by the computed rate or an unnecessarily large burden on the current generation of participants, employers and taxpayers. The actuarial assumptions for the Wisconsin Retirement System are reviewed and updated as necessary every three years in an experience study. This triennial review is intended to manage the potential for future gains and losses.

The objective of a gain and loss analysis is to determine the portion of the change that is attributable to each risk area.

The fact that actual experience differs from assumed experience should be expected. The future cannot be predicted with complete precision. Further, year-to-year statistical fluctuations occur, even in very large groups. This year's report reflects just a single year's experience. Changes in the valuation assumed experience for a risk area should be made only when the differences between assumed and actual experience have been observed to be sizable and persistent. One year's gain and loss analysis may or may not be indicative of ***long-term trends, which are the basis of actuarial assumptions.*** However, a persistent series of gains and losses can indicate a need for an assumption change or a method change, even if on a demographic basis, the assumptions appear to model reality well. In the Wisconsin Retirement System, longer term trends are reviewed in connection with the regular three-year investigation of experience (the most recent three-year investigation covered the period January 1, 2015 to December 31, 2017). It is the results of the three-year investigation that lead to recommendations for changes in the actuarial assumptions.

Overall Experience

Overall experience resulted in a net actuarial gain of $502 million for the 2020 calendar year. The development of this figure is shown on the following page. Investment gains were partially offset by losses from demographic and other experience. The net result was a 0.5% decrease in the overall 2022 normal cost rate for the General and Elected group, a 0.2% decrease in the overall 2022 normal cost rate for the Protective without Social Security group and no change in the 2022 normal cost rate for the Protective with Social Security group.

Development of Total Actuarial Gain (Loss) – Calendar Year December 31, 2020 ($ Millions)

	Year Ended December 31, 2020				
		Executive	Protective		
	General	& Elected	With S.S.	Without S.S.	Total
(1) Entry Age UAAL at start of year	$ 963.3	$ 95.0	$ 405.1	$ 65.9	$ 1,529.3
(2) Entry Age Normal cost from last valuation	1,746.8	14.4	224.3	50.9	2,036.4
(3) Actual contributions	1,833.9	16.4	266.9	57.9	2,175.1
(4) Interest	64.4	6.6	26.9	4.4	102.3
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	940.6	99.6	389.4	63.3	1,492.9
(6) Change in actuarial assumptions	0.0	0.0	0.0	0.0	0.0
(7) Other changes	0.0	0.0	0.0	0.0	0.0
(8) Expected UAAL after changes: (5) + (6) + (7)	940.6	99.6	389.4	63.3	1,492.9
(9) Actual Entry Age UAAL at end of year	381.0	105.4	445.3	59.4	991.1
(10) Gain (loss): (8) - (9)	**$ 559.6**	**$ (5.8)**	**$ (55.9)**	**$ 3.9**	**$ 501.8**

The gain/loss analysis is intended to explain the financial effect of differences between actual and assumed experience in basic risk areas: investment income, pay increases, retirement rates, turnover rates, etc. In order for the gain/loss analysis to proceed, the change in the Entry Age Unfunded Actuarial Accrued Liabilities from one year to the next is analyzed to remove the effect of expected changes. The table above develops this year's gain or loss (line 10) which is subtracted from the Experience Amortization Reserve (EAR). When the EAR decreases "unexpectedly," this is favorable experience and downward pressure is exerted on contribution rates. Similarly, an unexpected increase in the EAR is unfavorable experience and upward pressure is exerted on contribution rates.

By measuring gains and losses each year and, to the extent possible, determining the "responsible" assumptions, insight is gained into how well the actuarial assumptions estimate WRS liabilities. Such information aids in understanding financial effects of emerging trends and is particularly useful during preparation of the WRS experience study.

Population Development During Calendar Year 2020

	General	Executive & Elected	Protective		Total	Expected
			With S.S.	Without S.S.		
Beginning Census	235,645	1,302	19,528	2,759	259,234	
(-) Normal Retirement	3,877	45	460	86	4,468	4,630
(-) Reduced Retirement	3,528	12	129	14	3,683	4,168
(-) Death	109	1	7	2	119	244
(-) Disability Retirement						
-Total disabilities approved	265	0	26	4	295	118
-Less pending at beginning of year	77	0	10	0	87	
-Net new from active status	188	0	16	4	208	
(-) Other Separations	13,244	56	800	37	14,137	13,883
(-) Transfers Out	1,726	18	216	10	1,970	
(+) Transfers In	1,600	60	276	34	1,970	
(+) New Entrants	20,055	50	1,500	114	21,719	
Ending Census	234,628	1,280	19,676	2,754	258,338	

This schedule reconciles the active member populations reported in connection with the December 31, 2020 and the prior year valuations. Assumptions related to population development are a primary focus of the gain/loss analysis. They generally tend to be more stable than economic assumptions, and therefore, measurements have more meaning. Please note also that the table above represents changes in actual and expected counts of members. Beginning with the 2009 valuations, some of the actuarial assumptions (retirement, turnover, etc.) are based on liability weighted rates. Therefore, comparing actual to expected number counts alone may not form the basis for our conclusions.

Transfers for the General group include transfer between subgroups (teachers, university, general employees, etc.). Please note that the number of new retirees shown in the table above may include a small cohort of retirees (primarily members retiring during the end of December) that were not included in the Retired Lives Valuation. This is due to the lag in reporting dates and they will be included in the following year Retired Lives Valuation.

Gain (Loss) Overview

Population Results

Normal Retirements varied by group and gender. Overall normal retirements were slightly less than expected. In general, fewer normal retirements than assumed often creates a gain. However, looking at counts alone is not always an accurate predictor of whether a gain or loss occurs. If there are fewer retirements in shorter service, lower paid groups and more retirements than expected in longer service, higher paid groups, there will be a net loss to the System even if the actual total counts might be equal to or less than expected. In order to account for this, retirement rates are now developed partially on a liability weighted methodology. The net result for this past year was a small loss.

Reduced Retirements were less than expected, overall producing a small loss.

Disabilities were more than expected and produced a loss. This means that the reserves needed for the disability benefit were slightly larger than the reserves that had been held for retirement benefits.

Deaths among active participants were less than expected. The net result for the past year was a small loss.

Other Separations varied by group, gender, and service but were overall higher than expected. The net result for the past year was a small loss.

In total, the population risk areas (retirement, death, disability, and other separations) all produced losses, producing a net loss during 2020.

Economic Results

On a market recognition account basis net of fee **investment return** was 10.5% and investment activity produced a gain for all groups due to the combined effect of this year's gain and the continued recognition of prior gains and losses. The total recognized investment gain of $1,746 million was partially offset by a $548 million increase in the combined value of variable excess benefits and money purchase benefits (as shown on page D-7), resulting in a net recognized investment gain of about $1,199 million.

Pay Increases were overall higher than expected, producing a loss.

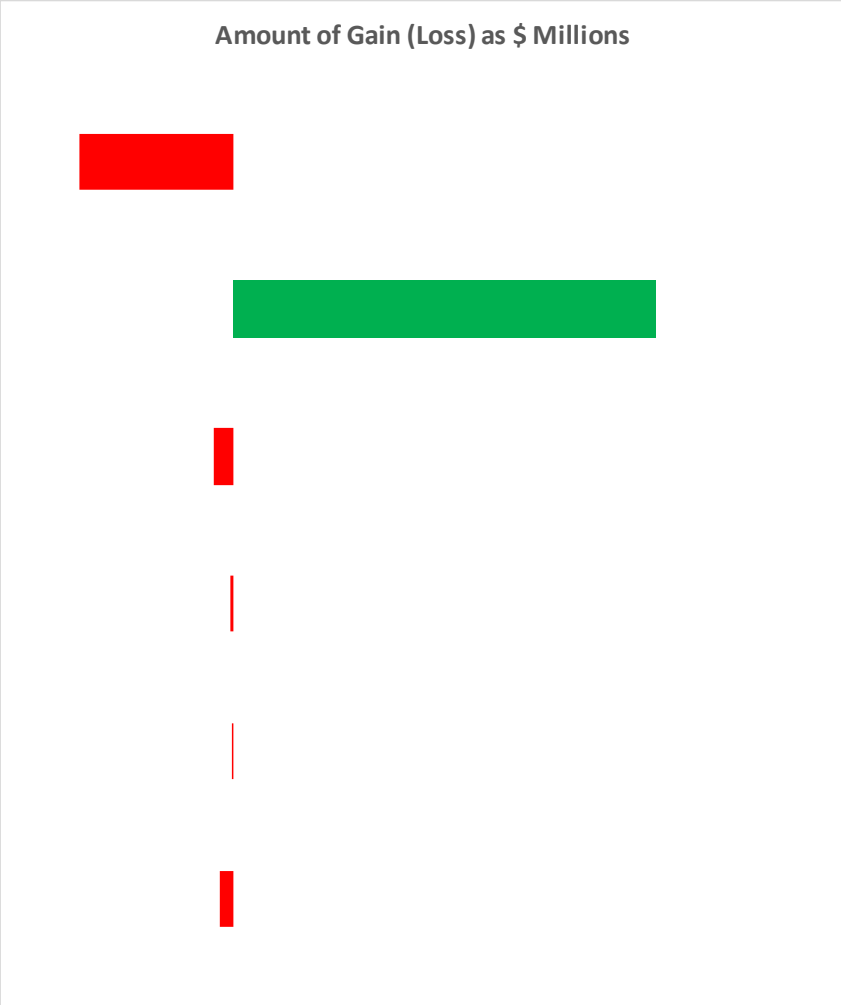
Gain (Loss) Detail
($ Millions)

Type of Activity	General	Executive & Elected	Protective		Total	Prior Year
			With S.S.	Without S.S.		
Decrement Risk Areas						
Normal Retirement	$ (16.6)	$ (0.1)	$ (14.3)	$ (2.5)	$ (33.5)	$ (25.1)
Reduced Retirement	(18.5)	(0.7)	(3.2)	(0.3)	(22.7)	(13.3)
Disability Retirement	(6.5)	0.1	(3.4)	(0.7)	(10.5)	(5.5)
Death with Benefit	(1.6)	0.0	(0.2)	0.1	(1.7)	(3.7)
Other Separations	(32.8)	(0.4)	(6.4)	(0.8)	(40.4)	(13.5)
Economic Risk Areas						
Salary Increases	(264.0)	(3.3)	(150.5)	(21.3)	(439.1)	(65.5)
Investment Return	1,012.9	4.1	145.7	36.0	1,198.7	160.2
Other Activity	(113.3)	(5.5)	(23.6)	(6.6)	(149.0)	(122.1)
Total Gain (Loss)	**$ 559.6**	**$ (5.8)**	**$ (55.9)**	**$ 3.9**	**$ 501.8**	**$(88.5)**
-% of Accrued Liability	**1.4%**	**(3.3)%**	**(1.2)%**	**0.4%**	**1.1%**	**(0.2)%**

Page D-8 presents a partial explanation of the other activity shown in this schedule.

Gain/Loss Analysis
2020 Experience
Divisions Combined

Salary Increases	$ (439)
Investment Return	$ 1,199
Retirement	$ (56)
Disability Retirement	$ (11)
Death-in-Service	$ (2)
Other Separations	$ (40)



Gain (Loss) from Investment Income During Calendar Year 2020
($ Millions)

	General	Executive & Elected	Protective		Total
			With SS	Without SS	
(1) Beginning of Year Active Participant Assets					
(a) Participant Accumulation Reserve	$17,632.7	$ 25.8	$1,368.9	$244.6	$19,272.0
(b) PAR Closing Adjustment	0.1	0.0	0.0	0.0	0.1
(c) Employer Accumulation Reserve	19,522.0	153.9	2,945.9	757.7	23,379.5
(d) EAR Closing Adjustment	2.2	0.0	0.3	0.1	2.6
(e) Total	37,157.0	179.7	4,315.1	1,002.4	42,654.2
(2) End of Year Active Participant Assets					
(a) Participant Accumulation Reserve	18,959.5	21.6	1,427.8	241.2	20,650.1
(b) Employer Accumulation Reserve	20,486.1	156.5	3,159.9	812.5	24,615.0
(c) Total	39,445.6	178.1	4,587.7	1,053.7	45,265.1
(3) Investment Earnings Credited					
(a) Participant Accumulation Reserve	1,885.6	2.0	147.3	26.2	2,061.1
(b) Employer Accumulation Reserve	2,173.9	16.4	325.2	83.6	2,599.1
(c) Total	4,059.5	18.4	472.5	109.8	4,660.2
(4) Average Balance: .5 x {(1e)+(2c)-(3c)}	36,271.6	169.7	4,215.2	973.2	41,629.7
(5) Expected Earnings: .070 x (4)	2,539.0	11.9	295.1	68.1	2,914.1
(6) Gain (Loss) for Year from Investment Experience: (3c)-(5)	1,520.5	6.5	177.4	41.7	1,746.1
(7) Portion applied to Change in Variable Excess Reserve and Money Purchase Minimum Benefit	507.7	2.4	31.8	5.7	547.5
(8) Remaining Gain (Loss): (6)-(7)	**$ 1,012.9**	**$ 4.1**	**$ 145.7**	**$ 36.0**	**$ 1,198.6**

Analysis of "Other" Activity
($ Millions)

"Other" activity refers to gain or loss activity that is not directly related to the main actuarial assumptions. Other activity this year resulted in a loss of $149.0 million as shown on page D-5. The schedule below analyzes this activity. The **Reserve Difference** produced a loss of about $57 million. There are two identifiable sources for this loss. The first relates to cases where the service credit or final average salary at retirement differed from what was expected based upon the prior valuation. The second relates to final computations of annuities that were originally based on estimates. The **Re-established Liability** represents the liability for new or rehired active members who were not active in the prior year. Typically, it is expected that a new hire will have very little liability. However, often new members appear with more than one year of service or with liability greater than contributions made on their behalf. Although this amount is difficult to determine accurately due to the timing of contribution amounts, we estimate the Re-established Liability loss at about $83 million.

	General	Executive & Elected	Protective		Total
			With S.S.	Without S.S.	
Expected Reserve Transfers					
Normal Retirement	$1,869	$26	$ 316	$89	$2,300
Reduced Retirement	1,098	5	88	12	1,203
Death	14	0	2	0	16
Disability Retirement	68	0	9	4	81
Deferred Retirement	376	3	32	6	417
Expected Total Reserve Transfers	3,425	34	447	111	4,017
Actual Reserve Transfer (From Retiree Report)	3,473	36	452	113	4,074
Reserve Difference	(48)	(2)	(5)	(2)	(57)
Expected Refunds	60	0	4	0	64
Actual Refunds	35	0	3	0	38
Refund Difference	25	0	1	0	26
Re-established Liability	(72)	(1)	(9)	(1)	(83)
Total Explained Difference	(95)	(3)	(13)	(3)	(114)
Unknown Difference	(18)	(3)	(10)	(4)	(35)
Total Other Activity	(113)	(6)	(23)	(7)	(149)
Other Activity as % of Liabilities	(0.29)%	(3.37)%	(0.50)%	(0.66)%	(0.33)%

Comparative Schedule of Experience
5-Year History of Gains and Losses
($ Millions)

Year	Retmt.	Disability Retmt.	Other Separations*	Salary Increases	Investment Return	Other	Total
			GENERAL				
2016	$ (32.6)	$ 15.3	$ 18.2	$ 268.1	$ 112.8	$ (40.9)	$ 340.9
2017	(19.0)	14.3	34.1	114.0	287.8	(91.8)	339.4
2018	(21.5)	(7.7)	(13.8)	322.0	(583.3)	(80.2)	(384.5)
2019	(11.6)	(3.3)	(17.2)	(32.6)	117.7	(111.4)	(58.4)
2020	**(35.1)**	**(6.5)**	**(34.4)**	**(264.0)**	**1,012.9**	**(113.3)**	**559.6**
			EXECUTIVE & ELECTED				
2016	$ (0.5)	$ 0.1	$ (1.2)	$ 14.0	$ 0.7	$ 1.5	$ 14.6
2017	(2.5)	0.1	0.3	(14.7)	0.1	(8.2)	(24.9)
2018	0.6	0.1	0.2	1.7	(0.7)	(2.1)	(0.2)
2019	(0.8)	(0.1)	1.3	(1.8)	(1.3)	(4.5)	(7.2)
2020	**(0.8)**	**0.1**	**(0.4)**	**(3.3)**	**4.1**	**(5.5)**	**(5.8)**
			PROTECTIVE WITH SOCIAL SECURITY				
2016	$ (17.4)	$ 1.2	$ 4.0	$ 8.5	$ 19.0	$ 17.8	$ 33.1
2017	(17.6)	0.8	1.3	3.9	48.6	(10.3)	26.7
2018	(11.0)	-	(2.3)	(5.4)	(89.9)	(7.1)	(115.7)
2019	(22.0)	(2.6)	(1.0)	(26.6)	34.6	(4.9)	(22.5)
2020	**(17.5)**	**(3.4)**	**(6.6)**	**(150.5)**	**145.7**	**(23.6)**	**(55.9)**
			PROTECTIVE WITHOUT SOCIAL SECURITY				
2016	$ (1.1)	$ 0.6	$ (1.2)	$ 7.6	$ 5.6	$ 2.0	$ 13.5
2017	(1.3)	0.7	(0.7)	(2.2)	12.5	(12.1)	(3.1)
2018	(0.9)	(0.1)	(0.8)	(0.7)	(23.1)	0.7	(24.9)
2019	(4.0)	0.5	(0.3)	(4.5)	9.2	(1.3)	(0.4)
2020	**(2.8)**	**(0.7)**	**(0.7)**	**(21.3)**	**36.0**	**(6.6)**	**3.9**

* *Includes separation due to death.*

SECTION E

CENSUS DATA

Total Participants Included in Valuations
December 31, 2020

Valuation Group	Number	Average Annual Earnings/Benefits*
Actives	258,338	$58,317
Inactives	169,166	$18,228
Retirees & Beneficiaries	222,723	$26,369
Total Participants	**650,227**	

* *For inactives, average money purchase balance.*

Active Participants Included in Valuations
December 31, 2020

Active participants included in the valuations totaled 258,338 with an annual payroll totaling $15,065.6 million, as follows:

Valuation Group	Number	Annual Earnings ($ Millions)	Group Averages			
			Earnings	Age	Years of Service	Contribs.
General	234,628	$13,294.7	$56,663	45.2	11.1	$63,450
Executive Group & Elected Officials	1,280	116.3	90,894	55.4	14.1	118,510
Protective Occupation with Social Security	19,676	1,414.6	71,893	39.7	12.0	73,676
Protective Occupation without Social Security	2,754	240.0	87,136	40.7	13.9	93,611
Total Active Participants	**258,338**	**$15,065.6**	**$58,317**	**44.8**	**11.2**	**$64,823**
Prior Year	259,234	$14,583.7	$56,257	44.9	11.3	$60,694

Group averages are not used in the valuation, but are shown here for their general interest.

Inactive Participants Included in Valuations
December 31, 2020

Inactive participants included in the valuations totaled 169,166 as follows:

Valuation Group	Number	Group Averages		
		Age	Service	Money Purchase Balance
General	160,974	47.2	3.4	$17,958
Executive Group & Elected Officials	596	54.3	4.8	36,025
Protective Occupation with Social Security	7,340	41.4	4.0	21,958
Protective Occupation without Social Security	256	43.0	6.1	39,038
Total Inactive Participants	**169,166**	**47.0**	**3.4**	**$18,228**
Prior Year	169,471	47.2	3.3	$16,861

The valuations also included 3,483 Qualified Domestic Relations Order cases whose average age was 52.6 years. These accounts for divorced spouses of WRS participants have been established in accordance with Wisconsin Domestic Relations Law.

General Participants as of December 31, 2020
by Attained Age and Years of Service

Attained Ages	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
15-19	160							160	$ 4,184,689
20-24	5,750	13						5,763	199,580,763
25-29	17,458	2,175	3					19,636	861,858,471
30-34	13,006	11,641	1,176	11				25,834	1,300,501,279
35-39	10,800	9,021	7,830	1,358	14			29,023	1,603,486,379
40-44	9,208	6,715	6,003	7,892	1,550	12		31,380	1,865,419,608
45-49	7,140	5,537	4,389	5,154	7,160	923	16	30,319	1,888,148,653
50-54	6,372	5,247	4,328	4,668	6,051	5,884	1,183	33,733	2,121,450,761
55	1,117	936	859	922	1,085	1,031	877	6,827	425,327,387
56	1,075	944	768	840	965	861	863	6,316	389,121,214
57	1,030	950	829	886	894	736	889	6,214	378,473,148
58	1,006	842	801	819	808	671	781	5,728	339,599,730
59	996	829	751	842	783	625	719	5,545	323,606,035
60	916	764	739	779	796	547	755	5,296	306,518,354
61	732	707	631	710	735	463	621	4,599	262,512,819
62	657	566	636	634	658	388	585	4,124	235,971,612
63	576	508	450	531	501	331	468	3,365	191,027,818
64	476	469	403	398	395	290	430	2,861	163,898,311
65	411	336	299	337	306	176	323	2,188	123,972,756
66	246	223	182	205	191	141	227	1,415	83,527,355
67	222	162	148	119	117	83	141	992	55,760,829
68	177	103	98	106	81	52	115	732	41,109,482
69	155	91	72	81	58	50	94	601	34,363,815
70	126	82	59	43	54	33	77	474	26,136,544
71	108	61	45	33	33	25	52	357	18,122,497
72	78	35	29	28	32	10	37	249	11,719,968
73	70	32	21	19	16	13	22	193	8,997,527
74	62	32	23	23	13	13	23	189	8,965,525
75 & Up	166	128	50	38	32	21	80	515	21,359,411
Totals	**80,296**	**49,149**	**31,622**	**27,476**	**23,328**	**13,379**	**9,378**	**234,628**	**$13,294,722,740**

Executive Group and Elected Officials
as of December 31, 2020
by Attained Age and Years of Service

Attained Ages	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24	1							1	$ 52,999
25-29	3	2						5	304,841
30-34	14	14	1					29	2,142,155
35-39	29	30	15	1				75	6,435,451
40-44	35	21	38	12	5			111	10,265,406
45-49	34	25	24	26	28	2	1	140	14,166,038
50-54	38	42	28	32	33	22	7	202	19,258,932
55	11	6	7	6	8	10	2	50	5,176,299
56	10	10	4	5	8	3	5	45	4,006,701
57	8	7	7	7	8	7	6	50	4,591,268
58	10	6	6	6	6	10	3	47	4,521,650
59	12	13	4	5	5	8	8	55	5,222,288
60	13	6	7	4	5	10	11	56	5,211,228
61	8	7	3	8	6	5	14	51	5,277,141
62	11	7	5	3	6	3	18	53	4,933,841
63	10	5	4	4	9	4	9	45	4,283,728
64	8	3	3	2	3		8	27	2,199,690
65	6	5	1	3	4	3	8	30	3,048,140
66	6	7	3	1		2	6	25	2,282,573
67	7	2	4	4	5	1	7	30	2,573,280
68	5	3	2	1	3	2	2	18	1,810,878
69	6	7	2	3	2	2	3	25	1,597,031
70	4	4	1	1	1	2	3	16	1,162,363
71	2	3	2	1	2		2	12	1,029,354
72	3	1	2	1	1		2	10	828,052
73	5	3	3	1		1	2	15	1,007,216
74		4		2	2	1	1	10	898,468
75 & Up	19	14	3		5	2	4	47	2,057,839
Totals	**318**	**257**	**179**	**139**	**155**	**100**	**132**	**1,280**	**$116,344,850**

Protective Occupation Participants with Social Security as of December 31, 2020 by Attained Age and Years of Service

Attained Ages	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
15-19	15							15	$ 531,558
20-24	1,009							1,009	49,729,272
25-29	2,329	557						2,886	176,352,628
30-34	1,115	1,527	351	5				2,998	202,709,034
35-39	601	777	1,210	444	11			3,043	220,937,260
40-44	368	335	552	1,060	534	9		2,858	215,717,579
45-49	212	187	289	573	1,258	361	4	2,884	230,982,189
50	37	37	55	115	238	236	9	727	59,470,164
51	42	32	41	74	183	214	26	612	50,091,732
52	38	28	35	71	129	190	33	524	42,800,585
53	28	16	39	44	94	142	50	413	34,103,296
54	29	18	22	42	64	90	45	310	25,996,412
55	24	15	29	52	49	47	30	246	19,038,742
56	23	15	18	46	48	36	34	220	17,711,055
57	14	9	17	31	25	26	24	146	11,298,063
58	18	21	15	38	30	29	25	176	13,051,631
59	10	15	20	29	22	20	25	141	10,634,979
60	9	12	14	22	23	12	17	109	8,246,952
61	9	8	6	23	15	10	14	85	6,198,651
62	5	4	10	22	11	2	11	65	4,785,995
63	8	2	9	18	12	7	9	65	4,740,196
64	8	2	5	10	6	4	5	40	2,842,230
65	2	3	7	8	6	3	7	36	2,608,223
66	2	5	1	3	2	3	6	22	1,925,818
67	6	2	2	4	2	1	1	18	1,108,907
68	1	2	1	2	2		2	10	598,411
69	2			1			1	4	139,322
70 & Up	6	5	1	1			1	14	222,784
Totals	**5,970**	**3,634**	**2,749**	**2,738**	**2,764**	**1,442**	**379**	**19,676**	**$1,414,573,668**

Protective Occupation Participants without Social Security
as of December 31, 2020
by Attained Age and Years of Service

Attained Ages	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24	83							83	$ 4,522,716
25-29	210	90						300	21,276,235
30-34	148	214	75					437	34,170,016
35-39	53	153	190	57	1			454	38,385,843
40-44	23	50	135	170	79			457	40,486,440
45-49	9	18	45	96	236	41	1	446	42,485,991
50	2	1	6	14	40	34	3	100	9,763,962
51			4	18	41	34	11	108	11,174,086
52	3		2	16	24	27	9	81	8,069,312
53		1	3	5	20	23	11	63	6,362,301
54	3	2	2	6	24	15	12	64	6,510,924
55		1	4	2	14	17	4	42	4,371,446
56	2			3	9	11	7	32	3,281,220
57		1		2	3	14	3	23	2,317,123
58	1	1	2	1	4	4	4	17	1,823,036
59			1	1	5	5	3	15	1,763,070
60			1	1	2	3	2	9	885,870
61	1		1	1	3	2	1	9	899,605
62			1	1		1	2	5	549,531
63				1		1	1	3	307,799
64					1		1	2	225,801
65	1							1	18,505
66							1	1	103,750
67							1	1	115,705
70 & Up							1	1	102,526
Totals	**539**	**532**	**472**	**395**	**506**	**232**	**78**	**2,754**	**$239,972,813**

Active Participants
as of December 31, 2020
by Years of Service and Gender

Completed Years of Service	Males	Females	Totals	Valuation Payroll	
				Total	Average
0	6,191	13,895	20,086	$ 643,302,361	$32,027
1	7,101	13,243	20,344	883,794,607	43,443
2	6,085	11,098	17,183	794,523,744	46,239
3	5,431	9,946	15,377	752,525,577	48,938
4	5,227	8,906	14,133	729,542,170	51,620
5	4,614	7,919	12,533	667,008,911	53,220
6	4,422	7,488	11,910	652,175,877	54,759
7	3,992	6,883	10,875	616,762,244	56,714
8	3,822	5,977	9,799	566,396,185	57,801
9	3,162	5,293	8,455	500,659,848	59,215
10	2,587	4,398	6,985	423,212,097	60,589
11	2,256	4,200	6,456	396,723,200	61,450
12	2,731	4,639	7,370	464,927,106	63,084
13	2,798	4,630	7,428	479,966,211	64,616
14	2,520	4,263	6,783	443,687,695	65,412
15 & Up	33,859	48,762	82,621	6,050,406,238	73,231
Totals	**96,798**	**161,540**	**258,338**	**$15,065,614,071**	**$58,317**
Average					
Age	44.9	44.7	44.8		
Service	11.9	10.8	11.2		

Comparative Statement of Active Participants in Valuations

Valuation 12/31	General				Executive and Elected			
		Earnings				Earnings		
	No.	$ Millions	Average	% Incr.	No.	$ Millions	Average	% Incr.
1996	219,265	$ 6,832	$ 31,160	2.2%	1,459	$ 67	$45,967	1.8 %
1997	222,888	7,128	31,980	2.6%	1,455	71	48,881	6.3 %
1998	227,017	7,457	32,847	2.7%	1,450	73	50,664	3.6 %
1999*	229,657	7,704	34,445	4.9%	1,468	77	53,263	5.1 %
2000	234,076	8,335	35,610	3.4%	1,486	83	55,582	4.4 %
2001	238,944	8,746	36,605	2.8%	1,486	85	57,060	2.7 %
2002	240,990	9,007	37,377	2.1%	1,476	87	58,865	3.2 %
2003	239,696	9,273	38,686	3.5%	1,468	86	58,336	(0.9)%
2004	238,943	9,501	39,764	2.8%	1,469	89	60,379	3.5 %
2005	237,501	9,661	40,678	2.3%	1,452	90	61,788	2.3 %
2006	236,877	9,933	41,935	3.1%	1,436	93	64,480	4.4 %
2007	237,124	10,278	43,344	3.4%	1,427	95	66,320	2.9 %
2008**	238,994	10,806	45,216	4.3%	1,430	101	70,316	6.0 %
2009	240,401	11,098	46,165	2.1%	1,427	101	70,786	0.7 %
2010	239,959	11,195	46,655	1.1%	1,418	101	71,394	0.9 %
2011	232,518	10,947	47,080	0.9%	1,393	99	70,802	(0.8)%
2012	231,765	11,041	47,639	1.2%	1,408	104	73,968	4.5 %
2013	231,973	11,270	48,584	2.0%	1,397	106	76,125	2.9 %
2014	232,433	11,574	49,794	2.5%	1,401	109	77,998	2.5 %
2015	231,631	11,786	50,881	2.2%	1,380	108	78,230	0.3 %
2016	232,684	11,964	51,417	1.1%	1,347	106	78,667	0.6 %
2017	232,874	12,167	52,249	1.6%	1,335	107	80,366	2.2 %
2018	233,462	12,445	53,307	2.0%	1,302	108	82,986	3.3 %
2019	235,645	12,926	54,855	2.9%	1,302	112	86,269	4.0 %
2020**	234,628	13,295	56,663	3.3%	1,280	116	90,894	5.4 %

* *After change in method of calculating average pay.*

** *Some groups had a 27-period payroll during 2008 and 2020.*

Comparative Statement of Active Participants in Valuations

Valuation 12/31	Protective with Social Security				Protective without Social Security			
		Earnings				Earnings		
	No.	$ Millions	Average	% Incr.	No.	$ Millions	Average	% Incr.
1996	13,820	$ 495	$ 35,807	3.1%	2,625	$116	$44,063	3.7 %
1997	14,232	536	37,625	5.1%	2,654	121	45,568	3.4 %
1998	14,810	570	38,509	2.3%	2,658	127	47,733	4.8 %
1999*	16,483	649	39,864	3.5%	2,691	131	48,947	2.5 %
2000	16,970	717	42,263	6.0%	2,685	135	50,423	3.0 %
2001*	17,981	772	42,914	1.5%	2,715	142	52,339	3.8 %
2002	18,325	804	43,871	2.2%	2,709	148	54,603	4.3 %
2003	18,660	856	45,891	4.6%	2,714	154	56,673	3.8 %
2004	18,964	896	47,266	3.0%	2,709	159	58,546	3.3 %
2005	19,036	920	48,330	2.3%	2,689	162	60,241	2.9 %
2006	19,297	977	50,622	4.7%	2,692	167	62,153	3.2 %
2007	19,757	1,036	52,419	3.5%	2,695	174	64,449	3.7 %
2008**	20,038	1,099	54,859	4.7%	2,724	181	66,502	3.2 %
2009	20,205	1,124	55,636	1.4%	2,733	189	69,149	4.0 %
2010	20,019	1,125	56,184	1.0%	2,754	189	68,559	(0.9)%
2011	19,610	1,119	57,065	1.6%	2,711	189	69,898	2.0 %
2012	19,353	1,105	57,104	0.1%	2,727	193	70,949	1.5 %
2013	19,290	1,121	58,127	1.8%	2,736	197	71,960	1.4 %
2014	19,533	1,151	58,916	1.4%	2,733	204	74,487	3.5 %
2015	19,273	1,171	60,755	3.1%	2,730	209	76,376	2.5 %
2016	19,431	1,203	61,924	1.9%	2,746	213	77,553	1.5 %
2017	19,431	1,227	63,145	2.0%	2,743	219	79,753	2.8 %
2018	19,399	1,263	65,113	3.1%	2,770	225	81,206	1.8 %
2019	19,528	1,314	67,310	3.4%	2,759	231	83,619	3.0 %
2020**	19,676	1,415	71,893	6.8%	2,754	240	87,136	4.2 %

* *After change in method of calculating average pay.*

** *Some groups had a 27-period payroll during 2008 and 2020.*

Core Annuities Being Paid
Tabulated by Attained Ages

Attained Ages	Regular		Disability		Death-in-Service		Totals	
	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount
Under 20	0	$ 0	1	$ 11,582	7	$ 47,293	8	$ 58,875
20-24	0	0	5	60,155	14	140,005	19	200,160
25-29	0	0	7	107,876	19	135,073	26	242,949
30-34	0	0	20	292,864	28	190,350	48	483,214
35-39	2	12,769	68	1,354,895	33	236,182	103	1,603,846
40-44	5	30,495	149	3,153,888	40	375,105	194	3,559,488
45-49	49	520,773	295	6,460,421	48	466,730	392	7,447,924
50-54	1,464	46,327,763	573	13,584,397	73	961,058	2,110	60,873,218
55-59	12,144	352,765,099	1,148	27,781,453	121	1,781,794	13,413	382,328,346
60-64	29,152	757,080,604	1,612	35,969,953	211	3,522,220	30,975	796,572,777
65-69	47,947	1,170,267,402	1,224	28,874,772	245	4,707,177	49,416	1,203,849,351
70-74	49,625	1,230,215,752	1,093	24,863,370	219	4,199,138	50,937	1,259,278,260
75-79	31,779	746,307,590	773	16,331,870	139	2,598,583	32,691	765,238,043
80-84	20,155	451,256,769	548	10,730,623	95	1,358,587	20,798	463,345,979
85-89	12,226	277,221,615	327	5,537,217	64	771,871	12,617	283,530,703
90-94	5,772	129,728,605	128	2,295,028	36	559,690	5,936	132,583,323
95& Up	1,709	35,761,807	35	413,003	25	331,791	1,769	36,506,601
Certain Only*	1,239	25,014,039	1	3,720	31	507,485	1,271	25,525,244
Totals	**213,268**	**$5,222,511,082**	**8,007**	**$177,827,087**	**1,448**	**$22,890,132**	**222,723**	**$5,423,228,301**

Averages in Years				
Age at retirement	59.9	50.8	51.8	59.5
Attained age	71.3	64.5	66.9	71.0

** Certain Only category consists of continuations of 5-, 10- and 15-year certain and life annuities to beneficiaries of deceased annuitants.*

Variable Annuities Being Paid
Tabulated by Attained Ages

Attained Ages	Regular		Disability		Death-in-Service		Totals	
	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount
Under 20	0	$ 0	1	$ 1,290	0	$ 0	1	$ 1,290
20-24	0	0	1	918	3	3,802	4	4,720
25-29	0	0	4	9,883	3	3,505	7	13,388
30-34	0	0	8	13,913	6	4,266	14	18,179
35-39	0	0	11	29,864	5	4,949	16	34,813
40-44	2	995	17	59,317	9	27,880	28	88,192
45-49	19	117,171	23	100,801	18	69,524	60	287,496
50-54	346	2,330,910	71	358,777	17	86,848	434	2,776,535
55-59	2,479	18,743,836	146	638,827	35	202,591	2,660	19,585,254
60-64	5,128	31,687,929	203	783,160	50	267,784	5,381	32,738,873
65-69	8,413	54,039,175	250	1,048,690	56	287,110	8,719	55,374,975
70-74	9,504	93,981,893	181	1,266,693	56	319,766	9,741	95,568,352
75-79	6,068	89,118,991	141	1,565,905	35	452,153	6,244	91,137,049
80-84	3,596	67,806,119	103	1,170,321	22	256,876	3,721	69,233,316
85-89	2,507	47,711,542	68	578,829	18	213,105	2,593	48,503,476
90-94	1,370	24,627,200	29	245,258	13	120,417	1,412	24,992,875
95 & Up	452	7,317,536	4	23,601	12	106,585	468	7,447,722
Certain Only*	247	1,863,169	0	0	3	36,868	250	1,900,037
Totals	**40,131**	**$439,346,466**	**1,261**	**$7,896,047**	**361**	**$2,464,029**	**41,753**	**$449,706,542**

Averages in Years				
Age at retirement	59.2	52.6	51.9	59.0
Attained age	71.3	66.5	67.7	71.2

* *Certain Only category consists of continuations of 5-, 10- and 15-year certain and life annuities to beneficiaries of deceased annuitants.*

SECTION F

METHODS AND ASSUMPTIONS

Summary of Actuarial Assumptions and Methods

Valuation Date	December 31, 2020
Actuarial Cost Method	Frozen Entry Age
Amortization Method	Level Percent -- Closed Period
Amortization Period	30-Year closed from date of participation in WRS
Asset Valuation Method	5-Year Smoothed Market (Closed)
Actuarial Assumptions	
Assumed Rates of Investment Return for:	
Retired participants	5.0%
Post-retirement active participants	5.0%
Pre-retirement active participants	7.0%
Weighted Average Investment Rate of Return	5.4%
Projected Salary Increases*	3.1% to 8.6%
Payroll Growth Rate	3.0%
Population Growth Rate	0.0%

** Includes merit and seniority increases that vary by service plus wage inflation of 3.0%/year.*

Financial Principles and Operational Techniques of the Wisconsin Retirement System

Benefit Promises Made Which Must Be Paid For. A retirement program is an orderly means of handing out, keeping track of, and financing contingent retirement promises. As each participant of the Retirement System acquires a unit of service credit he is, in effect, handed an "IOU" which reads: "The Wisconsin Retirement System promises to pay you one unit of annuity benefits, payments in cash commencing when you retire."

The principal related financial question is: ***When shall the money required to cover the "IOU" be contributed?*** This year, when the benefit of the participant's unit of service is received? Or, some future year, when the "IOU" becomes a cash demand?

The law governing the Wisconsin Retirement System financing intends that the money to cover an "IOU" is contributed in the year the "IOU" is handed out. In this way contribution rates expressed as percents of participant payroll can be determined so as to remain approximately level from year to year and decade to decade as long as the basic experience and make-up of the group of participants does not change significantly. This means that for equivalent benefits each generation of Wisconsin taxpayers will contribute at approximately the same payroll rates.

Translated into actuarial terminology, the level percent-of-payroll contribution objective means that the contribution rate must total at least:

> **Normal Cost** (the current discounted value of benefits likely to be paid on account of participants' service rendered in the current year)
>
> … plus …
>
> **Amortization of any Unfunded Frozen Initial Liabilities (UFIL)**

If contributions to the system are less than the preceding amount, the difference, **plus investment earnings not realized thereon**, will have to be contributed at some later time, or benefits will have to be reduced, to satisfy the fundamental equation under which all retirement programs must operate; that is:

$$B = C + I - E$$

Benefit payments to any group of participants and their beneficiaries cannot exceed

Contributions received on behalf of the group
… plus …
Investment earnings on those contributions
… minus …
Expenses incurred in operating the program.

There are retirement programs (Social Security is an example) designed to defer the bulk of contributions far into the future. The present contribution rate for such systems is artificially low, but is destined to increase relentlessly to a level which may be greatly in excess of the level percent-of-payroll rate.

A by-product of a level percent-of-payroll contribution objective is the accumulation of invested assets for varying periods of time. Investment income becomes the third and largest contributor to the retirement system and the amount is directly related to the amount of contributions and investment performance.

Computing Contribution Rates to Finance Benefits. From a given schedule of benefits and from the data furnished, the actuary calculates the contribution rates **by means of an actuarial valuation** – the technique of assigning monetary values to the risks assumed in operating a retirement program.

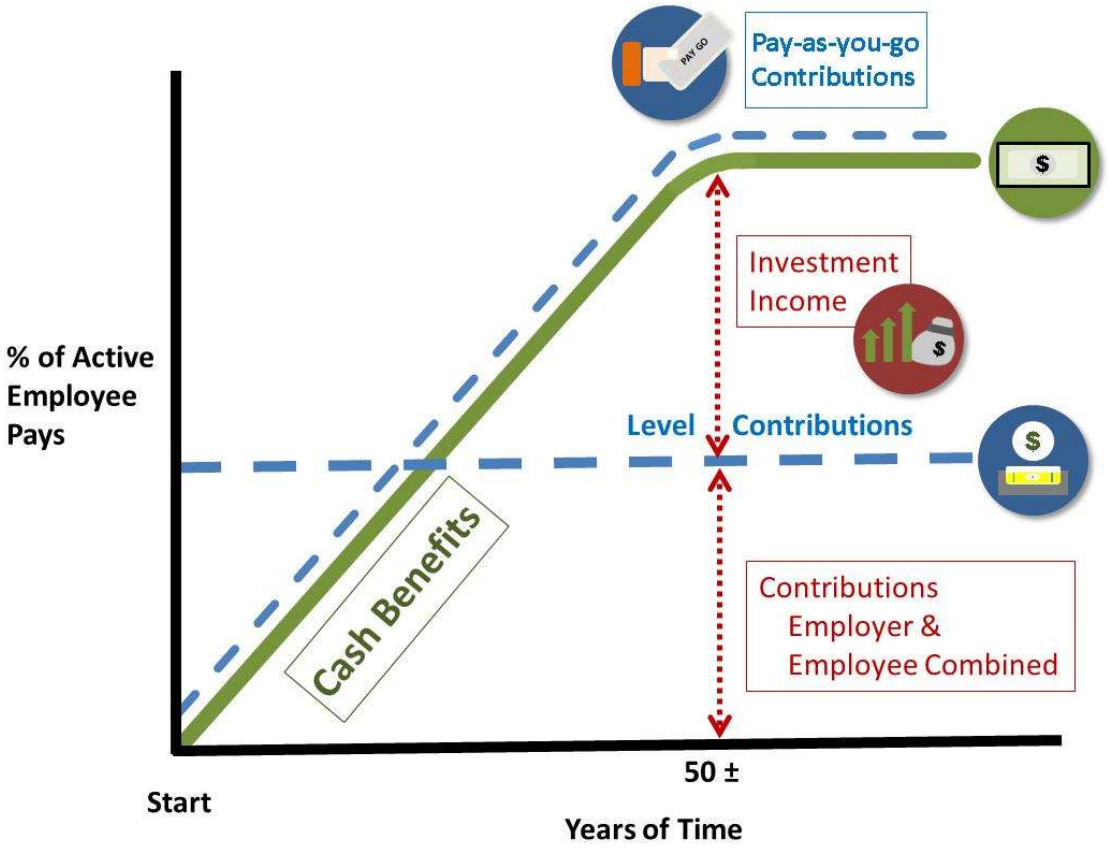
Actuarial Method and Assumptions Used in Valuations

The principal actuarial assumptions relate to:

- Long-term ***rates of investment income*** likely to be generated by system assets;
- ***Rates of mortality*** among participants, retirants and beneficiaries;
- ***Rates of withdrawal*** of active participants;
- ***Rates of disability*** among participants;
- ***Patterns of salary increases*** to be experienced by participants; and
- The age and service ***distribution of actual retirements.***

In an actuarial valuation, the actuary projects the monetary effect of each assumption for each distinct experience group, for the next year and for each year over the next half-century or longer.

Once actual risk experience has occurred and been observed, it will not coincide exactly with assumed risk experience, regardless of the skill of the actuary, the completeness of the data, and the precision of the calculations. Each valuation provides a complete recalculation of assumed future risk experience and takes into account all past differences between assumed and actual risk experience. The result is a continual series of small adjustments to the computed contribution rate. From time to time it becomes necessary to adjust the package of risk measurements to reflect basic experience trends – but not random year-to-year fluctuations.



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

- **Economic Areas**
  - Rates of investment return
  - Rates of pay increase
  - Changes in active member group size
- **Non-Economic Areas**
  - Ages at actual retirement
  - Rates of mortality
  - Rates of withdrawal of active members (turnover)
  - Rates of disability

Actuarial Valuation Method

The actuarial funding method prescribed in the statute for WRS is the Frozen Entry Age Method which is also referred to as the Frozen Initial Liability (FIL) method in this report. Under this method, the amount of remaining unfunded actuarial accrued liabilities at any valuation date is affected only by the monthly amortization payments, compound interest, the added liability created by new employer units, and any added liabilities caused by changes in benefit provisions.

Actuarial gains or losses arising from the difference between actual and assumed experience are reflected in the determination of the normal cost. In this manner, experience gains or losses in any year are amortized (spread) over the average future working lifetime of the active participant group - a period of approximately 12 years. Hence, the computed normal cost is made up of two parts:

- The pure entry-age normal cost (EANC) determined without regard to past gains or losses, and
- An experience amortization component.

Section 40.04(1) of the Wisconsin Statutes provides authority to maintain accounts and reserves determined to be "useful in achieving the funds' purposes - - -". A fundamental WRS objective is stable contribution rates. Accordingly, based on the authority granted under Section 40.04, the experience portion of the normal cost is separately calculated each year and the amortization period is varied upward or downward in order to minimize short-term rate fluctuations. The policy regarding the EAR amortization period is described below:

- The standard period is set 20 years.
- The standard period is reconsidered as part of each triennial experience study (no changes were made with the most recent experience study).
- Temporary interim changes in the period are made only when there are large, but mostly offsetting market gains and losses known to be flowing through the MRA that would otherwise result in contribution rate volatility. Large changes would be defined as those which, over a 2-year period, were expected to result in contribution rate changes of at least 0.4% of payroll.
- The minimum and maximum EAR amortization periods are 10 years and 30 years respectively.
- The amortization policy will be applied in the same manner to market gains and losses flowing through the MRA.
- For 2020, a 20-year period was used.

Asset Valuation Method

An essential step in the valuation process is comparing valuation assets with computed liabilities. Computed liabilities result from actuarial calculations involving the covered population, the benefits, and actuarial assumptions. Valuation assets are those assets that are recognized and available to fund the System's liabilities. WRS assets are invested in the Core Investment Trust, and in the Variable Investment Trust, both of which are managed by the State of Wisconsin Investment Board (SWIB). Assets in the Variable Investment Trust are marked to market each year. Assets in the Core Investment Trust (most of the assets) are valued (or recognized) using an "asset valuation method."

Asset valuation methods are distinguished by the timing of the recognition of investment return. Total investment return is the sum of ordinary income and capital value changes. Under a book value approach, ordinary income is recognized immediately and capital gains (or losses) are recognized only when securities are sold. Book value investment return is directly affected by the timing of sales activity and underlying experience may be distorted. Under a pure market value approach, ordinary investment income and all capital value changes are recognized immediately. Because of market volatility, use of pure market values in retirement funding can result in volatile contribution rates and unstable financial ratios, contrary to WRS objectives.

The asset valuation method used for WRS valuations is statutory, and is referred to as the "Market Recognition Account" or MRA. Act 11 of 1999 closed the former Transaction Amortization Account (TAA) and created the Market Recognition Account (MRA). The MRA recognizes assumed returns fully each year. Differences between actual and assumed returns are phased-in over a closed five-year period. The objective is to give recognition to long-term changes in asset values while minimizing the effect of short-term fluctuations in the capital markets. In accordance with its smoothing objective, the MRA will tend to exceed the market value when the markets are doing poorly, and will fall short of the market value when markets are doing well. Some retirement systems set limits on the amount by which the recognized value of assets can differ from the market value.

Annual Actuarial Valuations
Assumptions Adopted by ETF Board after Consulting with Actuary

ECONOMIC ASSUMPTIONS

The rationale for these assumptions is based upon an experience study covering the period 2015-2017.

For determining plan liabilities, the discount rate is 5.0% for retired participants, 5.0% for active and inactive participants following retirement, and 7.0% for active and inactive participants prior to their retirement. A valuation performed assuming a 5.4% discount rate for all participants at all stages of life, reproduces the results of an actuarial valuation using the 5.0% post-retirement and 7.0% pre-retirement assumptions. Thus, it can be said that **the net discount rate assumed in the valuations was 5.4% per year, compounded annually (net after administrative expenses).**

The **Wage Inflation Rate** assumed in this valuation was 3.0% per year. The wage inflation rate is defined to be the portion of total pay increases for an individual that are due to macroeconomic forces including productivity, price inflation, and labor market conditions. The wage inflation rate does not include pay changes rated to individual merit and seniority effects.

No specific **Price Inflation** assumption is required to perform this valuation. The price inflation assumption used to evaluate the investment return assumption is 2.5%.

The assumed **Real Rate of Return** over wage inflation is defined to be the portion of total investment return that is more than the assumed total wage growth rate. Considering other economic assumptions, the 7.0% pre-retirement investment return rate translates to an assumed real rate of return over wage inflation of 4.0%. The assumed real rate of return over price inflation is 4.5% considering an inflation assumption of 2.5%.

Merit and Longevity pay increase assumptions for individual active members are shown for sample services below. An additional 3.0% recognizes wage inflation, including price inflation, productivity increases, and other macroeconomic forces.

% Merit and Longevity Increase Next Year						
		Exec. &	University	Public School	Protective	
Service	Gen.	Elec.	Teachers	Teachers	With S.S.	W/O S.S.
1	3.5%	2.5%	3.0%	5.6%	4.8%	5.5%
2	3.5%	2.5%	3.0%	5.6%	4.8%	5.5%
3	3.1%	2.0%	2.9%	5.2%	4.1%	4.7%
4	2.8%	1.6%	2.8%	4.7%	3.5%	3.8%
5	2.5%	1.1%	2.7%	4.3%	2.8%	3.0%
10	1.5%	0.2%	2.2%	2.6%	1.1%	0.9%
15	1.1%	0.2%	1.7%	1.4%	0.8%	0.5%
20	0.9%	0.2%	1.2%	0.6%	0.7%	0.4%
25	0.6%	0.2%	0.9%	0.3%	0.6%	0.3%
30	0.4%	0.2%	0.7%	0.2%	0.5%	0.2%

Decrement Probabilities

The Active Member Population is assumed to remain constant. For purposes of financing the unfunded liabilities and amortizing the EAR, total payroll is assumed to grow at the wage inflation rate – 3.00% per year.

The mortality table used was the Wisconsin 2018 Mortality Table adopted by the Board in connection with the 2015-2017 Experience Study. The rates in this table were based on actual WRS experience adjusted for future mortality improvements using the MP-2018 fully generational improvement scale. In accordance with the experience study's in-depth review of Wisconsin-specific mortality experience, the MP-2018 fully generational improvement scale was multiplied by a 60% factor. This approach will be reviewed in the next experience study covering 2018-2020. Sample retirement values from this table are shown below. This assumption is used to measure the probabilities of participants dying before retirement and the probabilities of each benefit payment being made after retirement.

Single Life Retirement Values
Wisconsin 2018 Mortality Table with 5% Interest

Sample Attained Ages in 2020	Present Value of $1 Monthly for Life*		Future Life Expectancy (years)*		Mortality Rates*	
	Males	Females	Males	Females	Males	Females
40	$213.04	$217.69	45.4	48.3	0.000999	0.000619
45	204.74	210.36	40.3	43.2	0.001243	0.000922
50	194.30	201.24	35.3	38.2	0.001610	0.001335
55	181.69	190.09	30.4	33.2	0.003746	0.002407
60	167.45	176.84	25.8	28.4	0.005427	0.003517
65	150.47	160.89	21.4	23.7	0.008322	0.005262
70	131.26	141.93	17.1	19.2	0.013474	0.008704
75	109.81	120.31	13.2	15.0	0.022566	0.015725
80	87.08	96.94	9.7	11.1	0.041382	0.029617
85	65.62	73.71	6.8	7.9	0.077414	0.059609

* *With a fully generational mortality table, the mortality rate depends on the year of birth. Later years of birth will correspond to a lower mortality rate at a given age.*

The values shown above are for non-disabled participants in 2020. For disabled participants, the following table was used:

Sample Attained Ages in 2020	Present Value of $1 Monthly for Life		Future Life Expectancy (years)		Mortality Rates*	
	Males	Females	Males	Females	Males	Females
40	$199.65	$207.91	37.8	41.8	0.001441	0.001027
45	188.03	198.23	32.8	36.8	0.002357	0.001537
50	174.63	186.48	28.1	31.9	0.004644	0.002699
55	158.90	172.41	23.5	27.1	0.006263	0.003971
60	140.43	155.56	19.1	22.4	0.010932	0.006136
65	120.05	135.91	15.0	18.0	0.017777	0.010514
70	98.05	113.95	11.4	13.9	0.030629	0.018928
75	75.91	90.50	8.2	10.2	0.057905	0.035682
80	56.28	67.87	5.7	7.1	0.106542	0.073019
85	40.23	49.64	3.9	4.9	0.171981	0.126179

* *With a fully generational mortality table, the mortality rate depends on the year of birth. Later years of birth will correspond to a lower mortality rate at a given age.*

Active Participant Mortality Rates

Sample Attained Ages in 2020	Mortality Rates*	
	Males	Females
20	0.000135	0.000081
25	0.000165	0.000091
30	0.000214	0.000124
35	0.000380	0.000224
40	0.000500	0.000310
45	0.000621	0.000462
50	0.000805	0.000668
55	0.001873	0.001205
60	0.002713	0.001760
65	0.004161	0.002634
70	0.006737	0.004356
75	0.011283	0.007870
80	0.020691	0.014823

* *With a fully generational mortality table, the mortality rate depends on the year of birth. Later years of birth will correspond to a lower mortality rate at a given age.*

This assumption is used to measure the probability of participants dying while in service.

Rates of Retirement for Those Eligible to Retire

Normal Retirement

Age	General		Exec. &	University		Public School		Protective*	
	Male	Female	Elected	Male	Female	Male	Female	With S.S.	W/O S.S.
50								6%	2%
51								8%	4%
52								10%	4%
53								25%	17%
54								20%	23%
55								20%	25%
56								20%	25%
57	19%	17%	8%	12%	15%	33%	27%	20%	25%
58	19%	17%	8%	12%	15%	29%	27%	20%	33%
59	19%	17%	8%	12%	10%	24%	27%	20%	33%
60	19%	17%	20%	12%	12%	25%	27%	20%	20%
61	19%	17%	12%	12%	16%	25%	27%	20%	20%
62	26%	27%	12%	12%	15%	35%	37%	30%	40%
63	29%	27%	12%	12%	20%	32%	30%	30%	40%
64	28%	27%	15%	12%	20%	29%	28%	30%	40%
65	30%	30%	15%	15%	20%	29%	37%	40%	40%
66	35%	35%	15%	20%	24%	35%	39%	40%	100%
67	30%	30%	15%	20%	20%	33%	33%	40%	100%
68	19%	25%	15%	18%	17%	27%	30%	40%	100%
69	19%	25%	20%	16%	17%	23%	28%	40%	100%
70	19%	25%	20%	20%	18%	25%	38%	100%	100%
71	19%	20%	20%	18%	18%	20%	20%	100%	100%
72	19%	20%	20%	16%	18%	15%	20%	100%	100%
73	19%	20%	20%	16%	15%	15%	20%	100%	100%
74	19%	20%	20%	16%	15%	15%	20%	100%	100%
75	100%	100%	100%	100%	100%	100%	100%	100%	100%

** Includes reduced retirements for Protective with 20+ years of service.*

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Reduced Retirement

Age	% Retiring Next Year						
	General		Exec. &	University		Public School	
	Male	Female	Elected	Male	Female	Male	Female
55	8.0%	7.0%	3.0%	3.0%	5.0%	13.0%	12.0%
56	8.0%	7.0%	3.0%	3.0%	5.0%	13.0%	12.0%
57	4.8%	5.5%	3.0%	3.0%	5.0%	12.0%	12.0%
58	5.7%	6.5%	3.0%	3.0%	5.0%	13.0%	12.0%
59	6.8%	7.0%	3.0%	4.0%	5.0%	14.0%	13.0%
60	8.5%	9.5%	5.0%	5.5%	9.0%	14.0%	17.0%
61	9.0%	9.5%	5.0%	5.5%	9.0%	15.0%	17.0%
62	17.0%	16.0%	2.0%	7.4%	12.0%	21.0%	23.0%
63	18.0%	18.0%	2.0%	7.4%	12.0%	21.0%	23.0%
64	17.0%	18.0%	2.0%	10.0%	15.0%	21.0%	23.0%

The assumed rates of separation from employment prior to service retirement due to disability and other causes are shown below for sample ages. For other terminations it was assumed that a percentage, depending on age of participants terminating after age 35 with 5 or more years of service, will leave their contributions on deposit and be paid a benefit at normal retirement age and that the remaining participants would take a separation benefit. The percentage taking a separation benefit is 25% at age 35, grading downward to 0% at retirement eligibility. All participants terminating prior to normal retirement age with less than five years of service were assumed to take a separation benefit.

Assumed Termination Rates
by Attained Age and Years of Service

		% of Active Participants Terminating								
		General		Exec. &	University		Public Schools		Protective	
									With	Without
Age	Service	Males	Females	Elected	Males	Females	Males	Females	Soc. Sec.	Soc. Sec.
	0	17.0%	20.0%	14.0%	16.0%	14.5%	18.5%	15.0%	16.0%	4.0%
	1	12.3%	15.0%	13.0%	15.0%	14.0%	11.0%	11.0%	9.5%	3.5%
	2	9.3%	11.5%	12.0%	13.0%	13.0%	8.0%	8.0%	6.0%	1.5%
	3	7.6%	10.0%	10.0%	11.0%	10.0%	6.5%	6.0%	5.0%	1.3%
	4	7.5%	9.5%	10.0%	9.0%	9.5%	5.5%	5.5%	4.5%	1.2%
	5	5.8%	7.8%	5.0%	8.0%	9.0%	4.0%	5.0%	4.0%	1.1%
	6	4.8%	7.0%	5.0%	7.5%	7.0%	3.5%	4.0%	3.8%	1.0%
	7	4.7%	6.0%	5.0%	6.0%	6.0%	3.2%	3.7%	3.5%	0.9%
	8	4.1%	5.7%	5.0%	5.5%	5.0%	3.0%	3.3%	3.0%	0.8%
	9	4.0%	5.3%	5.0%	5.0%	4.0%	2.8%	3.0%	2.5%	0.7%
25	10 & Over	4.0%	5.0%	5.0%	5.0%	4.0%	2.5%	2.5%	2.5%	0.7%
30		3.7%	4.7%	5.0%	4.7%	4.0%	2.2%	2.4%	2.3%	0.7%
35		3.0%	3.9%	5.0%	4.2%	4.0%	1.8%	1.9%	2.0%	0.7%
40		2.4%	3.2%	5.0%	3.4%	3.7%	1.5%	1.5%	1.6%	0.6%
45		2.0%	2.7%	4.7%	2.7%	3.2%	1.4%	1.3%	1.4%	0.6%
50		1.7%	2.2%	4.2%	2.2%	2.7%	1.3%	1.2%	1.2%	0.5%
55		1.6%	2.0%	4.0%	2.0%	2.5%	1.3%	1.2%	1.2%	0.5%
60		1.6%	2.0%	4.0%	2.0%	2.5%	1.3%	1.2%	1.2%	0.5%

Disability Rates

	% of Active Participants Becoming Disabled									
	General		Exec. & Elected		University		Public Schools		Protective	
Age	Males	Females	Males	Females	Males	Females	Males	Females	With SS	W/O SS
20	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.03%
25	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.03%
30	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.03%
35	0.01%	0.02%	0.01%	0.01%	0.00%	0.02%	0.00%	0.01%	0.01%	0.03%
40	0.02%	0.03%	0.01%	0.01%	0.00%	0.02%	0.01%	0.01%	0.02%	0.04%
45	0.04%	0.04%	0.01%	0.01%	0.01%	0.02%	0.02%	0.04%	0.02%	0.08%
50	0.09%	0.06%	0.02%	0.02%	0.01%	0.04%	0.06%	0.07%	0.04%	0.46%
55	0.17%	0.12%	0.09%	0.09%	0.04%	0.06%	0.12%	0.10%	0.61%	0.34%
60	0.30%	0.16%	0.11%	0.11%	0.06%	0.09%	0.19%	0.15%	1.02%	0.10%

Miscellaneous and Technical Assumptions

Amortization Payoff Reserve:	Additional reserves in the amount of $4,765,339 (discounted from the year 2029 to the current valuation date) were added to general group liabilities to account for the possibility that some non-state employers may never be able to pay off their unfunded actuarial accrued liability.
Assumed Retirement for Deferred Members:	Members with a deferred vested benefit were assumed to retire at age 65 for General members, age 54 for Protective members and age 62 for Executive and Elected members.
Benefit Service:	Exact fractional service on the decrement date is used to determine the amount of benefit payable.
Decrement Operation:	Disability operates during the retirement pattern.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and total service (in all benefit groups) nearest whole year on the date the decrement is assumed to occur.
Expenses:	Assumed investment return is net of administrative and investment expenses.
Final Average Salary:	For present value of future benefit purposes, final average salary was calculated in accordance with pay increase assumptions, but was not permitted to fall below the final average salary reported in the data.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
Liability Adjustments:	Final Average Salaries were increased 2.5% (3.0% for Executive and Elected and 3.5% for Protectives) to account for additional contingencies in actual benefit amount calculated at the time of retirement.
Marriage Assumption:	80% of males and 70% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses.

Miscellaneous and Technical Assumptions (Concluded)

Non-Benefit Service:	Liabilities for service in divisions other than the division in which the individual is currently active are calculated as indexed deferred vested benefits. Benefits are indexed in accordance with the salary adjustment factors for the division where the member is currently employed. People are assumed to retire at the earliest age that full benefits will become available. The liabilities are assigned to the division in which the service was rendered.
Normal Form of Benefit:	The assumed normal form of benefit is a straight life benefit, except where otherwise noted.
Pay Annualization:	Reported pay for members with less than 12 contributing months was annualized by the ratio of 12 to the number of contributing months in the year.
Pay Increase Timing:	Beginning of (calendar) year for most people. Middle of calendar year for teachers.
Service Credit Accruals:	It is assumed that members accrue one year of service credit per year.
Variable Excess Benefits:	These benefits are valued by increasing the otherwise calculated liabilities by an amount equal to twice the value of the variable excess. (The variable excess is the difference between the variable account and the variable at core account, summed over all participants.)

SECTION G

PLAN PROVISIONS

Summary of Benefit Provisions Evaluated
December 31, 2020 **Actuarial Valuation**

Normal Retirement Eligibility

The age a participant becomes eligible for an unreduced age and service annuity is:

General, Public School, and University		Protective		Executive & Elected#	
Age	**Service**	**Age**	**Service**	**Age**	**Service**
65	Any*	54	Any*	62	Any*
57	30	53	25	57	30

* *Participants first employed after 1989 and terminated before April 24, 1998 must have creditable service in five calendar years.*

\# *These conditions apply to those people hired on or before December 31, 2016. For others, the General eligibility conditions apply.*

Normal Retirement Annuity

The age and service annuity payable at Normal Retirement Age is based on Final Average Earnings (FAE) and Creditable Service (CS) as follows:

Multiplier for Service Rendered			
Before 2000	**Between 2000 and 2011**	**After 2011**	**Group**
2.165%	2.0%	1.6%	Executive group and elected officials
2.165%	2.0%	2.0%	Protective occupation participants covered by Social Security
2.665%	2.5%	2.5%	Protective occupation participants not covered by Social Security
1.765%	1.6%	1.6%	All other participants

FAE is generally the average of the three highest years of earnings (July 1 - June 30 for teachers, educational support staff, and judges; calendar year for others) preceding retirement. These years do not have to be consecutive. For legislators and state constitutional officers who are ineligible to receive pay increases during their term, FAE is the statutory rate of earnings at termination.

Maximum formula annuity is 85% of FAE for protective occupation participants not covered by Social Security, 65% of FAE for protectives covered by Social Security, and 70% for all other participants. If greater than the formula amount, an annuity equal to the actuarial equivalent of two times the required accumulated contributions is paid in lieu of the formula amount (i.e., the Money Purchase Minimum).

Reduced Retirement. Any participant who has attained age 55 and any Protective occupation participant who has attained age 50 may apply for a reduced retirement annuity. The benefit is reduced 0.4% for each month that the annuity effective date precedes the Normal Retirement Age. For Non-Protective participants terminating after 6/30/90, the 0.4% is reduced for months after the attainment of age 57 and before the annuity effective date by .001111% for each month of creditable service.

Voluntary Termination Before Immediate Benefit Eligibility. Participant may either (i) receive a refund of accumulated contributions, or (ii) leave contributions on deposit and apply for a retirement annuity on or after the minimum retirement age based upon age and accrued service at time of termination.

Post-Retirement Adjustments. Annuities are increased annually if the investment income credited to retired life funds is in excess of the assumed benefit rate (presently 5%), other plan experiences are within projected ranges, and the resulting adjustment would be at least 0.5% (2.0% for the variable fund).

Disability Benefits. Generally, disability means the inability to engage in any substantial gainful activity by reason of a medically determinable physical or mental impairment which can be expected to result in death or to be of long-continued and indefinite duration. Disability applicants must be participating employees who are under normal retirement age, have not already taken a WRS benefit and who meet a service requirement.

For this purpose, **normal retirement age** is:

- 65 for general employees and executives and elected officials hired after December 31, 2016
- 62 for executives and elected officials hired on or before December 31, 2016
- 53 for protective occupation employees with 25 or more years of creditable service
- 54 for other protective occupation employees

The **service requirement** is that during the seven years preceding application the individual must have earned:

- At least 6 months of service credit in five of those years or
- A total of five years of service credit.

The service credit requirement may be waived if the disability is work related.

Protective occupation employees who become disabled between the ages of 50 and 55, who have at least 15 years of service, and who can no longer perform the duties of their position may apply for a special disability benefit until age 55.

Disability Amount: The disability benefit is the WRS formula benefit based upon service projected to normal retirement age as described above, without regard to the reduced retirement reduction.

Death-in-Service.

(a) Prior to age 50 for Protective participants, age 55 for others, the benefit is the equivalent of twice the accumulated employee contributions required and all additional contributions and employer amounts contributed prior to 1974 for teachers, or 1966 for others.

(b) After age 50 for Protective participants, age 55 for others, the benefit is the amount that would have been paid if participant had retired and elected 100% survivor option. Benefit is payable to an eligible beneficiary who must be a natural living person. If there is no eligible beneficiary, a refund of contributions is paid to the estate.

Interest Credits. For years after 1999, and for people with some active service after 1999, participant core accounts (including the variable at core accounts) are credited with interest at the full (core) effective rate. For others, accounts are credited with interest as follows:

	Rate Credited for Purpose of	
Date of Participation	**Money Purchase Minimum**	**Refunds**
Prior to 1982	Actual	Actual
January 1, 1982 & Later	5%	3%

Participant variable accounts are credited with interest based on the earnings in the variable portfolio.

Contribution Rates. The financial objective of WRS is to establish and receive contributions that will remain level from year to year and decade to decade.

Statutory required participant contributions prior to July 1, 2011 were as follows:

General, Public School, and University	5.0%
Executives & Elected Officials	5.5
Protectives	
- With Social Security	6.0
- Without Social Security	8.0

Statutory required participant contributions after July 1, 2011 are set equal to one-half of the actuarially determined rate for General participants and Executive and Elected Officials. Participant contributions for Protective participants are set equal to the participant contribution for General members.

Normal Form of Benefit. The normal form of benefit is a straight life annuity with no death benefits. Optional forms of benefit which are actuarially reduced are listed below:

- A life annuity with 60 or 180 monthly payments guaranteed.
- A joint survivorship annuity with 75% continued to beneficiary.
- A joint survivorship annuity with 100% continued to beneficiary.
- A joint survivorship annuity reduced 25% upon either your death or your beneficiary's death.
- A joint survivorship annuity with 100% continued to beneficiary combined with 180 monthly payments guaranteed.

For formula benefit calculations, optional forms are calculated at the lower of the current age or age 62 (Normal Retirement Age for Protective occupations). If a retiree (and beneficiary if in receipt of a joint survivorship annuity) dies prior to receiving benefits which, in total, are at least equal to the members contributions, a "residual refund" for the difference is paid.

Vesting. Participants hired prior to July 1, 2011 vest immediately. After July 1, 2011, participants vest after five years of service.

SECTION H

GAIN/LOSS STATISTICAL SUMMARY

General Males
Withdrawal Experience
During Calendar Year 2020

Male Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	443	2,389	0.1854	0.1700	406
2	597	4,285	0.1393	0.1230	527
3	339	3,525	0.0962	0.0930	328
4	250	3,279	0.0762	0.0760	249
5	177	2,784	0.0636	0.0750	209
6	152	2,653	0.0573	0.0580	154
7	126	2,317	0.0544	0.0480	111
8	109	2,039	0.0535	0.0470	96
9	85	1,920	0.0443	0.0410	79
10	39	1,384	0.0282	0.0400	55
Totals	2,317	26,575	0.0872	0.0833	2,214

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Male Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	4	0.0000	0.0400	-
30-34	4	234	0.0171	0.0350	8
35-39	39	1,297	0.0301	0.0260	34
40-44	54	2,235	0.0242	0.0230	51
45-49	56	2,848	0.0197	0.0180	51
50-54	82	4,098	0.0200	0.0160	66
Over 54	114	10,078	0.0113		114
Totals	349	20,794	0.0168	0.0156	324

General Females
Withdrawal Experience
During Calendar Year 2020

Female Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	1,209	5,850	0.2067	0.2000	1,170
2	1,545	9,796	0.1577	0.1500	1,469
3	886	7,279	0.1217	0.1150	837
4	631	6,546	0.0964	0.1000	655
5	418	5,271	0.0793	0.0950	501
6	410	4,680	0.0876	0.0780	365
7	269	4,098	0.0656	0.0700	287
8	234	3,545	0.0660	0.0600	213
9	162	3,137	0.0516	0.0570	179
10	133	2,548	0.0522	0.0530	135
Totals	5,897	52,750	0.1118	0.1102	5,811

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Female Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	1	2	0.5000	0.0500	-
30-34	17	365	0.0466	0.0450	16
35-39	66	1,942	0.0340	0.0350	68
40-44	95	3,312	0.0287	0.0300	99
45-49	124	4,127	0.0300	0.0250	103
50-54	143	6,081	0.0235	0.0200	122
Over 54	270	17,639	0.0153		270
Totals	716	33,468	0.0214	0.0203	678

Public Schools Males
Withdrawal Experience
During Calendar Year 2020

Male Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	54	513	0.1053	0.1850	95
2	101	904	0.1117	0.1100	99
3	85	916	0.0928	0.0800	73
4	50	883	0.0566	0.0650	57
5	35	829	0.0422	0.0550	46
6	31	860	0.0360	0.0400	34
7	27	811	0.0333	0.0350	28
8	26	820	0.0317	0.0320	26
9	22	778	0.0283	0.0300	23
10	10	657	0.0152	0.0280	18
Totals	441	7,971	0.0553	0.0626	499

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Male Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	-	N/A	0.0250	-
30-34	4	147	0.0272	0.0200	3
35-39	16	1,382	0.0116	0.0160	22
40-44	27	2,379	0.0113	0.0150	36
45-49	41	2,737	0.0150	0.0140	38
50-54	42	2,825	0.0149	0.0130	37
Over 54	24	3,042	0.0079		24
Totals	154	12,512	0.0123	0.0128	160

Public Schools Females
Withdrawal Experience
During Calendar Year 2020

Female Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	140	1,508	0.0928	0.1500	226
2	249	2,914	0.0854	0.1100	321
3	247	2,901	0.0851	0.0800	232
4	171	2,726	0.0627	0.0600	164
5	159	2,558	0.0622	0.0550	141
6	134	2,764	0.0485	0.0500	138
7	127	2,711	0.0468	0.0400	108
8	97	2,504	0.0387	0.0370	93
9	88	2,276	0.0387	0.0330	75
10	68	1,973	0.0345	0.0300	59
Totals	1,480	24,835	0.0596	0.0627	1,557

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Female Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	-	N\A	0.0250	-
30-34	11	464	0.0237	0.0230	11
35-39	87	4,269	0.0204	0.0170	73
40-44	108	6,238	0.0173	0.0140	87
45-49	103	6,600	0.0156	0.0130	86
50-54	90	7,446	0.0121	0.0120	89
Over 54	93	8,270	0.0112		93
Totals	492	33,287	0.0148	0.0132	439

University Males
Withdrawal Experience
During Calendar Year 2020

Male Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	67	411	0.1630	0.1600	66
2	123	767	0.1604	0.1500	115
3	104	743	0.1400	0.1300	97
4	62	637	0.0973	0.1100	70
5	49	570	0.0860	0.0900	51
6	50	475	0.1053	0.0800	38
7	33	503	0.0656	0.0750	38
8	22	489	0.0450	0.0600	29
9	15	434	0.0346	0.0550	24
10	12	372	0.0323	0.0500	19
Totals	537	5,401	0.0994	0.1013	547

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Male Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	-	N/A	0.0500	-
30-34	1	21	0.0476	0.0450	1
35-39	9	187	0.0481	0.0400	7
40-44	9	492	0.0183	0.0300	15
45-49	19	764	0.0249	0.0250	19
50-54	26	966	0.0269	0.0200	19
Over 54	16	2,439	0.0066		16
Totals	80	4,869	0.0164	0.0158	77

University Females
Withdrawal Experience
During Calendar Year 2020

Female Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	72	520	0.1385	0.1450	75
2	139	987	0.1408	0.1400	138
3	126	1,023	0.1232	0.1300	133
4	102	917	0.1112	0.1000	92
5	60	768	0.0781	0.0950	73
6	39	701	0.0556	0.0900	63
7	47	660	0.0712	0.0700	46
8	34	621	0.0548	0.0600	37
9	22	532	0.0414	0.0500	27
10	21	491	0.0428	0.0400	20
Totals	662	7,220	0.0917	0.0975	704

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Female Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	-	N/A	0.0400	-
30-34	3	64	0.0469	0.0400	3
35-39	10	360	0.0278	0.0400	14
40-44	28	738	0.0379	0.0350	26
45-49	26	887	0.0293	0.0300	27
50-54	43	1,030	0.0417	0.0250	26
Over 54	9	2,271	0.0040		9
Totals	119	5,350	0.0222	0.0196	105

Protective with Social Security
Withdrawal Experience
During Calendar Year 2020

Male and Female Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	162	734	0.2207	0.1600	117
2	203	1,455	0.1395	0.0950	138
3	84	1,168	0.0719	0.0600	70
4	60	1,146	0.0524	0.0500	57
5	44	1,014	0.0434	0.0450	46
6	29	821	0.0353	0.0400	33
7	29	807	0.0359	0.0375	30
8	18	686	0.0262	0.0350	24
9	22	650	0.0338	0.0300	20
10	15	489	0.0307	0.0250	12
Totals	666	8,970	0.0742	0.0610	547

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Male and Female Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	-	N\A	0.0250	-
30-34	12	400	0.0300	0.0220	9
35-39	28	1,691	0.0166	0.0180	30
40-44	34	2,181	0.0156	0.0150	33
45-49	32	2,575	0.0124	0.0130	33
50-54	20	2,422	0.0083	0.0120	29
Totals	126	9,269	0.0136	0.0145	134

Protective without Social Security
Withdrawal Experience
During Calendar Year 2020

Male and Female Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	4	31	0.1290	0.0400	1
2	3	101	0.0297	0.0350	4
3	1	130	0.0077	0.0150	2
4	-	108	0.0000	0.0130	1
5	4	114	0.0351	0.0120	1
6	2	113	0.0177	0.0110	1
7	3	116	0.0259	0.0100	1
8	1	110	0.0091	0.0090	1
9	2	95	0.0211	0.0080	1
10	-	92	0.0000	0.0070	1
Totals	20	1,010	0.0198	0.0139	14

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Male and Female Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	1	0.0000	0.0070	-
30-34	2	76	0.0263	0.0070	1
35-39	1	245	0.0041	0.0065	2
40-44	1	372	0.0027	0.0060	2
45-49	4	437	0.0092	0.0055	2
50-54	6	424	0.0142	0.0050	2
Totals	14	1,555	0.0090	0.0058	9

Executive and Elected
Withdrawal Experience
During Calendar Year 2020

Male and Female Service-Based Withdrawals
All Ages

Service Index	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
1	4	25	0.1600	0.1400	4
2	16	100	0.1600	0.1300	13
3	5	51	0.0980	0.1200	6
4	11	75	0.1467	0.1000	8
5	3	42	0.0714	0.1000	4
6	4	72	0.0556	0.0500	4
7	1	29	0.0345	0.0500	1
8	2	61	0.0328	0.0500	3
9	3	46	0.0652	0.0500	2
10	-	56	0.0000	0.0500	3
Totals	49	557	0.0880	0.0862	48

Service index 1 corresponds to service between 0 and 1 years, service index 2 corresponds to service between 1 and 2 years of service, etc. As such, service index 10 corresponds to service between 9 and 10 years of service.

Male and Female Age-Based Withdrawals
10+ Years of Service

Age	Withdrawals	Exposure	Crude Rates	Current Rates	Expected Withdrawals
25-29	-	-	N/A	0.0500	-
30-34	-	2	0.0000	0.0500	-
35-39	-	13	0.0000	0.0500	1
40-44	-	47	0.0000	0.0500	2
45-49	-	73	0.0000	0.0450	3
50-54	2	123	0.0163	0.0400	5
Over 54	5	425	0.0118		5
Totals	7	683	0.0102	0.0234	16

General
Disability Experience
During Calendar Year 2020

Male Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0000	-
20-24	-	13	0.0000	0.0000	-
25-29	-	586	0.0000	0.0000	-
30-34	-	2,278	0.0000	0.0000	-
35-39	1	3,425	0.0003	0.0001	-
40-44	1	3,809	0.0003	0.0003	1
45-49	6	4,211	0.0014	0.0004	2
50-54	8	5,408	0.0015	0.0012	6
55-59	18	5,375	0.0033	0.0021	11
60-64	21	3,811	0.0055	0.0041	16
65-69	-	-	N\A	0.0016	-
70-74	-	-	N\A	0.0014	-
75 and over	-	-	N/A	0.0014	-
Totals	55	28,916	0.0019	0.0012	36

Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0000	-
20-24	-	10	0.0000	0.0000	-
25-29	-	897	0.0000	0.0000	-
30-34	-	3,515	0.0000	0.0002	1
35-39	2	4,935	0.0004	0.0002	1
40-44	1	5,897	0.0002	0.0003	2
45-49	5	6,747	0.0007	0.0004	3
50-54	16	9,065	0.0018	0.0008	7
55-59	14	10,131	0.0014	0.0014	15
60-64	30	7,562	0.0040	0.0018	14
65-69	-	-	N\A	0.0014	-
70-74	-	-	N\A	0.0012	-
75 and over	-	-	N/A	0.0012	-
Totals	68	48,759	0.0014	0.0009	43

The people shown on this page are cases involving §40.63 disability benefits and includes those who were either active or inactive with pending benefits at the beginning of the year.

Public Schools
Disability Experience
During Calendar Year 2020

Male Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0000	-
20-24	-	-	N/A	0.0000	-
25-29	-	310	0.0000	0.0000	-
30-34	-	1,695	0.0000	0.0000	-
35-39	-	2,336	0.0000	0.0000	-
40-44	-	2,923	0.0000	0.0001	-
45-49	1	3,104	0.0003	0.0003	1
50-54	1	3,075	0.0003	0.0010	3
55-59	7	1,818	0.0039	0.0013	2
60-64	4	655	0.0061	0.0023	2
65-69	-	-	N\A	0.0032	-
70-74	-	-	N\A	0.0034	-
75 and over	-	-	N/A	0.0034	-
Totals	13	15,916	0.0008	0.0005	8

Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0001	-
20-24	-	1	0.0000	0.0001	-
25-29	-	1,374	0.0000	0.0001	-
30-34	-	5,643	0.0000	0.0001	-
35-39	-	6,844	0.0000	0.0001	-
40-44	1	7,694	0.0001	0.0002	1
45-49	5	7,736	0.0006	0.0006	5
50-54	10	8,306	0.0012	0.0008	7
55-59	18	4,985	0.0036	0.0013	6
60-64	7	2,051	0.0034	0.0018	4
65-69	-	-	N\A	0.0010	-
70-74	-	-	N\A	0.0008	-
75 and over	-	-	N/A	0.0008	-
Totals	41	44,634	0.0009	0.0005	23

The people shown on this page are cases involving §40.63 disability benefits and includes those who were either active or inactive with pending benefits at the beginning of the year.

University
Disability Experience
During Calendar Year 2020

Male Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0000	-
20-24	-	-	N/A	0.0000	-
25-29	-	48	0.0000	0.0000	-
30-34	-	357	0.0000	0.0000	-
35-39	1	765	0.0013	0.0000	-
40-44	-	1,073	0.0000	0.0000	-
45-49	-	1,116	0.0000	0.0001	-
50-54	-	1,226	0.0000	0.0002	-
55-59	2	1,006	0.0020	0.0006	1
60-64	1	784	0.0013	0.0005	-
65-69	-	-	N\A	0.0007	-
70-74	-	-	N\A	0.0006	-
75 and over	-	-	N/A	0.0006	-
Totals	4	6,375	0.0006	0.0002	1

Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0000	-
20-24	-	-	N/A	0.0000	-
25-29	-	103	0.0000	0.0000	-
30-34	-	639	0.0000	0.0000	-
35-39	-	1,120	0.0000	0.0002	-
40-44	2	1,418	0.0014	0.0003	-
45-49	-	1,307	0.0000	0.0002	-
50-54	1	1,346	0.0007	0.0005	1
55-59	4	1,233	0.0032	0.0007	1
60-64	-	753	0.0000	0.0011	1
65-69	-	-	N\A	0.0007	-
70-74	-	-	N\A	0.0006	-
75 and over	-	-	N/A	0.0006	-
Totals	7	7,919	0.0009	0.0004	3

The people shown on this page are cases involving §40.63 disability benefits and includes those who were either active or inactive with pending benefits at the beginning of the year.

Protective without Social Security
Disability Experience
During Calendar Year 2020

Male and Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0003	-
20-24	-	-	N/A	0.0003	-
25-29	-	99	0.0000	0.0003	-
30-34	-	322	0.0000	0.0003	-
35-39	1	412	0.0024	0.0003	-
40-44	-	425	0.0000	0.0005	-
45-49	1	454	0.0022	0.0010	-
50-54	2	311	0.0064	0.0070	2
55-59	-	-	N\A	0.0010	-
60-64	-	-	N\A	0.0010	-
65-69	-	-	N/A	0.0010	-
70-74	-	-	N/A	0.0010	-
75 and over	-	-	N/A	0.0010	-
Totals	4	2,023	0.0020	0.0010	2

The people shown on this page are cases involving §40.63 disability benefits and includes those who were either active or inactive with pending benefits at the beginning of the year.

Protective with Social Security
Disability Experience
During Calendar Year 2020

Male and Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0001	-
20-24	-	3	0.0000	0.0001	-
25-29	-	754	0.0000	0.0001	-
30-34	-	1,988	0.0000	0.0001	-
35-39	2	2,516	0.0008	0.0001	-
40-44	5	2,537	0.0020	0.0002	-
45-49	3	2,790	0.0011	0.0003	1
50-54	6	1,972	0.0030	0.0005	1
55-59	-	-	N\A	0.0098	-
60-64	-	-	N\A	0.0105	-
65-69	-	-	N\A	0.0007	-
70-74	-	-	N/A	0.0007	-
75 and over	-	-	N/A	0.0007	-
Totals	16	12,560	0.0013	0.0002	2

The people shown on this page are cases involving §40.63 disability benefits and includes those who were either active or inactive with pending benefits at the beginning of the year.

Executive and Elected
Disability Experience
During Calendar Year 2020

Male and Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Current Rates	Expected Disabilities
Under 20	-	-	N/A	0.0000	-
20-24	-	-	N/A	0.0000	-
25-29	-	1	0.0000	0.0000	-
30-34	-	21	0.0000	0.0000	-
35-39	-	42	0.0000	0.0001	-
40-44	-	73	0.0000	0.0001	-
45-49	-	106	0.0000	0.0002	-
50-54	-	171	0.0000	0.0003	-
55-59	-	182	0.0000	0.0012	-
60-64	-	58	0.0000	0.0011	-
65-69	-	-	N\A	0.0009	-
70-74	-	-	N\A	0.0009	-
75 and over	-	-	N/A	0.0009	-
Totals	-	654	N/A	N/A	-

The people shown on this page are cases involving §40.63 disability benefits and includes those who were either active or inactive with pending benefits at the beginning of the year.

General
Pay Increase Assumption
During Calendar Year 2020

Service-Based Pay Increase Experience

Service Group		Total % Increase	
Beginning of Year	Number	Actual	Expected
1-5	43,886	10.41 %	6.45 %
6-10	25,979	5.07 %	4.90 %
11-15	15,896	4.66 %	4.25 %
16-20	12,916	4.09 %	4.00 %
21-25	9,870	4.29 %	3.75 %
26-30	5,715	4.18 %	3.50 %
31-35	3,050	4.15 %	3.30 %
36-40	1,033	3.68 %	3.20 %
Over 40	367	4.22 %	3.10 %
Total	118,712		

Public Schools
Pay Increase Assumption
During Calendar Year 2020

Service-Based Pay Increase Experience

Service Group		Total % Increase	
Beginning of Year	Number	Actual	Expected
1-5	15,273	10.74 %	8.60 %
6-10	15,397	5.07 %	6.40 %
11-15	11,701	4.46 %	5.10 %
16-20	11,855	3.40 %	4.00 %
21-25	10,250	2.58 %	3.35 %
26-30	6,168	2.09 %	3.20 %
31-35	2,465	1.78 %	3.15 %
36-40	366	1.64 %	3.10 %
Over 40	58	1.91 %	3.05 %
Total	73,533		

University
Pay Increase Assumption
During Calendar Year 2020

Service-Based Pay Increase Experience

Service Group		Total % Increase	
Beginning of Year	Number	Actual	Expected
1-5	6,363	16.08 %	6.00 %
6-10	4,895	3.49 %	5.50 %
11-15	3,272	3.13 %	5.00 %
16-20	2,633	2.41 %	4.50 %
21-25	1,784	1.64 %	3.95 %
26-30	937	2.09 %	3.80 %
31-35	545	1.80 %	3.60 %
36-40	210	1.37 %	3.20 %
Over 40	89	2.00 %	3.10 %
Total	20,728		

Protective with Social Security
Pay Increase Assumption
During Calendar Year 2020

Male and Female Service-Based Pay Increase Experience

Service Group		Total % Increase	
Beginning of Year	Number	Actual	Expected
1-5	4,871	19.93 %	7.75 %
6-10	3,296	7.91 %	4.50 %
11-15	2,726	7.37 %	3.90 %
16-20	2,805	7.85 %	3.80 %
21-25	2,647	7.69 %	3.70 %
26-30	1,269	7.18 %	3.60 %
31-35	231	6.19 %	3.50 %
36-40	42	4.26 %	3.40 %
Over 40	13	4.31 %	3.20 %
Total	17,900		

Protective without Social Security
Pay Increase Assumption
During Calendar Year 2020

Male and Female Service-Based Pay Increase Experience

Service Group		Total % Increase	
Beginning of Year	Number	Actual	Expected
1-5	465	17.07 %	8.50 %
6-10	515	6.37 %	4.30 %
11-15	466	5.70 %	3.60 %
16-20	396	5.52 %	3.50 %
21-25	478	4.99 %	3.40 %
26-30	229	5.95 %	3.30 %
31-35	52	4.89 %	3.20 %
36-40	4	4.97 %	3.10 %
Over 40	1	N/A	3.05 %
Total	2,606		

Executive and Elected
Pay Increase Assumption
During Calendar Year 2020

Service-Based Pay Increase Experience

Service Group		Total % Increase	
Beginning of Year	Number	Actual	Expected
1-5	276	14.67 %	5.50 %
6-10	256	5.86 %	3.20 %
11-15	144	4.80 %	3.20 %
16-20	142	5.30 %	3.20 %
21-25	135	4.88 %	3.20 %
26-30	103	4.65 %	3.20 %
31-35	60	5.10 %	3.20 %
36-40	37	4.00 %	3.20 %
Over 40	17	4.75 %	3.20 %
Total	1,170		

General Males
Normal Retirement Experience
During Calendar Year 2020

Male Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	41	223	0.1839	0.1900	42
58	44	211	0.2085	0.1900	40
59	29	275	0.1055	0.1900	52
60	58	258	0.2248	0.1900	49
61	47	214	0.2196	0.1900	41
62	76	233	0.3262	0.2600	61
63	50	175	0.2857	0.2900	51
64	31	149	0.2081	0.2800	42
65	155	653	0.2374	0.3000	196
66	154	531	0.2900	0.3500	186
67	106	332	0.3193	0.3000	100
68	50	249	0.2008	0.1900	47
69	29	198	0.1465	0.1900	38
70	22	160	0.1375	0.1900	30
71	17	111	0.1532	0.1900	21
72	8	80	0.1000	0.1900	15
73	10	84	0.1190	0.1900	16
74	7	47	0.1489	0.1900	9
Totals	934	4,183	0.2233	0.2477	1,036
75 & Over	19	190			190
Totals	953	4,373			1,226

General Males
Reduced Retirement Experience
During Calendar Year 2020

Male Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	44	1,180	0.0373	0.0800	94
56	59	1,234	0.0478	0.0800	99
57	32	953	0.0336	0.0480	46
58	50	1,044	0.0479	0.0570	60
59	47	964	0.0488	0.0680	66
60	67	939	0.0714	0.0850	80
61	79	843	0.0937	0.0900	76
62	124	802	0.1546	0.1700	136
63	106	664	0.1596	0.1800	120
64	85	563	0.1510	0.1700	96
Totals	693	9,186	0.0754	0.0950	873

General Females
Normal Retirement Experience
During Calendar Year 2020

Female Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	65	297	0.2189	0.1700	50
58	60	302	0.1987	0.1700	51
59	49	278	0.1763	0.1700	47
60	62	294	0.2109	0.1700	50
61	66	297	0.2222	0.1700	50
62	68	278	0.2446	0.2700	75
63	73	239	0.3054	0.2700	65
64	47	184	0.2554	0.2700	50
65	342	1,205	0.2838	0.3000	362
66	236	795	0.2969	0.3500	278
67	137	523	0.2620	0.3000	157
68	72	352	0.2045	0.2500	88
69	41	278	0.1475	0.2500	70
70	48	195	0.2462	0.2500	49
71	33	154	0.2143	0.2000	31
72	21	113	0.1858	0.2000	23
73	16	90	0.1778	0.2000	18
74	10	76	0.1316	0.2000	15
Totals	1,446	5,950	0.2430	0.2570	1,529
75 & Over	33	239			239
Totals	1,479	6,189			1,768

General Females
Reduced Retirement Experience
During Calendar Year 2020

Female Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	71	2,127	0.0334	0.0700	149
56	85	2,179	0.0390	0.0700	153
57	71	1,953	0.0364	0.0550	107
58	88	1,923	0.0458	0.0650	125
59	114	1,949	0.0585	0.0700	136
60	148	1,899	0.0779	0.0950	180
61	152	1,742	0.0873	0.0950	165
62	260	1,511	0.1721	0.1600	242
63	238	1,367	0.1741	0.1800	246
64	184	1,043	0.1764	0.1800	188
Totals	1,411	17,693	0.0797	0.0956	1,691

Public School Males
Normal Retirement Experience
During Calendar Year 2020

Male Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	47	158	0.2975	0.3300	52
58	34	117	0.2906	0.2900	34
59	33	100	0.3300	0.2400	24
60	23	80	0.2875	0.2500	20
61	18	63	0.2857	0.2500	16
62	20	48	0.4167	0.3500	17
63	17	41	0.4146	0.3200	13
64	9	20	0.4500	0.2900	6
65	27	93	0.2903	0.2900	27
66	16	71	0.2254	0.3500	25
67	14	55	0.2545	0.3300	18
68	12	50	0.2400	0.2700	14
69	9	44	0.2045	0.2300	10
70	8	30	0.2667	0.2500	8
71	4	21	0.1905	0.2000	4
72	3	15	0.2000	0.1500	2
73	3	12	0.2500	0.1500	2
74	2	10	0.2000	0.1500	2
Totals	299	1,028	0.2909	0.2860	294
75 & Over	4	33			33
Totals	303	1,061			327

Public School Males
Reduced Retirement Experience
During Calendar Year 2020

Male Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	72	615	0.1171	0.1300	80
56	50	497	0.1006	0.1300	65
57	28	253	0.1107	0.1200	30
58	18	239	0.0753	0.1300	31
59	19	214	0.0888	0.1400	30
60	37	176	0.2102	0.1400	25
61	20	158	0.1266	0.1500	24
62	32	147	0.2177	0.2100	31
63	17	97	0.1753	0.2100	20
64	12	77	0.1558	0.2100	16
Totals	305	2,473	0.1233	0.1423	352

Public School Females
Normal Retirement Experience
During Calendar Year 2020

Female Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	94	352	0.2670	0.2700	95
58	87	291	0.2990	0.2700	79
59	56	239	0.2343	0.2700	65
60	76	202	0.3762	0.2700	55
61	64	193	0.3316	0.2700	52
62	34	97	0.3505	0.3700	36
63	35	104	0.3365	0.3000	31
64	21	58	0.3621	0.2800	16
65	84	244	0.3443	0.3700	90
66	67	169	0.3964	0.3900	66
67	30	106	0.2830	0.3300	35
68	31	95	0.3263	0.3000	29
69	14	69	0.2029	0.2800	19
70	8	40	0.2000	0.3800	15
71	8	44	0.1818	0.2000	9
72	5	21	0.2381	0.2000	4
73	6	21	0.2857	0.2000	4
74	3	15	0.2000	0.2000	3
Totals	723	2,360	0.3064	0.2979	703
75 & Over	5	40			40
Totals	728	2,400			743

Public School Females
Reduced Retirement Experience
During Calendar Year 2020

Female Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	128	1,501	0.0853	0.1200	180
56	157	1,327	0.1183	0.1200	159
57	77	810	0.0951	0.1200	97
58	77	718	0.1072	0.1200	86
59	76	629	0.1208	0.1300	82
60	86	596	0.1443	0.1700	101
61	78	481	0.1622	0.1700	82
62	92	429	0.2145	0.2300	99
63	65	295	0.2203	0.2300	68
64	58	250	0.2320	0.2300	58
Totals	894	7,036	0.1271	0.1438	1,012

University Males
Normal Retirement Experience
During Calendar Year 2020

Male Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	2	13	0.1538	0.1200	2
58	8	31	0.2581	0.1200	4
59	-	22	0.0000	0.1200	3
60	4	26	0.1538	0.1200	3
61	3	33	0.0909	0.1200	4
62	4	39	0.1026	0.1200	5
63	7	61	0.1148	0.1200	7
64	4	43	0.0930	0.1200	5
65	22	177	0.1243	0.1500	27
66	37	152	0.2434	0.2000	30
67	24	115	0.2087	0.2000	23
68	18	93	0.1935	0.1800	17
69	14	87	0.1609	0.1600	14
70	13	65	0.2000	0.2000	13
71	15	52	0.2885	0.1800	9
72	5	34	0.1471	0.1600	5
73	6	30	0.2000	0.1600	5
74	6	26	0.2308	0.1600	4
Totals	192	1,099	0.1747	0.1638	180
75 & Over	16	81			81
Totals	208	1,180			261

University Males
Reduced Retirement Experience
During Calendar Year 2020

Male Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	5	221	0.0226	0.0300	7
56	7	243	0.0288	0.0300	7
57	5	204	0.0245	0.0300	6
58	7	168	0.0417	0.0300	5
59	9	170	0.0529	0.0400	7
60	9	172	0.0523	0.0550	9
61	7	178	0.0393	0.0550	10
62	11	156	0.0705	0.0740	12
63	15	152	0.0987	0.0740	11
64	16	126	0.1270	0.1000	13
Totals	91	1,790	0.0508	0.0486	87

University Females
Normal Retirement Experience
During Calendar Year 2020

Female Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	2	25	0.0800	0.1500	4
58	7	27	0.2593	0.1500	4
59	7	26	0.2692	0.1000	3
60	7	24	0.2917	0.1200	3
61	5	39	0.1282	0.1600	6
62	4	33	0.1212	0.1500	5
63	13	37	0.3514	0.2000	7
64	7	36	0.1944	0.2000	7
65	27	140	0.1929	0.2000	28
66	25	113	0.2212	0.2400	27
67	34	77	0.4416	0.2000	15
68	16	68	0.2353	0.1700	12
69	15	50	0.3000	0.1700	9
70	12	43	0.2791	0.1800	8
71	7	25	0.2800	0.1800	5
72	4	19	0.2105	0.1800	3
73	5	19	0.2632	0.1500	3
74	2	15	0.1333	0.1500	2
Totals	199	816	0.2439	0.1850	151
75 & Over	7	30			30
Totals	206	846			181

University Females
Reduced Retirement Experience
During Calendar Year 2020

Female Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	13	283	0.0459	0.0500	14
56	9	293	0.0307	0.0500	15
57	17	227	0.0749	0.0500	11
58	9	231	0.0390	0.0500	12
59	7	199	0.0352	0.0500	10
60	14	195	0.0718	0.0900	18
61	17	177	0.0960	0.0900	16
62	18	131	0.1374	0.1200	16
63	18	143	0.1259	0.1200	17
64	12	107	0.1121	0.1500	16
Totals	134	1,986	0.0675	0.0730	145

Protective with Social Security
Normal Retirement Experience
During Calendar Year 2020

Male and Female Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
50	37	512	0.0723	0.0600	31
51	35	424	0.0825	0.0800	34
52	54	388	0.1392	0.1000	39
53	118	358	0.3296	0.2500	90
54	73	319	0.2288	0.2000	64
55	41	266	0.1541	0.2000	53
56	30	193	0.1554	0.2000	39
57	28	178	0.1573	0.2000	36
58	28	168	0.1667	0.2000	34
59	23	138	0.1667	0.2000	28
60	17	112	0.1518	0.2000	22
61	18	84	0.2143	0.2000	17
62	20	79	0.2532	0.3000	24
63	10	57	0.1754	0.3000	17
64	20	52	0.3846	0.3000	16
65	14	41	0.3415	0.4000	16
66	7	25	0.2800	0.4000	10
67	7	19	0.3684	0.4000	8
68	-	5	0.0000	0.4000	2
69	2	6	0.3333	0.4000	2
70	2	3	0.6667	1.0000	3
71	1	1	1.0000	1.0000	1
72	1	2	0.5000	1.0000	2
73	1	3	0.3333	1.0000	3
74	-	1	0.0000	1.0000	1
Totals	587	3,434	0.1709	0.1724	592
75 & Over	1	4			4
Totals	588	3,438			596

Protective without Social Security
Normal Retirement Experience
During Calendar Year 2020

Male and Female Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
50	3	76	0.0395	0.0200	2
51	5	92	0.0543	0.0400	4
52	5	57	0.0877	0.0400	2
53	10	57	0.1754	0.1700	10
54	20	79	0.2532	0.2300	18
55	13	54	0.2407	0.2500	14
56	15	42	0.3571	0.2500	11
57	5	20	0.2500	0.2500	5
58	6	28	0.2143	0.3300	9
59	5	14	0.3571	0.3300	5
60	2	11	0.1818	0.2000	2
61	3	9	0.3333	0.2000	2
62	2	6	0.3333	0.4000	2
63	3	6	0.5000	0.4000	2
64	1	2	0.5000	0.4000	1
65	1	2	0.5000	0.4000	1
66	-	-	N/A	1.0000	-
67	1	2	0.5000	1.0000	2
68	-	-	N/A	1.0000	-
69	-	1	0.0000	1.0000	1
70	-	-	N/A	1.0000	-
71	-	-	N/A	1.0000	-
72	-	-	N/A	1.0000	-
73	-	-	N/A	1.0000	-
74	-	-	N/A	1.0000	-
Totals	100	558	0.1792	0.1667	93
75 & Over	-	-	N/A		-
Totals	100	558			93

Executive and Elected
Normal Retirement Experience
During Calendar Year 2020

Male and Female Age-Based Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
57	1	6	0.1667	0.0800	-
58	1	6	0.1667	0.0800	-
59	1	10	0.1000	0.0800	1
60	1	16	0.0625	0.2000	3
61	1	13	0.0769	0.1200	2
62	7	49	0.1429	0.1200	6
63	3	32	0.0938	0.1200	4
64	3	26	0.1154	0.1500	4
65	2	22	0.0909	0.1500	3
66	5	30	0.1667	0.1500	5
67	2	18	0.1111	0.1500	3
68	4	21	0.1905	0.1500	3
69	2	15	0.1333	0.2000	3
70	3	17	0.1765	0.2000	3
71	-	8	0.0000	0.2000	2
72	-	9	0.0000	0.2000	2
73	2	13	0.1538	0.2000	3
74	2	6	0.3333	0.2000	1
Totals	40	317	0.1262	0.1514	48
75 & Over	4	34			34
Totals	44	351			82

Executive and Elected
Reduced Retirement Experience
During Calendar Year 2020

Male and Female Age-Based Reduced Retirement Experience

Age	Retirements	Exposure	Crude Rates	Current Rates	Expected Retirements
55	-	40	0.0000	0.0300	1
56	2	37	0.0541	0.0300	1
57	-	32	0.0000	0.0300	1
58	1	37	0.0270	0.0300	1
59	2	36	0.0556	0.0300	1
60	5	36	0.1389	0.0500	2
61	1	22	0.0455	0.0500	1
62	-	9	0.0000	0.0200	-
63	-	11	0.0000	0.0200	-
64	-	10	0.0000	0.0200	-
Over 64	1	63	0.0159		
Totals	12	333			8

Death-in-Service
During Calendar Year 2020

Male

Age	Deaths	Exposure	Crude Rates	Current Rates	Expected Deaths
Under 20	-	24	0.0000	0.0001	-
20-24	-	1,890	0.0000	0.0001	-
25-29	2	7,704	0.0003	0.0002	1
30-34	1	10,782	0.0001	0.0003	3
35-39	2	12,518	0.0002	0.0004	6
40-44	3	12,834	0.0002	0.0005	7
45-49	7	13,034	0.0005	0.0007	9
50-54	12	13,944	0.0009	0.0011	16
55-59	12	11,922	0.0010	0.0023	27
60-64	11	8,265	0.0013	0.0030	25
65-69	5	3,088	0.0016	0.0051	16
70-74	2	821	0.0024	0.0081	7
75 and over	2	2	1.0000	0.0141	-
Totals	59	96,828	0.0006	0.0012	117

Female

Age	Deaths	Exposure	Crude Rates	Current Rates	Expected Deaths
Under 20	-	54	0.0000	0.0001	-
20-24	-	3,215	0.0000	0.0001	-
25-29	-	14,059	0.0000	0.0001	1
30-34	-	17,793	0.0000	0.0002	3
35-39	1	19,722	0.0001	0.0003	5
40-44	6	21,105	0.0003	0.0004	8
45-49	5	20,965	0.0002	0.0005	11
50-54	9	23,345	0.0004	0.0008	19
55-59	18	21,556	0.0008	0.0014	31
60-64	11	14,653	0.0008	0.0020	30
65-69	7	4,344	0.0016	0.0031	14
70-74	1	903	0.0011	0.0055	5
75 and over	2	-	N/A	0.0100	-
Totals	60	161,714	0.0004	0.0008	127

APPENDIX

GLOSSARY

Glossary

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

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

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

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

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

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

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

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

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

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

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

Glossary
(Concluded)

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

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