

Summary of Actuarial Assumptions and Methods

As of January 1, 2021



- a)** The actuarial valuation was prepared using the entry age actuarial cost method. As described in the certification letter, the contribution rates are set based on the board's funding policy, which states the contribution rate will not be less than the amount needed to amortize the unfunded actuarial accrued liability of each System over a 20-year period from the valuation date (January 1, 2020).

In calculating this minimum, amortization payments are designed to remain level as a percent of payroll, and payroll is assumed to increase 2.90% per year. Under this method, actuarial gains and losses are identified and amortized as part of the unfunded actuarial accrued liability over a period that does not exceed 20 years.

- b)** The future investment earnings of the assets of the Systems are assumed to accrue at an annual rate of 6.85%, compounded annually. This rate is made up of a 2.50% assumed inflation rate and a 4.35% assumed real rate of return. This assumption was adopted effective January 1, 2021.

- c)** The total rates of assumed annual salary increase are shown on the actuarial schedule on page 173. The rates include increases due to promotion and longevity and a 3.25% per annum rate of increase in the general wage level of the membership. Salaries of judges are assumed to increase at 3.25%. All of these assumptions were adopted effective January 1, 2020.

- d)** Post-retirement benefit increases are based on the consumer price index (CPI), limited by the provisions of each System. The increases are assumed to be 2.5% for all Systems. Increases are based on the member's original retirement allowance except in the Judges Retirement System where increases are compounded. For current retirees who have received cumulative COLAs less than the total of annual CPI increases since retirement, higher COLAs are assumed, subject to the annual maximum (2.5% or 4% for Public Safety and 4% for all other Systems), as long as the member has "banked" CPI increases remaining.

Summary of Actuarial Assumptions and Methods *(Continued)*

As of January 1, 2020

- e) Tables of mortality rates for male members retired for service and beneficiaries were developed from actual experience of URS retirees. Mortality rates for female members retired for service and beneficiaries were developed from actual experience of the URS retirees.

The mortality basis is adjusted based upon the member's class and gender as shown to the right. These base rates are adjusted for future improvement in mortality using 80% of the ultimate rates from the published MP-2019 mortality improvement scale projected from the year 2020. All of these rates were adopted effective January 1, 2020. Mortality rates for active members use the PUB-2010 Employees Mortality Table for public employees, teachers, and public safety members, as applicable for each member's employee group. The assumptions were adopted effective January 1, 2020.

Retired Member Mortality

Class of Member

Educators and Judges

Men	2020URSM (90%)
Women	2020URSF (90%)

Public Safety and Firefighters

Men	2020URSM (110%)
Women	2020URSF (110%)

Local Government, Public Employees

Men	2020URSM (110%)
Women	2020URSF (110%)

2020URSM = Constructed Mortality table based on actual experience of male URS retirees multiplied by given percentage

2020URSF = Constructed Mortality table based on actual experience of female URS retirees multiplied by given percentage

- f) Mortality among disabled members is based on 115% of the PUB-2010 Disabled Retiree Table for general employees for males, and 125% of the PUB-2010 Disabled Retiree Table for general employees for females. The rates for males and females are also adjusted for

future improvement in mortality using 80% of the ultimate rates from the published MP-2019 mortality scale from the year 2010.

- g) Other demographic assumptions regarding retirement, mortality, disablement, and termination from employment are illustrated in the following actuarial schedules.

The retirement assumptions illustrated for the Noncontributory and Contributory Retirement Systems (and the Tier 2 Public Employees Retirement System) are for members eligible for unreduced retirement benefits. The retirement assumptions illustrated for the Public Safety, Firefighters, and Judges Retirement Systems are for members of the Systems who are eligible to retire with 30 years of service (35 years of service for Tier 2). For public employees the rates vary by age and eligibility for reduced or unreduced retirement. For Public Safety, Firefighters, and Judges the rates vary by age and service groupings.

Rates of assumed termination from employment are assumed to vary by years of service. All terminating members who are not eligible for vested benefits are assumed to withdraw their contributions immediately. Vested members are assumed to withdraw their contributions and forfeit the right to further benefits at the rates illustrated.

- h) The Retirement Board uses the expected rate of return method for calculating the actuarial value of assets. This method is based on the total earnings of the co-mingled investments and spreads the excess/shortfall of actual investment returns over or under the expected return over five years. One-fifth of the excess/shortfall is recognized each year. The actuarial values of assets under this method were calculated and reported to us by the Systems' staff.
- i) All of the demographic assumptions were renewed or adopted by the Retirement Board in 2020 and the investment return assumption was adopted by the Board in 2021, all as recommended by the actuary. The assumptions for Tier 2 members are the same as the Tier 1 members, except for retirement rates.

Summary of Actuarial Assumptions and Methods *(Continued)*

as of January 1, 2021

Percent Retiring Within Next Year Among Active Members

Retirement Age	Eligible for Retirement							
	Male				Female			
	State and School Division		Local Government Division	Governors and Legislators Retirement Plan	State and School Division		Local Government Division	Governors and Legislators Retirement Plan
	Educators	Public Employees	Educators		Public Employees			
Tier 1 Noncontributory and Contributory Retirement Systems <i>Adopted January 1, 2020</i>	50	20.00 %	15.00 %	15.00 %	30.00 %	17.00 %	12.00 %	0.00 %
	51	20.00	15.00	15.00	30.00	16.00	12.00	0.00
	52	20.00	15.00	15.00	30.00	16.00	12.00	0.00
	53	20.00	15.00	15.00	14.00	16.00	12.00	0.00
	54	15.00	15.00	15.00	14.00	16.00	12.00	0.00
	55	15.00	16.00	15.00	14.00	16.00	15.00	0.00
	56	15.00	16.00	15.00	18.00	16.00	15.00	0.00
	57	15.00	16.00	15.00	18.00	16.00	15.00	0.00
	58	15.00	16.00	15.00	18.00	20.00	15.00	0.00
	59	15.00	16.00	15.00	18.00	20.00	20.00	0.00
	60	23.00	20.00	20.00	30.00	25.00	20.00	0.00
	61	23.00	20.00	20.00	30.00	25.00	20.00	0.00
	62	33.00	30.00	23.00	35.00	33.00	28.00	100.00
	63	33.00	30.00	23.00	35.00	33.00	28.00	100.00
	64	33.00	30.00	23.00	35.00	33.00	28.00	100.00
	65	33.00	22.00	23.00	35.00	28.00	28.00	100.00
	66	33.00	22.00	23.00	35.00	28.00	28.00	100.00
	67	30.00	22.00	22.00	35.00	28.00	28.00	100.00
	68	30.00	22.00	22.00	28.00	22.00	28.00	100.00
	69	25.00	22.00	22.00	28.00	22.00	28.00	100.00
	70	20.00	22.00	22.00	28.00	22.00	30.00	100.00
	71	20.00	22.00	22.00	28.00	22.00	30.00	100.00
	72	20.00	22.00	22.00	28.00	22.00	30.00	100.00
	73	20.00	22.00	22.00	28.00	22.00	25.00	100.00
	74	20.00	22.00	22.00	28.00	22.00	25.00	100.00
	75	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Percent Retiring Within Next Year Among Active Members Eligible for Retirement

Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age							
Tier 1 Public Safety Retirement Systems <i>Adopted January 1, 2020</i>	45	15.00 %	50	15.00 %	55	15.00 %	59	20.00 %	63	30.00 %	67	50.00 %
	46	15.00	51	15.00	56	15.00	60	20.00	64	30.00	68	50.00
	47	15.00	52	15.00	57	15.00	61	20.00	65	30.00	69	50.00
	48	15.00	53	15.00	58	15.00	62	30.00	66	40.00	70	100.00
	49	15.00	54	15.00								

Percent Retiring Within Next Year Among Active Members Eligible for Retirement

Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age							
Tier 1 Firefighters Retirement Systems <i>Adopted January 1, 2020</i>	45	15.00 %	50	15.00 %	55	15.00 %	59	20.00 %	63	25.00 %	67	50.00 %
	46	15.00	51	15.00	56	15.00	60	20.00	64	25.00	68	50.00
	47	15.00	52	15.00	57	15.00	61	20.00	65	50.00	69	50.00
	48	15.00	53	15.00	58	20.00	62	25.00	66	50.00	70	100.00
	49	15.00	54	15.00								

Percent Retiring Within Next Year Among Active Members Eligible for Retirement

Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age							
Judges Retirement Systems <i>Adopted January 1, 2020</i>	45	10.00 %	50	10.00 %	55	10.00 %	59	10.00 %	63	10.00 %	67	25.00 %
	46	10.00	51	10.00	56	10.00	60	10.00	64	20.00	68	25.00
	47	10.00	52	10.00	57	10.00	61	10.00	65	20.00	69	25.00
	48	10.00	53	10.00	58	10.00	62	10.00	66	25.00	70	100.00
	49	10.00	54	10.00								

Summary of Actuarial Assumptions and Methods *(Continued)*

as of January 1, 2021

Percent Retiring Within Next Year Among Active Members							
Eligible for Retirement							
Male							
Female							
Retirement Age	State and School Division			Local Government Division	State and School Division		
	Educators	Public Employees			Educators	Public Employees	Local Government Division
Tier 2	50	20.00 %	15.00 %	15.00 %	30.00 %	17.00 %	12.00 %
Public Employees Retirement System	51	20.00	15.00	15.00	30.00	16.00	12.00
<i>Adopted January 1, 2020</i>	52	20.00	15.00	15.00	30.00	16.00	12.00
	53	20.00	15.00	15.00	14.00	16.00	12.00
	54	15.00	15.00	15.00	14.00	16.00	12.00
	55	15.00	16.00	15.00	14.00	16.00	15.00
	56	15.00	16.00	15.00	18.00	16.00	15.00
	57	15.00	16.00	15.00	18.00	16.00	15.00
	58	15.00	16.00	15.00	18.00	20.00	15.00
	59	15.00	16.00	15.00	18.00	20.00	20.00
	60	23.00	20.00	20.00	30.00	25.00	20.00
	61	23.00	20.00	20.00	30.00	25.00	20.00
	62	33.00	30.00	23.00	35.00	33.00	28.00
	63	33.00	30.00	23.00	35.00	33.00	28.00
	64	33.00	30.00	23.00	35.00	33.00	28.00
	65	33.00	22.00	23.00	35.00	28.00	28.00
	66	33.00	22.00	23.00	35.00	28.00	28.00
	67	30.00	22.00	22.00	35.00	28.00	28.00
	68	30.00	22.00	22.00	28.00	22.00	28.00
	69	25.00	22.00	22.00	28.00	22.00	28.00
	70	20.00	22.00	22.00	28.00	22.00	30.00
	71	20.00	22.00	22.00	28.00	22.00	30.00
	72	20.00	22.00	22.00	28.00	22.00	30.00
	73	20.00	22.00	22.00	28.00	22.00	25.00
	74	20.00	22.00	22.00	28.00	22.00	25.00
	75	100.00	100.00	100.00	100.00	100.00	100.00

Retirement rates at the age the member is first eligible for an unreduced retirement benefit prior to age 65 is increased by 30%.

Percent Retiring Within Next Year Among Active Members Eligible for Retirement											
Tier 2 Public Safety and Firefighter Retirement System											
Public Safety											
<i>Adopted January 1, 2020</i>											
Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age
45	15.00 %	50	15.00 %	55	15.00 %	59	20.00 %	63	30.00 %	67	50.00 %
46	15.00	51	15.00	56	15.00	60	20.00	64	30.00	68	50.00
47	15.00	52	15.00	57	15.00	61	20.00	65	30.00	69	50.00
48	15.00	53	15.00	58	15.00	62	30.00	66	40.00	70	100.00
49	15.00	54	15.00								

Retirement rates at the age the member is first eligible for an unreduced retirement benefit prior to age 65 is increased by 10%.

Percent Retiring Within Next Year Among Active Members Eligible for Retirement											
Firefighters											
<i>Adopted January 1, 2020</i>											
Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age	Retirement Age
45	15.00 %	50	15.00 %	55	15.00 %	59	20.00 %	63	25.00 %	67	50.00 %
46	15.00	51	15.00	56	15.00	60	20.00	64	25.00	68	50.00
47	15.00	52	15.00	57	15.00	61	20.00	65	50.00	69	50.00
48	15.00	53	15.00	58	20.00	62	25.00	66	50.00	70	100.00
49	15.00	54	15.00								

Retirement rates at the age the member is first eligible for an unreduced retirement benefit prior to age 65 is increased by 10%.

Summary of Actuarial Assumptions and Methods *(Continued)*

as of January 1, 2021

Percent Electing a Refund of Contributions Upon Termination While Vested

Years of Service	Male				Female			Governors and Legislators Retirement Plan
	State and School Division		Local Government Division	State and School Division		Local Government Division		
	Educators	Public Employees		Educators	Public Employees			
Noncontributory and Contributory Retirement Systems <i>Adopted January 1, 2020</i>	0	16.00 %	27.00 %	18.00 %	17.00 %	28.00 %	24.00 %	10.00 %
	1	12.00	20.00	13.00	14.00	21.00	18.00	10.00
	2	8.50	12.00	9.00	11.00	15.00	14.00	10.00
	3	7.00	10.00	8.50	10.00	13.00	12.00	10.00
	4	6.50	9.00	7.50	9.00	11.00	11.00	10.00
	5	6.00	8.00	7.00	8.00	10.00	9.50	10.00
	6	5.50	7.00	6.50	7.00	8.50	9.00	10.00
	7	4.50	6.00	5.50	5.50	7.25	8.00	10.00
	8	4.00	5.00	5.00	4.75	6.25	6.50	10.00
	9	3.50	5.00	4.50	4.25	5.75	6.50	10.00
	10	3.00	4.50	4.00	4.00	5.25	5.50	10.00
	11	2.75	4.50	3.50	3.50	4.50	5.00	10.00
	12	2.75	4.00	3.25	3.00	4.25	4.75	10.00
	13	2.25	3.75	3.00	2.50	4.00	4.50	10.00
	14	2.00	3.50	3.00	2.00	3.75	4.00	10.00
	15	2.00	3.00	2.75	2.00	3.50	4.00	10.00
	16	2.00	2.75	2.75	1.75	3.00	3.75	10.00
	17	2.00	2.50	2.50	1.75	2.75	3.50	10.00
	18	2.00	2.00	2.50	1.75	2.75	3.00	10.00
	19	1.50	2.00	2.50	1.50	2.75	3.00	10.00
	20	1.50	2.00	2.00	1.50	2.75	2.50	10.00
	21	1.50	2.00	2.00	1.50	2.50	2.50	10.00
	22	1.50	2.00	1.75	1.50	2.25	2.25	10.00
	23	1.50	1.50	1.50	1.50	2.00	2.00	10.00
	24	1.50	1.50	1.25	1.50	2.00	2.00	10.00
	25	1.00	1.00	1.00	1.00	1.00	1.00	10.00

Other Termination of Employment of Active Members Separating Within Next Year

Years of Service	Years of Service	Years of Service	Years of Service	Years of Service
Public Safety Retirement System <i>Adopted January 1, 2020</i>	0 15.00 %	5 4.50 %	9 3.00 %	13 2.00 %
	1 8.00	6 4.00	10 2.50	14 1.75
	2 6.50	7 4.00	11 2.50	15 1.75
	3 6.00	8 3.50	12 2.00	16 1.50
	4 5.00			20+ 1.00

Other Termination of Employment of Active Members Separating Within Next Year

Years of Service	Years of Service	Years of Service	Years of Service	Years of Service
Firefighters Retirement System <i>Adopted January 1, 2020</i>	0 7.00 %	5 2.50 %	9 1.50 %	13 0.50 %
	1 5.50	6 2.00	10 1.50	14 0.50
	2 4.00	7 1.75	11 1.50	15 0.50
	3 3.50	8 1.50	12 1.00	16 0.50
	4 3.00			20+ 0.50

Other Termination of Employment of Active Members Separating Within Next Year

Judges Retirement System <i>Adopted January 1, 1993</i>	None assumed.
---	---------------

Summary of Actuarial Assumptions and Methods *(Continued)*

as of January 1, 2021

	Years of Service	Total Annual Increase in Salary (Male and Female)										
		State and School Division			Local Government Division	Public Safety Retirement System	Firefighters Retirement System	State and School Division			Public Safety Retirement System	Firefighters Retirement System
		Educators	Public Employees	Public Employees				Educators	Public Employees	Public Employees		
All Retirement Systems <i>Adopted January 1, 2020</i>	0	9.25 %	8.25 %	8.25 %	6.75 %	8.50 %	13	4.75 %	4.25 %	4.00 %	4.50 %	4.50 %
	1	8.50	7.50	7.00	6.00	8.00	14	4.50	4.00	4.00	4.50	4.25
	2	7.50	6.50	6.50	6.00	7.75	15	4.25	3.75	4.00	4.50	4.25
	3	7.25	6.00	6.00	6.00	7.50	16	4.00	3.75	3.75	4.25	4.25
	4	7.00	5.75	5.50	6.00	7.50	17	3.75	3.75	3.75	4.00	4.00
	5	6.75	5.25	5.25	6.00	7.25	18	3.75	3.75	3.75	4.00	3.75
	6	6.75	5.00	5.00	5.75	7.25	19	3.75	3.75	3.50	4.00	3.75
	7	6.50	4.75	4.75	5.50	6.75	20	3.75	3.50	3.50	4.00	3.75
	8	6.50	4.75	4.50	5.25	6.50	21	3.75	3.50	3.50	3.75	3.50
	9	6.25	4.50	4.50	5.25	6.00	22	3.75	3.50	3.50	3.75	3.50
	10	5.75	4.50	4.25	5.00	5.50	23	3.50	3.50	3.25	3.50	3.50
	11	5.50	4.25	4.00	4.75	5.00	24	3.50	3.25	3.25	3.50	3.25
	12	5.25	4.25	4.00	4.50	4.75	25+	3.25	3.25	3.25	3.25	3.25

	Age	Probability of Mortality Within the Next Year for Active Members								
		Male				Female				
		Educators	Local Government and Public Employees	Educators	Local Government and Public Employees	Educators	Local Government and Public Employees	Educators	Local Government and Public Employees	
Noncontributory and Contributory Retirement Systems <i>Adopted January 1, 2020</i>	20	0.0340 %	0.0370 %	0.0130 %	0.0130 %	50	0.1110 %	0.1490 %	0.0730 %	0.0830 %
	25	0.0160	0.0280	0.0090	0.0090	55	0.1720	0.2190	0.1070	0.1230
	30	0.0220	0.0360	0.0140	0.0150	60	0.2640	0.3190	0.1610	0.1860
	35	0.0300	0.0470	0.0200	0.0230	65	0.4350	0.4680	0.2700	0.2960
	40	0.0420	0.0660	0.0310	0.0360	70	0.7090	0.7030	0.4850	0.4890
	45	0.0670	0.0980	0.0480	0.0560					

	Years of Service	Percent Electing a Refund of Contributions Upon Termination While Vested						
		Male			Female			
		Educators	Public Employees	Local Government Division	Educators	Public Employees	Local Government Division	Local Government Division
Noncontributory and Contributory Retirement Systems <i>Adopted January 1, 1993</i>	0-3	100 %	100 %	100 %	100 %	100 %	100 %	
	4	75	86	75	65	80	77	
	5	73	83	73	64	79	75	
	10	54	73	61	53	64	61	
	15	33	63	49	32	52	40	
	19	9	29	23	8	22	13	
	20	0	0	0	0	0	0	

	Age	Probability of Mortality Within the Next Year for Active Members							
		Public Safety and Firefighters Employees							
		Male	Female	Male	Female	Male	Female		
Public Safety Retirement System and Firefighters Retirement System <i>Adopted January 1, 2020</i>	20	0.0410 %	0.0160 %	40	0.0590 %	0.0490 %	60	0.2640 %	0.1680 %
	25	0.0370	0.0200	45	0.0820	0.0670	65	0.4100	0.2280
	30	0.0410	0.0270	50	0.1200	0.0910	70	0.7660	0.4540
	35	0.0470	0.0360	55	0.1750	0.1230			

	Years of Service	Percent Electing a Refund of Contributions Upon Termination While Vested			
		Public Safety and Firefighters Retirement Employees			
		Male		Female	
Public Safety Retirement System and Firefighters Retirement System <i>Adopted January 1, 1993</i>	0-3	100 %		15	35 %
	4	76		19	15
	5	74		20	0
	10	57			