

Draft Board Approved February 22, 2023



The Police Retirement System of St. Louis

GASB 67/68 Report as of September 30, 2022

Produced by Cheiron February 2023



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LETTER OF TRANSMITTAL

February 17, 2023

Board of Trustees The Police Retirement System of St. Louis 2020 Market Street St. Louis, Missouri 63101

Dear Members of the Board:

The purpose of this report is to provide accounting and financial disclosure information under GASB 67 for the Police Retirement System of St. Louis and under GASB 68 for the City of St. Louis. This information includes:

- Determination of the discount rate as of September 30, 2022,
- Projection of the Total Pension Liability from the valuation date to the measurement date,
- Calculation of the Net Pension Liability at the discount rate as well as discount rates 1% higher and lower than the discount rate,
- Changes in the Net Pension Liability,
- Schedule of Employer Contributions,
- Disclosure of Deferred Inflows and Outflows, and
- Calculation of the Annual Pension Expense for the System.

If you have any questions about the report or would like additional information, please let us know.

Sincerely, Cheiron

Michael J. Noble, FSA, FCA, EA Principal Consulting Actuary Patrick T. Nelson, FSA, CERA, EA Consulting Actuary

SECTION I – BOARD SUMMARY

The purpose of this report is to provide accounting and financial disclosure information under Governmental Accounting Standards Board Statements 67 and 68 for the Police Retirement System of St. Louis (System) and the City of St. Louis. This information includes:

- Determination of the discount rate as of September 30, 2022,
- Projection of the Total Pension Liability from the valuation date to the measurement date,
- Calculation of the Net Pension Liability at the discount rate as well as discount rates 1% higher and lower than the discount rate,
- Changes in the Net Pension Liability,
- Schedule of Employer Contributions,
- Disclosure of Deferred Inflows and Outflows, and
- Calculation of the Annual Pension Expense for the System.

Highlights

The reporting date for the Police Retirement System of St. Louis is September 30, 2022. Measurements as of the reporting date are based on the fair value of assets as of September 30, 2022, and the Total Pension Liability as of the valuation date, October 1, 2021, projected to September 30, 2022. There have been changes in actuarial assumptions since the prior measurement date which had the net effect of decreasing the Net Pension Liability. Other than the change in assumptions, there were no significant events between the valuation date and the measurement date, so the update procedures only included the addition of service cost and interest cost offset by actual benefit payments, based on the revised assumptions.

The table below provides a summary of the key results during this reporting period.

Summary of Results										
	Measurement Date September 30, 2022 September 30, 2021									
Net Pension Liability Deferred Outflows Deferred Inflows	\$	349,314,122 (82,054,624) 25,503,900	\$	225,146,431 (14,097,587) 81,166,554						
Net Impact on Statement of Net Position Pension Expense (\$ Amount) Pension Expense (% of Payroll)	\$ \$	292,763,398 37,837,426 48.90%	\$ \$	292,215,398 39,973,124 48.12%						

The Net Pension Liability (NPL) increased approximately \$124.2 million since the prior measurement date, primarily due to a large investment loss. An actuarial gain and a change in actuarial assumptions helped to offset the increase in NPL. The investment loss is recognized



SECTION I – BOARD SUMMARY

over five years, and the actuarial gain and assumption changes are recognized over the average remaining service life, which is three years. Unrecognized amounts are reported as deferred inflows and deferred outflows. As of the end of the reporting year, the System and the City would report a Net Pension Liability of \$349,314,122, Deferred Inflows of \$25,503,900, and Deferred Outflows of \$82,054,624. Consequently, the net impact on the City's Statement of Net Position due to the System would be \$292,763,398 at the end of the reporting year. In addition, any contributions between the measurement date and the City's reporting date would be reported as deferred outflows to offset the cash outflow reported.

For the measurement year ending September 30, 2022, the annual pension expense is \$37,837,426 or 48.90% of covered-employee payroll. This amount is not equal to the City's contribution to the System (\$37,289,426), but instead represents the change in the net impact on the City's Statement of Net Position plus employer contributions (\$292,763,398 – \$292,215,398 + \$37,289,426). The pension expense for the current year is less than the expense for the prior year. Volatility in pension expense from year to year is to be expected. It will largely be driven by investment gains or losses, but other changes, such as changes in assumptions, can also have a significant impact. A breakdown of the components of the net pension expense is shown in the report.



SECTION II - CERTIFICATION

The purpose of this report is to provide accounting and financial reporting information under GASB 67 for the Police Retirement System of St. Louis and under GASB 68 for the City of St. Louis. This report is for the use of the Police Retirement System, the City of St. Louis, and their auditors in preparing financial reports in accordance with applicable law and accounting requirements. This report is not appropriate for other purposes, including the measurement of funding requirements for the System or estimating the price to settle the System's obligations.

In preparing our report, we relied on information (some oral and some written) supplied by the System. This information includes, but is not limited to, the plan provisions, employee data, and financial information. In accordance with the Actuarial Standard of Practice No. 23, we performed an informal examination of the obvious characteristics of the data for reasonableness and consistency and found the data to be appropriate for Actuarial Valuation purposes.

Future actuarial measurements may differ significantly from the current measurements 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; and changes in plan provisions or applicable law.

The membership data and plan provisions are the same as were described in the October 1, 2021 Actuarial Valuation Report. The actuarial assumptions, except for the blended discount rate described in Section III, are the same as are described in the October 1, 2021 actuarial valuation.

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

This report was prepared for the Police Retirement System of St. Louis for the purposes described herein and for the use by the Plan auditor in completing an audit related to the matters herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely, Cheiron

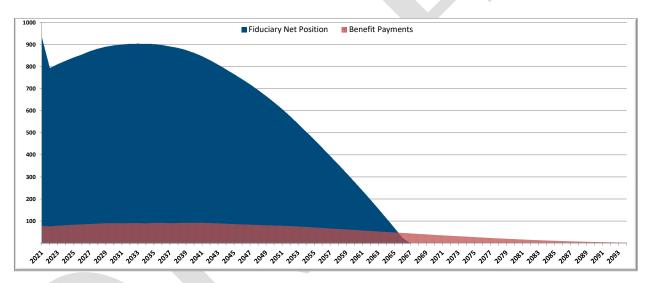
Michael J. Noble, FSA, FCA, EA Principal Consulting Actuary Patrick T. Nelson, FSA, CERA, EA Consulting Actuary



SECTION III - DETERMINATION OF DISCOUNT RATE

The City's funding policy is to contribute exactly the Actuarially Determined Contribution annually. This contribution is equal to the employer's normal cost. The employer's normal cost is calculated according to the Aggregate Actuarial Cost Method and is equal to the actuarial present value of future benefits minus the sum of the actuarial value of assets and the present value of future employee contributions, funded over the present value of future salary for current participants.

The discount rate used to measure the Total Pension Liability is 6.65% which is a blend of the assumed long-term expected rate of return of 7.00% on System investments and a municipal bond index rate of 4.02% based on the Bond Buyer GO 20-Year Municipal Bond Index as of September 29, 2022. Following the procedures described in paragraphs 39 - 45 of GASB Statement 67, projections of the System's fiduciary net position have indicated that it is not expected to be sufficient to make projected benefit payments for current Plan members after 2066. Therefore, the portion of future projected benefit payments after 2066 are discounted at the municipal bond index rate. The results of these projections are shown in the chart below.



This discount rate is intended to be used for accounting and financial reporting but is not appropriate for estimating the price to settle the plan's liability.

A similar calculation was made as of September 30, 2021 and the fiduciary net position was only expected to be sufficient to make projected benefit payments for current members until 2074. Thus using a blend of the assumed long-term expected rate of return of 7.00% on System investments and a municipal bond index rate of 2.26%, this calculation resulted in a blended discount rate of 6.51% as of September 30, 2021.

The projection of cash flows used to determine the discount rate assumed that employer contributions continued to be made in accordance with the contribution policy in effect for the October 1, 2021 actuarial valuation.

Appendix D shows the details of this calculation.



SECTION IV – PROJECTION OF TOTAL PENSION LIABILITY

The Total Pension Liability (TPL) at the end of the measurement year, September 30, 2022, is measured as of a valuation date of October 1, 2021 and projected to September 30, 2022. There were no significant events during the projection period of which we are aware. Because the TPL shown in the prior report was measured as of September 30, 2020 and projected to September 30, 2021, as well as being determined using different actuarial assumptions, it will not match the amounts measured as of September 30, 2021 that are shown in this exhibit.

The table below shows the projection of the TPL at discount rates equal to the rate used for disclosure and plus and minus one percent from the rate used for disclosure.

Projection of Total Pension Li	iabilit	y from Valuat	ion	to Measurem	ent	Date
Discount Rate		5.65%		6.65%		7.65%
Valuation Total Pension Liability, September	30, 202	21				
Actives	\$	266,298,378	\$	224,593,272	\$	191,598,653
DROP and Re-entered		206,851,732		186,749,285		170,253,934
Retirees		786,211,684		719,169,998		662,113,043
Total	\$	1,259,361,794	\$	1,130,512,555	\$	1,023,965,630
Service Cost		19,790,946		15,897,577		12,977,856
Benefit Payments		77,834,206		77,834,206		77,834,206
Interest		69,536,748		73,152,836		75,898,327
Total Pension Liability, September 30, 2022	\$	1,270,855,282	\$	1,141,728,762	\$	1,035,007,607



SECTION V – NOTE DISCLOSURES

The table below shows the changes in the Total Pension Liability (TPL), the Plan Fiduciary Net Position (i.e., fair value of System assets), and the Net Pension Liability (NPL) during the Measurement Year.

Change in Net Pension Liability											
			Incre	ease (Decrease)							
	,	Fotal Pension Liability (a)		lan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)						
Balances at September 30, 2021	\$	1,156,959,283	\$	931,812,852	\$	225,146,431					
Changes for the year:											
Service cost		16,376,468				16,376,468					
Interest		73,349,139				73,349,139					
Changes of benefits		0				0					
Differences between expected and actual experience		(10,523,277)				(10,523,277)					
Changes of assumptions		(16,598,645)				(16,598,645)					
Contributions - employer				37,289,426		(37,289,426)					
Contributions - member				5,172,235		(5,172,235)					
Net investment income				(102,782,788)		102,782,788					
Benefit payments		(77,834,206)		(77,834,206)		0					
Administrative expense				(1,242,879)		1,242,879					
Net changes		(15,230,521)		(139,398,212)		124,167,691					
Balances at September 30, 2022	\$	1,141,728,762	\$	792,414,640	\$	349,314,122					

During the measurement year, the NPL increased by approximately \$124.2 million. The service cost and interest cost increased the NPL by approximately \$89.7 million while the investment loss and administrative expenses offset by contributions increased the NPL by approximately \$61.6 million.

There were no changes in benefits during the year. There were actuarial experience gains during the year of approximately \$10.5 million. Assumption changes decreased the NPL by \$16.6 million.

Changes in the discount rate affect the measurement of the TPL. Lower discount rates produce a higher TPL, and higher discount rates produce a lower TPL. Because the discount rate does not affect the measurement of assets, the percentage change in the NPL can be very significant for a relatively small change in the discount rate. The table on the next page shows the sensitivity of the NPL to the discount rate.



SECTION V – NOTE DISCLOSURES

Sensitivity of Net Pension	Sensitivity of Net Pension Liability to Changes in Discount Rate												
	1% Decrease 5.65%	Discount Rate 6.65%	1% Increase 7.65%										
Total Pension Liability Plan Fiduciary Net Position	\$ 1,270,855,282 792,414,640	\$ 1,141,728,762 792,414,640	\$ 1,035,007,607 792,414,640										
Net Pension Liability	\$ 478,440,642	\$ 349,314,122	<u>\$ 242,592,967</u>										
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	62.4%	69.4%	76.6%										

A one percent decrease in the discount rate increases the TPL by approximately 11.3% and increases the NPL by approximately 37.0%. A one percent increase in the discount rate decreases the TPL by approximately 9.3% and decreases the NPL by approximately 30.6%.



SECTION VI – REQUIRED SUPPLEMENTARY INFORMATION

The schedules of Required Supplementary Information generally start with information as of the implementation of GASB 67 and eventually will build up to 10 years of information. The schedule below shows the changes in NPL and related ratios required by GASB for the eight years since implementation.

			S	chedule of C	hai	nges in Net P	ens	sion Liability	and	d Related Rat	ios					
		FYE 2022		FYE 2021		FYE 2020		FYE 2019		FYE 2018		FYE 2017	FYE 2016	FYE 2015		FYE 2014
Total Pension Liability																
Service cost (MOY)	\$	16,376,468	\$	20,487,163	\$	18,188,606	\$	15,678,890	\$	16,369,318	\$	17,988,134 \$	12,617,971	\$ 12,977,679	\$	12,991,999
Interest (includes interest on service cost)		73,349,139		71,739,532		72,663,853		71,309,613		68,899,130		66,042,714	67,036,489	66,579,275		65,906,383
Changes of benefit terms		0		0		0		0		0		0	0	0		0
Differences between expected and actual experience		(10,523,277)		(16,689,147)		(16,422,842)		22,854,628		(4,886,531)		3,911,067	(3,684,265)	(2,041,444)		0
Changes of assumptions		(16,598,645)		(5,578,712)		42,292,759		59,418,045		(59,545,809)		(55,153,649)	131,846,504	16,248,637		6,650,362
Benefit payments, including refunds of member contributions		(77,834,206)		(71,382,914)		(69,963,781)		(68,548,936)		(68,576,111)		(63,452,580)	(62,637,432)	(69,533,077)		(60,973,465)
Net change in total pension liability	\$	(15,230,521)	\$	(1,424,078)	\$	46,758,595	\$	100,712,240	\$	(47,740,003)	\$	(30,664,314) \$	145,179,267	\$ 24,231,070	\$	24,575,279
Total pension liability - beginning		1,156,959,283		1,158,383,361		1,111,624,766		1,010,912,526		1,058,652,529		1,089,316,843	944,137,576	 919,906,506		895,331,227
Total pension liability - ending	\$	1,141,728,762	\$	1,156,959,283	\$	1,158,383,361	\$	1,111,624,766	\$	1,010,912,526	\$	1,058,652,529 \$	1,089,316,843	\$ 944,137,576	\$	919,906,506
Plan fiduciary net position																
Contributions - employer	\$	37,289,426	\$	32,839,034	\$	35,335,830	\$	35,970,630	\$	33,104,561	\$	33,826,528 \$	30,778,664	\$ 30,600,069	\$	32,324,823
Contributions - member		5,172,235		5,898,084		6,169,551		5,228,438		5,129,154		4,653,968	4,376,867	4,487,942		4,438,346
Net investment income		(102,782,788)		167,232,266		43,802,433		17,514,881		51,089,258		93,520,079	52,927,643	(8,325,611)		48,094,636
Benefit payments, including refunds of member contributions		(77,834,206)		(71,382,914)		(69,963,781)		(68,548,936)		(68,576,111)		(63,452,580)	(62,637,432)	(69,533,077)		(60,973,465)
Administrative expense	_	(1,242,879)		(1,423,896)		(1,446,227)	_	(1,572,951)		(1,165,930)		(1,206,161)	(1,102,866)	(1,125,310)		(1,095,653)
Net change in plan fiduciary net position	\$	(139,398,212)	\$	133,162,574	\$	13,897,806	\$	(11,407,938)	\$	19,580,932	\$	67,341,834 \$	24,342,876	\$ (43,895,987)	\$	22,788,687
Plan fiduciary net position - beginning		931,812,852		798,650,278		784,752,472		796,160,410		776,579,478		709,237,644	684,894,768	728,790,755		706,276,668
Plan fiduciary net position - ending	\$	792,414,640	\$	931,812,852	\$	798,650,278	\$	784,752,472	\$	796,160,410	\$	776,579,478 \$	709,237,644	\$ 684,894,768	\$	729,065,355
Net pension liability - ending	\$	349,314,122	\$	225,146,431	\$	359,733,083	\$	326,872,294	\$	214,752,116	\$	282,073,051 \$	380,079,199	\$ 259,242,808	S	190,841,151
Plan fiduciary net position as a percentage of the total pension liability		69.40%		80.54%		68.95%		70.60%		78.76%		73.36%	65.11%	72.54%		79.25%
Covered payroll Net pension liability as a percentage of covered payroll	\$	77,382,984 451.41%	\$	83,068,458 271.04%	\$	82,639,813 435.30%		82,494,022 396.24%	\$	76,710,452 279.95%	\$	76,141,625 \$ 370.46%	72,684,487 522.92%	\$ 72,325,153 358.44%	\$	72,151,450 264.50%



SECTION VI – REQUIRED SUPPLEMENTARY INFORMATION

If an Actuarially Determined Contribution is calculated, the following schedule is required. An Actuarially Determined Contribution is a contribution amount determined in accordance with Actuarial Standards of Practice.

	Schedule of Employer Contributions												
	FYE 2022	FYE 2021	FYE 2020	FYE 2019	FYE 2018	FYE 2017	FYE 2016	FYE 2015	FYE 2014				
Actuarially Determined Contribution Contributions in Relation to the	\$ 37,289,426	\$ 32,839,034	\$ 35,335,830	\$ 35,970,630	\$ 33,104,561	\$ 33,826,528	\$ 30,778,664	\$ 30,600,069	\$ 32,324,823				
Actuarially Determined Contribution	37,289,426	32,839,034	35,335,830	35,970,630	33,104,561	33,826,528	30,778,664	30,600,069	32,324,823				
Contribution Deficiency/(Excess)	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0				
Covered Payroll	\$ 77,382,984	\$ 83,068,458	\$ 82,639,813	\$ 82,494,022	\$ 76,710,452	\$ 76,141,625	\$ 72,684,487	\$ 72,325,153	\$ 72,151,450				
Contributions as a Percentage of Covered Payroll	48.19%	39.53%	42.76%	43.60%	43.16%	44.43%	42.35%	42.31%	44.80%				

Notes to Schedule

Valuation Date October 1, 2021

Timing Actuarially determined contribution rates are calculated based on

the actuarial valuation at the beginning of the plan year

Key Methods and Assumptions Used to Determine Contribution Rates for 2022:

Actuarial cost method Aggregate

Amortization method N/A

Asset valuation method 5-year smoothed market

Discount rate 7.00% net of investment expenses Salary increases Varies by age from 3.00% to 6.25%

Cost-of-living adjustments 2.50% per year Inflation 2.50% per year

Mortality (Ordinary) Pub-2010 Safety Employee Below-Median Income Weighted

mortality, projected fully generationally with Scale MP-2020

Mortality (Accidental) 0.03% per year for all ages in addition to ordinary mortality

Mortality (Retiree) Pub-2010 Safety Healthy Retiree Below-Median Income Weighted

mortality, projected fully generationally with Scale MP-2020

Mortality (Disabled) Pub-2010 Safety Disabled Retiree mortality, projected fully

generationally with Scale MP-2020

Mortality (Beneficiaries) Pub-2010 General Retiree Below-Median Income Weighted

mortality, projected fully generationally with Scale MP-2020



SECTION VII – EMPLOYER REPORTING AMOUNTS

The City of St. Louis was required to implement GASB 68 for its reporting date of June 30, 2015. The schedules in this section are provided for the City of St. Louis for its 2023 reporting.

The impact of experience gains or losses and assumption changes on the TPL are recognized in expense over the average expected remaining service life of all active and inactive members of the System. As of the measurement date, this recognition period was 2.66 years. The value rounded to the nearest year and used in this calculation was 3 years.

The impact of investment gains or losses is recognized over a period of five years.

The table below summarizes the current balances of deferred outflows and deferred inflows of resources along with the net recognition over the next five years.

Schedule of Deferred Inflows	and	Outflows of	Resou	irces
	Deferred Outflows of Resources]	Deferred Inflows of Resources
Differences between expected and actual				
experience	\$	0	\$	12,578,567
Changes in assumptions		0		12,925,333
Net difference between projected and actual				
earnings on pension plan investments		82,054,624		0
Total	\$	82,054,624	\$	25,503,900
Amounts reported as deferred outflows and defe in pension expense as follows:	rred ii	nflows of resource	es will b	oe recognized
Measurement year ended June 30	:			
2023	\$	6,186,105		
2024		5,382,295		
2025		11,632,361		
2026		33,349,963		
2027		0		
Thereafte	r	0		



SECTION VII – EMPLOYER REPORTING AMOUNTS

The table below provides details on the current balances of deferred inflows and outflows of resources along with the recognition of each base for each of the current and following five years, as well as the total for any years thereafter.

		Detailed	Schedule of l	Deferred Inf	lows and Ou	tflows of Re	esources			
Recognition of	Experience (C	Gains) and Loss	ses							
Experience	Recognition	Total	Remaining	g Amounts		R	ecognition Year	r		
Year	Period	Amount	BOY	EOY	2022	2023	2024	<u> 2025</u>	<u>2026</u>	
2022	3.00	\$ (10,523,277)	\$ (10,523,277)	\$ (7,015,518)	\$ (3,507,759)	\$ (3,507,759)	\$ (3,507,759)	\$ 0	\$ 0	
2021	3.00	(16,689,147)	(11,126,098)	(5,563,049)	(5,563,049)	(5,563,049)	0	0	0	
2020	3.00	(16,422,842)	(5,474,280)	0	(5,474,280)	0	0	0	0	
2019	3.00	22,854,628	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
Deferred Outflo	ows		\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	
Deferred Inflow	VS		(27,123,655)	(12,578,567)	(14,545,088)	(9,070,808)	(3,507,759)	0	0	
Net Change in l	Pension Expens	e	\$ (27,123,655)	\$(12,578,567)	\$ (14,545,088)	\$ (9,070,808)	\$ (3,507,759)	\$ 0	\$ 0	
	Recognition of Assumption Changes									
Experience	Recognition	Total	Remaining	g Amounts		R	ecognition Year	r		
Year	Period	Amount	BOY	EOY	<u>2022</u>	2023	<u>2024</u>	<u>2025</u>	<u>2026</u>	
2022	3.00	\$ (16,598,645)	\$ (16,598,645)	\$(11,065,763)	\$ (5,532,882)	\$ (5,532,882)	\$ (5,532,881)	\$ 0	\$ 0	
2021	3.00	(5,578,712)	(3,719,141)	(1,859,570)	(1,859,571)	(1,859,570)	0	0	0	
2020	3.00	42,292,759	14,097,587	0	14,097,587	0	0	0	0	
2019	3.00	59,418,045	0	0	0	0	0	0	0	
Deferred Outflo			\$ 14,097,587	\$ 0	\$ 14,097,587	\$ 0	\$ 0	\$ 0	\$ 0	
Deferred Inflow	VS		(20,317,786)	(12,925,333)	(7,392,453)	(7,392,452)	(5,532,881)	0	0	
Net Change in l	Pension Expens	e	\$ (6,220,199)	\$(12,925,333)	\$ 6,705,134	\$ (7,392,452)	\$ (5,532,881)	\$ 0	\$ 0	
Recognition of	,	,								
Experience	Recognition	Total	,	g Amounts		R	ecognition Year			
<u>Year</u>	Period	<u>Amount</u>	BOY	EOY	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	
2022	5.00	\$ 166,749,823	\$ 166,749,823		\$ 33,349,965	\$ 33,349,965		\$ 33,349,965	\$ 33,349,963	
2021	5.00	(108,588,012)	(86,870,410)	(65,152,808)	(21,717,602)	(21,717,602)		(21,717,604)	0	
2020	5.00	13,952,852	8,371,712	5,581,142	2,790,570	2,790,570	2,790,572	0	0	
2019	5.00	41,132,152	16,452,862	8,226,432	8,226,430	8,226,432	0	0	0	
2018	5.00	5,994,001	1,198,801	0	1,198,801	0	0	0	0	
Net Change in F	Pension Expense	•	\$ 105,902,788	\$ 82,054,624	\$ 23,848,164	\$ 22,649,365	\$ 14,422,935	\$ 11,632,361	\$ 33,349,963	



SECTION VII – EMPLOYER REPORTING AMOUNTS

The annual pension expense recognized by the City of St. Louis can be calculated in two different ways. First, it is the change in the amounts reported on the City's Statement of Net Position that relate to PRS and are not attributable to employer contributions. That is, it is the change in NPL plus the changes in deferred outflows and inflows plus employer contributions.

Alternatively, annual pension expense can be calculated by its individual components. While GASB does not require or suggest the organization of the individual components shown in the table below, we believe it helps to understand the level and volatility of pension expense.

Calculation of Pe	nsion	Expense		
		Measurement 2022	Yea	ar Ending 2021
Change in Net Pension Liability Change in Deferred Outflows Change in Deferred Inflows Employer Contributions	\$	124,167,691 (67,957,037) (55,662,654) 37,289,426	\$	(134,586,652) 71,502,749 70,217,993 32,839,034
Pension Expense Pension Expense as % of Payroll	\$	37,837,426 48.90%	\$	39,973,124 48.12%
Operating Expenses Service cost Employee contributions Administrative expenses Total	\$	16,376,468 (5,172,235) 1,242,879 12,447,112	\$ \$	20,487,163 (5,898,084) 1,423,896 16,012,975
Financing Expenses Interest cost Expected return on assets Total	\$ 	73,349,139 (63,967,035) 9,382,104	\$	71,739,532 (58,644,254) 13,095,278
Changes Benefit changes Recognition of assumption changes Recognition of liability gains and losses Recognition of investment gains and losses Total	\$ 	0 6,705,134 (14,545,088) 23,848,164 16,008,210	\$ 	0 32,044,030 (3,419,120) (17,760,039) 10,864,871
Pension Expense	\$	37,837,426	\$	39,973,124

First, there are components referred to as operating expenses. These are items directly attributable to the operation of the System during the measurement year. Service cost less



SECTION VII - EMPLOYER REPORTING AMOUNTS

employee contributions represent the increase in employer-provided benefits attributable to the year, and administrative expenses are the cost of operating the System for the year.

Second, there are the financing expenses: the interest on the Total Pension Liability less the expected return on assets.

The final category is changes. This category will drive most of the volatility in pension expense from year to year. It includes any changes in benefits made during the year and the recognized amounts due to assumption changes, gains or losses on the TPL, and investment gains or losses. The total pension expense for the current year is less than that of the prior year, decreasing by about \$2.1 million even though the recognition of changes increased by about \$5.1 million.





APPENDIX A – MEMBERSHIP INFORMATION

Part	ticipant D	ata Recor	iciliation		
	Actives	DROP	Retirees	Surviving Spouses and Children	Total
Participants as of October 1, 2020	1,229	57	1,439	494	3,219
New Entrants	60				60
Return to Active					0
Nonvested terminations	(111)				(111)
Retired	(30)	(13)	43		0
Entered into DROP	(9)	9			0
Re-Entry from DROP	9	(9)			0
Deaths without beneficiary	(1)		(23)	(39)	(63)
Deaths with Beneficiary	(2)		(30)	40	8
Disabled	(2)		2		0
Benefits Expired					0
Data Correction			2		2
Net Change	(86)	(13)	(6)	1	(104)
Participants as of October 1, 2021	1,143	44	1,433	495	3,115



APPENDIX A – MEMBERSHIP INFORMATION

	Distribution of Active Participants Years of Service												
Age	0 - 4	5-9	10 – 14	15 – 19	20 - 24	25 - 29	30 - 34	35+	Total				
Under 20									0				
20 - 24	50								50				
	\$47,659								\$47,659				
25 - 29	148	23							171				
	\$50,804	\$55,864							\$51,485				
30 - 34	87	66	17						170				
	\$50,628	\$59,884	\$66,013						\$55,760				
35 - 39	34	31	117	31					213				
	\$51,986	\$59,913	\$67,148	\$69,943					\$64,082				
40 - 44	14	14	46	106	12				192				
	\$51,850	\$60,363	\$67,708	\$70,053	\$74,282				\$67,722				
45 - 49	3	3	21	36	36	8			107				
	\$50,820	\$58,360	\$68,236	\$69,869	\$73,775	\$72,375			\$70,193				
50 - 54	3	1	5	24	56	31			120				
	\$51,827	\$58,698	\$69,728	\$68,938	\$75,508	\$77,569			\$73,753				
55 – 59			1	5	37	54	2		99				
			\$90,118	\$69,850	\$74,917	\$78,179	\$73,220		\$76,560				
60 - 64			. , -	2	4	12	3		21				
				\$68,596	\$75,056	\$78,506	\$106,349		\$80,883				
65 +)-			,-		0				
									· ·				
Total	339	138	207	204	145	105	5	0	1,143				
	\$50,466	\$59,228	\$67,463	\$69,853	\$74,813	\$77,594	\$93,098		\$63,829				



APPENDIX A – MEMBERSHIP INFORMATION

Statistics for Active Participants

		Average				
	Count	Age	Service	Co	mpensation	
As of October 1, 2021						
Continuing	1,083	40.8	13.1	\$	64,920	
New	60	28.6	0.6	\$	44,142	
Total	1,143	40.2	12.4	\$	63,829	
As of October 1, 2020						
Continuing	1,112	40.6	12.8	\$	64,889	
New	117	27.8	0.5	\$	46,398	
Total	1,229	39.4	11.6	\$	63,129	

Statistics for DROP Participants

				Average		
					DROP Account	Monthly Benefit
	Count	Age	Service	Compensation	Balance	Amount
As of October 1, 2021	44	52.8	22.8	\$ 74,789	\$ 99,754	\$ 3,101
As of October 1, 2020	57	52.5	23.2	\$ 74,814	\$ 87,011	\$ 3,069

Statistics for Inactive Participants

	Count	Total Monthly Benefits	Average Monthly Benefits
As of October 1, 2021			
Service Retirees	1,264	\$3,852,826	\$ 3,048
Ordinary Disabilities	19	27,712	1,459
Accidental Disabilities	149	422,361	2,835
Surviving Spouses	449	692,757	1,543
Children	46	29,540	642
Total	1,927	\$5,025,196	\$ 2,608
As of October 1, 2020			
Service Retirees	1,271	\$3,744,775	\$ 2,946
Ordinary Disabilities	20	28,362	1,418
Accidental Disabilities	148	414,364	2,800
Surviving Spouses	448	671,853	1,500
Children	46	27,500	598
Total	1,933	\$4,886,854	\$ 2,528



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A summary of the actuarial assumptions and methods used to calculate the Total Pension Liability as of September 30, 2022 (except for the discount rate as described in Section III) is provided below, including any assumptions that differ from those used in the October 1, 2021 actuarial valuation.

A. Actuarial Assumptions

1. Mortality Rates:

Actives, Ordinary: Pub-2010 Safety Employee Below-Median Income Weighted

mortality, projected fully generationally with Scale MP-2020

Actives, Accidental: 0.03% per year for all ages in addition to ordinary mortality rates.

Healthy Retirees: Pub-2010 Safety Healthy Retiree Below-Median Income Weighted

mortality, projected fully generationally with Scale MP-2020

Disabled Retirees: Pub-2010 Safety Disabled Retiree mortality, projected fully

generationally with Scale MP-2020

Beneficiaries: Pub-2010 General Retiree Below-Median Income Weighted

mortality, projected fully generationally with Scale MP-2020

2. Disability:

10% of disabilities are assumed ordinary and the remaining 90% are accidental disabilities.

Age	Disability (%)
25	0.0256
35	0.5080
45	0.9400
55	1.0000
60	1.0000



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

3. Withdrawal Rates before Retirement:

Service-related rates based on experience; see the table of sample rates.

Years of Service	Withdrawal (%)
0	13.0
1	12.0
2	11.0
3	10.0
4	9.0
5	8.0
6	7.0
7	6.0

Years of	Withdrawal
Service	(%)
8	5.0
9	4.0
10	3.5
11	3.0
12	2.5
13	2.0
14	1.5
15+	1.5

4. DROP Rates:

	DROP
Years of Service	Rate (%)
20	40
21	15
22-29	5
30	65

5. Retirement Rates:

Years of Service	Retirement Rate (%)
20	14
21	10
22-23	8
24-26	4
27-29	2
30	35

DROP and retirement rates are additive, so at 30 years of service, the chance of either entering DROP or retirement is 100%. All members are assumed to retire by age 65.

6. Marriage

75% of male active members are assumed to be married and 50% of female active members. The male spouse is assumed to be 3 years older than the female.



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

7. Children

Each member is assumed to have 1.5 children at retirement, disability, or death; the child is assumed to be 30 years younger than the member and to receive benefits until he or she is 20 years old.

8. DROP Participation

Members participate in DROP based on their completed service; see table for rates

- No disability is assumed while in DROP
- One-third of participants are expected to retire from DROP after four years
- One-third of participants are expected to re-enter the plan after five years in DROP and remain in the plan for two years
- The remaining third of participants are expected to re-enter the plan after five years in DROP and remain in the plan for eight years

9. Special Advisor and Consultant Benefits

Assumed to be paid to all eligible members.

10. Form of Payment

There are no optional forms of payment; automatic survivor benefits are paid to all members.

11. Investment Return

7.00% compounded annually for funding purposes, net of investment expenses.

12. Salary Increases

Wage inflation is assumed to be 3.0%. Individual salaries are expected to increase according to the following table which includes wage inflation and promotion.

Service	Salary Increase (%)
0-9	6.25
10-19	3.50
20+	3.00

13. Cost-of-Living Adjustments

2.5% per year.



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

14. Administrative Expenses

Prior year actual expenses increased by the assumed inflation rate (2.5%), rounded to the nearest \$1,000.

15. Interest on Member Contributions

4% per year

16. Rationale for actuarial assumptions

The actuarial assumptions were adopted by the Board of Trustees based upon recommendations made in an actuarial experience study performed by Cheiron covering the years 2015 through 2020 subsequent to the October 1, 2020 valuation. The rationale for such changes is contained in the experience study report presented to the Board on June 23, 2021 and in a discount rate review presented to the Board on September 29, 2021.

17. Changes in Actuarial Assumptions from the October 1, 2021 actuarial valuation

None.



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Actuarial Value of Assets

The market value of assets less unrecognized returns in each of the last five years, but no earlier than October 1, 2005. Initial unrecognized return is equal to the difference between the actual market return and expected return on the actuarial value of assets and is recognized over a five-year period. The actuarial value is further adjusted, if necessary, to be within 20% of the market value. The actuarial asset value was initialized at the market value as of October 1, 2005.

2. Actuarial Cost Method

For determining contributions, the cost method used in this valuation is the Aggregate Cost method. Under this method, the difference between the present value of future benefits and the actuarial value of assets is allocated as a level percentage over the future salary of the participants.

There is no actuarial accrued liability with this method. For accounting purposes, the actuarial accrued liability is determined under the entry age normal method.

3. Valuation Software

Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have a basic understanding of it and have used ProVal in accordance with its original intended purpose. We have not identified any material inconsistencies in the assumptions or output of ProVal that would affect this actuarial valuation.

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

4. Changes in Actuarial Methods since the October 1, 2021 actuarial valuation

None



APPENDIX C – SUMMARY OF PLAN PROVISIONS

The plan provisions are the same as those summarized in the October 1, 2021 Actuarial Valuation Report.





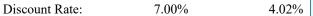
FYE	Projected Beginning Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expense	Projected Investment Earnings	Projected Ending Fiduciary Net Position	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments
2022	931,812,852	42,461,661	77,834,206	1,242,879	0	792,414,640	77,834,206	0
2023	792,414,640	40,436,690	75,725,801	1,206,644	54,213,277	810,132,162	75,725,801	0
2024	810,132,162	40,871,599	79,143,552	1,146,105	55,352,953	826,067,056	79,143,552	0
2025	826,067,056	40,544,570	81,060,919	1,097,722	56,392,835	840,845,820	81,060,919	0
2026	840,845,820	40,304,757	83,583,134	1,068,375	57,333,322	853,832,391	83,583,134	0
2027	853,832,391	42,515,863	84,932,723	1,035,017	58,273,173	868,653,687	84,932,723	0
2028	868,653,687	40,364,107	86,708,082	976,145	59,177,565	880,511,132	86,708,082	0
2029	880,511,132	38,797,611	88,848,047	949,473	59,880,972	889,392,195	88,848,047	0
2030	889,392,195	36,424,797	90,047,382	874,732	60,382,308	895,277,186	90,047,382	0
2031	895,277,186	34,464,896	90,366,752	831,320	60,717,325	899,261,335	90,366,752	0
2032	899,261,335	32,747,858	89,772,723	801,326	60,958,607	902,393,751	89,772,723	0
2033	902,393,751	31,170,952	90,843,954	772,163	61,087,763	903,036,349	90,843,954	0
2034	903,036,349	29,625,849	90,680,846	745,119	61,086,123	902,322,357	90,680,846	0
2035	902,322,357	28,336,046	89,578,674	727,035	61,030,310	901,383,004	89,578,674	0
2036	901,383,004	26,919,020	91,525,362	699,861	60,849,752	896,926,552	91,525,362	0
2037	896,926,552	25,645,404	91,709,276	685,283	60,488,151	890,665,549	91,709,276	0
2038	890,665,549	24,049,207	90,156,773	647,063	60,049,692	883,960,611	90,156,773	0
2039	883,960,611	22,725,303	91,222,604	620,297	59,499,041	874,342,054	91,222,604	0
2040	874,342,054	21,054,691	92,253,478	572,779	58,734,425	861,304,913	92,253,478	0
2041	861,304,913	19,389,866	91,759,356	524,479	57,783,205	846,194,149	91,759,356	0
2042	846,194,149	17,635,697	92,317,110	459,578	56,648,136	827,701,293	92,317,110	0
2043	827,701,293	16,019,567	90,764,032	400,761	55,353,490	807,909,557	90,764,032	0
2044	807,909,557	14,810,003	89,794,445	361,642	53,961,158	786,524,631	89,794,445	0
2045	786,524,631	13,711,508	87,504,122	326,460	52,506,432	764,911,989	87,504,122	0
2046	764,911,989	12,611,851	86,127,565	287,310	51,004,422	742,113,386	86,127,565	0
2047	742,113,386	11,596,123	84,408,609	253,140	49,433,892	718,481,652	84,408,609	0
2048	718,481,652	10,495,537	83,611,440	213,125	47,770,607	692,923,232	83,611,440	0
2049	692,923,232	9,375,709	82,270,603	173,199	45,990,496	665,845,635	82,270,603	0
2050	665,845,635	8,252,131	80,911,467	130,460	44,104,640	637,160,478	80,911,467	0
2051	637,160,478	7,142,674	79,617,479	85,785	42,104,566	606,704,455	79,617,479	0



FYE	Projected Beginning Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expense	Projected Investment Earnings	Projected Ending Fiduciary Net Position	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments
2052	606,704,455	6,077,476	78,734,418	42,677	39,967,860	573,972,696	78,734,418	0
2053	573,972,696	5,045,788	77,009,745	0	37,701,950	539,710,689	77,009,745	0
2054	539,710,689	4,583,127	75,422,907	0	35,342,290	504,213,200	75,422,907	0
2055	504,213,200	4,142,329	73,279,608	0	32,916,045	467,991,965	73,279,608	0
2056	467,991,965	3,743,730	70,738,526	0	30,454,278	431,451,446	70,738,526	0
2057	431,451,446	3,369,709	68,540,615	0	27,959,198	394,239,738	68,540,615	0
2058	394,239,738	3,007,397	66,401,794	0	25,415,504	356,260,845	66,401,794	0
2059	356,260,845	2,649,506	64,202,095	0	22,820,355	317,528,611	64,202,095	0
2060	317,528,611	2,308,960	61,841,031	0	20,178,621	278,175,160	61,841,031	0
2061	278,175,160	1,986,970	59,609,310	0	17,489,589	238,042,409	59,609,310	0
2062	238,042,409	1,676,383	57,361,033	0	14,746,969	197,104,728	57,361,033	0
2063	197,104,728	1,376,410	55,105,640	0	11,948,613	155,324,110	55,105,640	0
2064	155,324,110	1,086,299	52,851,550	0	9,091,547	112,650,407	52,851,550	0
2065	112,650,407	805,335	50,603,484	0	6,172,072	69,024,329	50,603,484	0
2066	69,024,329	532,833	48,358,994	0	3,186,098	24,384,266	48,358,994	0
2067	24,384,266	268,142	46,123,767	0	129,096	0	24,384,266	21,739,501
2068	0	10,638	43,898,870	0	0	0	0	43,898,870
2069	0	0	41,690,769	0	0	0	0	41,690,769
2070	0	0	39,508,479	0	0	0	0	39,508,479
2071	0	0	37,355,262	0	0	0	0	37,355,262
2072	0	0	35,232,855	0	0	0	0	35,232,855
2073	0	0	33,143,092	0	0	0	0	33,143,092
2074	0	0	31,089,411	0	0	0	0	31,089,411
2075	0	0	29,073,425	0	0	0	0	29,073,425
2076	0	0	27,097,495	0	0	0	0	27,097,495
2077	0	0	25,164,792	0	0	0	0	25,164,792
2078	0	0	23,279,188	0	0	0	0	23,279,188
2079	0	0	21,445,049	0	0	0	0	21,445,049
2080	0	0	19,667,137	0	0	0	0	19,667,137
2081	0	0	17,950,086	0	0	0	0	17,950,086



FYE	Projected Beginning Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expense	Projected Investment Earnings	Projected Ending Fiduciary Net Position	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments
2082	0	0	16,298,617	0	0	0	0	16,298,617
2083	0	0	14,717,507	0	0	0	0	14,717,507
2084	0	0	13,211,114	0	0	0	0	13,211,114
2085	0	0	11,783,519	0	0	0	0	11,783,519
2086	0	0	10,438,464	0	0	0	0	10,438,464
2087	0	0	9,179,283	0	0	0	0	9,179,283
2088	0	0	8,008,654	0	0	0	0	8,008,654
2089	0	0	6,928,597	0	0	0	0	6,928,597
2090	0	0	5,940,293	0	0	0	0	5,940,293
2091	0	0	5,043,976	0	0	0	0	5,043,976
2092	0	0	4,239,012	0	0	0	0	4,239,012
2093	0	0	3,523,503	0	0	0	0	3,523,503
2094	0	0	2,894,491	0	0	0	0	2,894,491
2095	0	0	2,348,142	0	0	0	0	2,348,142
2096	0	0	1,879,645	0	0	0	0	1,879,645
2097	0	0	1,483,339	0	0	0	0	1,483,339
2098	0	0	1,152,948	0	0	0	0	1,152,948
2099	0	0	881,808	0	0	0	0	881,808
2100	0	0	662,996	0	0	0	0	662,996
2101	0	0	489,551	0	0	0	0	489,551
2102	0	0	354,666	0	0	0	0	354,666
2103	0	0	251,872	0	0	0	0	251,872
2104	0	0	175,206	0	0	0	0	175,206
2105	0	0	119,286	0	0	0	0	119,286
2106	0	0	79,436	0	0	0	0	79,436
2107	0	0	51,710	0	0	0	0	51,710
2108	0	0	32,889	0	0	0	0	32,889
2109	0	0	20,431	0	0	0	0	20,431
2110	0	0	12,394	0	0	0	0	12,394
						Discount Rate:	7 00%	4 02%





FYE	Projected Beginning Fiduciary Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expense	Projected Investment Earnings	Projected Ending Fiduciary Net Position	"Funded" Portion of Benefit Payments	"Unfunded" Portion of Benefit Payments
						Present Value:	\$ 1,144,471,109	\$ 67,233,308
						Total Present Value:		\$ 1,211,704,416
						GASB Discount Rate:		6.65%





APPENDIX E – GLOSSARY OF TERMS

1. Actuarially Determined Contribution

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

2. Actuarial Valuation Date

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

3. Deferred Inflow of Resources

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

4. Deferred Outflow of Resources

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

5. Entry Age Actuarial Cost Method

The actuarial cost method required for GASB 67 and 68 calculations. Under this method, the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this actuarial present value allocated to a valuation year is called the Service Cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future service costs is called the Total Pension Liability.

6. Measurement Date

The date as of which the Total Pension Liability and Plan Fiduciary Net Position are measured. The Total Pension Liability may be projected from the Actuarial Valuation Date to the Measurement Date. The Measurement Date must be the same as the Reporting Date for the plan.



APPENDIX E – GLOSSARY OF TERMS

7. Net Pension Liability

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

8. Plan Fiduciary Net Position

The fair or market value of assets.

9. Reporting Date

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

10. Service Cost

The portion of the actuarial present value of projected benefit payments that is attributed to the current period of employee service in conformity with the requirements of GASB 67 and 68. The Service Cost is the normal cost calculated under the entry age actuarial cost method.

11. Total Pension Liability

The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of GASB 67 and 68. The Total Pension Liability is the actuarial liability calculated under the entry age actuarial cost method. This measurement generally is not appropriate for estimating the cost to settle the Plan's liabilities.





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