Employees' Retirement Fund of the City of Fort Worth

Annual Actuarial Valuation
as of December 31, 2023

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April 18, 2024

Board of Trustees
Employees' Retirement Fund of the City of Fort Worth
3801 Hulen Street, Suite 101
Fort Worth, TX 76107

Re: Actuarial Valuation for Funding Purposes as of December 31, 2023

Members of the Board:

We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Employees' Retirement Fund of the City of Fort Worth (FWERF) as of December 31, 2023. This report was prepared at the request of the Board and is intended for use by FWERF staff and those designated or approved by the Board. This report may be provided to parties other than FWERF only in its entirety and only with the permission of the Board.

Actuarial Valuation

The primary purposes of the actuarial valuation report are to determine the adequacy of the current City contribution rate, describe the current financial condition of FWERF, analyze changes in the condition of FWERF, and provide various summaries of the data. This report should not be relied on for any purpose other than the purposes described herein.

Plan Provisions

Our actuarial valuation as of December 31, 2023 reflects the benefit and contribution provisions set forth in Vernon's Texas Revised Civil Statutes, Article 6243i, Article I of Chapter 2.5 of the Code of the City of Fort Worth (City Code), and the Administrative Rules of FWERF. The current plan provisions are outlined in the Appendix titled Summary of Plan Provisions.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on December 20, 2023 based on the experience investigation that covered the four-year period from January 1, 2019 through December 31, 2022. In accordance with the Administrative Rules of FWERF, all actuarial assumptions and methodologies must be adopted by the Board upon the advice of the Actuary.

We believe the assumptions are internally consistent and are reasonable, and where appropriate are based on the actual experience of FWERF. The current actuarial assumptions and methods are outlined in the Appendix titled Summary of Actuarial Assumptions and Methods.

Results presented in this report are developed using the actuarial assumptions and methods disclosed in this report. 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; and changes in plan provisions or applicable law. This report does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of the investment and other significant risks that may have a material effect on the plan's financial condition.

Data

The valuation was based upon information as of December 31, 2023, furnished by FWERF staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal 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 FWERF staff.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code and ERISA.

The signing actuaries are independent of the plan sponsor. Mr. Newton is Fellow of the Soceity of Actuaries and Mr. Detweiler is an Associate of the Society of Actuaryies. They are each Enrolled Actuaries, Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Joseph Newton, FSA, EA, MAAA
Pension Market Lead and Actuary

Bill Detweiler, ASA, EA, FCA, MAAA
Consultant and Actuary

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SECTION A

EXECUTIVE SUMMARY

Executive Summary

	December 31, 2023	December 31, 2022
Membership		
• Number of		
- Active members	6,954	6,656
- Retirees and beneficiaries	5,177	5,037
- Inactive, vested	539	491
- Inactive, nonvested	1,533	1,247
- Total	14,203	13,431
• Member Contributory Payroll	$ 610,607,668	$571,796,707
• City Contributory Payroll	$ 585,446,432	$556,072,446
Effective Contribution Rates (excludes risk-sharing contributions)		
• Members	11.10%	11.14%
• City	24.47%	24.48%
Actuarially Determined City Contribution	$ 181,488,394	$175,663,286
• % of City Contributory Payroll	31.00%	31.59%
• Amortization Period	25 years	26 years
Assets		
• Market value (MVA)	$ 2,739,641,644	$2,576,294,075
• Actuarial value (AVA)	$ 2,827,229,055	$2,740,773,791
• Return on market value	8.9%	-7.9%
• Return on actuarial value	5.5%	6.0%
Actuarial Information on AVA (smoothed)		
• Normal cost % (exclude admin)	15.54%	15.86%
• Total normal cost	$ 94,888,432	$90,686,958
• Actuarial accrued liability	$ 5,130,222,737	$4,998,115,041
• Unfunded actuarial accrued liability (UAAL)	$ 2,302,993,682	$2,257,341,250
• Funded ratio	55.1%	54.8%
Actuarial Information on MVA		
• Unfunded actuarial accrued liability (UAAL)	$ 2,390,581,093	$2,421,820,966
• Funded ratio	53.4%	51.5%

Executive Summary (continued)

Eliminating the UAAL

Based on the recent modifications made to FWERF, multiple funding periods are calculated as part of the actuarial valuation and used for different purposes:

1. The funding period and the Actuarially Determined Employer Contribution (ADEC) are calculated at the valuation date based on the current statutory contribution rates for members and the City, excluding Risk-Sharing Contributions and Ad Hoc COLAs, to determine if Risk-Sharing Contributions and Ad Hoc COLAs should be paid.

Funding Period based on Actuarial Value of Assets	**2023**	**2022**
Incorporating only statutory contribution rates	47 years	55 years
Period Dictated by Funding Policy	25 years	26 years
Employer Contribution Rate Necessary to Meet Funding Policy	31.00%	31.59%

Funding Period based on Market Value of Assets	**2023**	**2022**
Incorporating only statutory contribution rates	53 years	74 years
Period Dictated by Funding Policy	25 years	26 years
Employer Contribution Rate Necessary to Meet Funding Policy	31.96%	33.44%

2. The funding period is also calculated to incorporate the projected Risk-Sharing Contributions and Ad Hoc COLAs which is the most reasonable estimate for the time until the UAAL is eliminated.

Funding Period Incorporating Projected Risk Sharing Contributions and Ad Hoc COLAs	**2023**	**2022**
Based on Actuarial Value of Assets	32 years	36 years
Based on Market Value of Assets	35 years	41 years

The amounts noted above assume that there will be no future actuarial gains and losses.

SECTION B

DISCUSSION

Discussion

Introduction

The results of the December 31, 2023 actuarial valuation of the Employees' Retirement Fund of the City of Fort Worth (FWERF) are presented in this report.

The primary purposes of the actuarial valuation report are to determine the adequacy of the current City contribution rate, describe the current financial condition of FWERF, analyze changes in the condition of FWERF, and provide various summaries of the data. This report should not be relied on for any purpose other than the purposes described herein.

All of the tables referenced in the following discussion appear in Section C of this report.

Plan Provisions

There were no changes to the plan provisions during the past year. The current plan provisions are outlined in the Appendix titled Summary of Plan Provisions.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on December 20, 2023 based on the experience investigation that covered the four-year period from January 1, 2019 through December 31, 2022. In accordance with the Administrative Rules of FWERF, all actuarial assumptions and methodologies must be adopted by the Board upon the advice of the Actuary. We believe the assumptions are internally consistent and are reasonable, and where appropriate are based on the actual experience of FWERF.

A detailed account of the revised actuarial assumptions and methods can be found in our Actuarial Experience Study report dated December 13, 2023. A summary of key changes in assumptions and methods is highlighted below:

Economic Assumptions

- Increase the ultimate salary scale assumption used to project individual salary increases to 3.40% for general employees only. In addition, update service-based salary increase rates for each employee group consistent with actual experience and step schedules.
- Increase the assumed overtime pay for police officers to 7.50% of base pay and for firefighters to 25.00% of base pay.

Mortality Assumptions

- Model all future mortality improvements to the ultimate mortality improvement rates in the most recent MP tables.

Other Demographic Assumptions

- Update termination rates consistent with FWERF member experience and future expectations, including now using service-based rates for general employees in all years.
- Update retirement rates consistent with FWERF member experience and future expectations.
- Value sick leave service explicitly using the data provided.
- Update duty disability rates to 10% for general employees and 70% for police officers.

Results presented in this report are developed using the actuarial assumptions and methods disclosed in this report. 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; and changes in plan provisions or applicable law. This report does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of the investment and other significant risks that may have a material effect on the plan's financial condition.

The current actuarial assumptions and methods are outlined in the Appendix titled Summary of Actuarial Assumptions and Methods.

Funding Adequacy

As outlined in the City Code and the Funding Policy adopted by the Board, the funding objective of FWERF is to fund the sum of the normal cost, the assumed administrative expenses, and an amount necessary to eliminate the UAAL over a closed 30-year period beginning on December 31, 2018 with the goal of eliminating the UAAL and attaining a funded ratio of 100% by December 31, 2048. The resulting actuarially determined contribution rates should be established which, over time, are expected to remain level as a percent of payroll. As a result, the ADEC is based on a 30-year amortization of the UAAL as of December 31, 2018 (25 years remaining as of December 31, 2023) and is being amortized as a level percentage of payroll. This ADEC will be equal to the City's portion of the total contributions that are necessary to meet this funding objective and this ADEC is appropriate for use by the Board to monitor progress towards these funding goals. This ADEC can be considered a "Reasonable Actuarially Determined Contribution" as required by the Actuarial Standards of Practice.

FWERF receives member contributions of 9.35% of the Member Contributory Payroll for General members, 13.13% of the Member Contributory Payroll for Police members, and 12.05% of the Member Contributory Payroll for Fire members. Based on the current composition of the active plan population, the average member rate is 11.10% of the Member Contributory Payroll.

The City contributes 24.24% of the City Contributory Payroll for General and Fire members and 24.96% of the City Contributory Payroll for Police members to FWERF, as set by City ordinance. Based on the current composition of the active plan population, the average City rate is 24.47% of the City Contributory Payroll. The ADEC for 2024 is 31.00% of City Contributory Payroll, or $181.5 million, which exceeds the expected City contribution by 6.53% of City Contributory Payroll, or $38.2 million. As a result, the stated funding objective is not being met.

City Contributory Payroll includes unscheduled overtime for Tier I members and does not include unscheduled overtime for Tier II members. A detailed description of compensation and contributions is included in the Appendix titled Summary of Plan Provisions.

The City Code specifically defines an actuarially determined contribution (ADC) as a contribution "based on a closed 30-year funding of unfunded liabilities." In this context, the ADC is the sum of the anticipated member contributions and the City contributions. Since the City and the members contribute on a different payroll basis, it would not be accurate to add the City and member contribution rates together. As a result, the actuarial valuation will focus on the Actuarially Determined Employer Contribution (ADEC)

for purposes of reporting required contribution rates so it is clear which payroll basis is being considered. However, the ADEC will simply be determined as the projected ADC less the anticipated member contributions.

The unfunded actuarial accrued liability (UAAL) of FWERF increased from $2.26 billion as of December 31, 2022 to $2.30 billion as of December 31, 2023. The UAAL was expected to increase to $2.28 billion as of December 31, 2023 but the plan incurred a net experience loss of $21 million which increased the UAAL to $2.30 billion. The primary sources of the experience changes were a $41 million loss on the actuarial valuation of assets and a $20 million gain on liabilities. Table 8 demonstrates the calculation of the expected UAAL and summarizes the sources of actuarial experience for the past year.

Additionally, the funded ratio of FWERF—actuarial value of assets divided by the actuarial accrued liability— increased from 54.8% to 55.1% as of December 31, 2023. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

Table 1 provides a summary of the actuarial valuation results and details the calculation of the ADEC. Tables 2 and 3 provide additional detail regarding the Actuarial Present Value of Future Benefits and the Normal Cost, respectively. Finally, Table 4 provides a history of the funded status of FWERF.

Impact of Risk-Sharing Contributions and Ad Hoc COLA Provisions

The current statutory contribution rates for members and the City are expected to eliminate the UAAL in 47 years. As previously stated, the funding objective is to eliminate the UAAL by the year 2048. Since this funding objective is not being met, the members and City were both required to make risk-sharing contributions to the plan beginning in 2022. Specifically, the City and member contributions are increased as required to meet the ADC with 60% of the increases allocated to the City and the remaining 40% allocated to the members. The annual increase in the total contribution rate is capped at 2% of pay and the aggregate increase is capped at 4% of pay.

Based on results of this actuarial valuation, it is anticipated that the risk-sharing contributions that commenced in 2022 at a combined 2% of pay (the maximum level) and increased in 2023 to a combined 4% of pay (the maximum level) will continue at the current 4% through 2054. Incorporating the risk-sharing contributions, the average member rate for 2024 is 12.70% of the Member Contributory Payroll and the average City rate is 26.87% of the City Contributory Payroll.

As the funded status of the plan continues to improve, members that elected the Conditional Ad Hoc COLA will begin to receive increases once the funding period (incorporating only statutory contribution rates) reaches 28 years, or less. **Based on results of this actuarial valuation, it is anticipated that the Conditional Ad Hoc COLAs will be paid on an annual basis beginning in 2035.**

Finally, when the impact of the risk-sharing contributions and Conditional Ad Hoc COLAs are incorporated into the projection of the UAAL, the UAAL is projected to be eliminated in 32 years. This period falls within the 30 to 40-year period which should allow the current Funding Soundness Restoration Plan (FSRP) for FWERF to maintain the status as a "legacy" FSRP when the new 30-year FSRP requirements become effective in 2025.

System Assets

This report contains several tables that summarize key information with respect to the FWERF assets.

The total market value of assets increased from $2.58 billion to $2.74 billion as of December 31, 2023. Table 5 reconciles the changes in the fund during the year. Total contributions increased from $206 million to $231 million and total benefit payments (retirement benefits, DROP payments and refunds) decreased from $310 million to $288 million.

Table 6 shows the development of the actuarial value of assets (AVA). The AVA is a "smoothed" market value. A smoothed value is used in order to dampen some of the year-to-year fluctuations that would occur if the market value were used instead. The method phases in differences between the actual and expected market returns over five years. Additionally, offsetting unrecognized gains and losses are recognized immediately. The actuarial value is currently 3.2% more than the market value.

The approximate investment return for the fiscal year ending December 31, 2023 was 8.9% when measured on market value and 5.5% when measured on actuarial value. Table 7 shows a history of return rates. The FWERF ten-year average market return, calculated consistent with the actuarial assumptions with respect to expenses, is 6.2%.

Data

The valuation was based upon information as of December 31, 2023, furnished by FWERF staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal 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 FWERF staff.

The Appendix titled Summaries of Membership Data shows key census statistics for the various groups included in the valuation.

SECTION C

TABLES

Table 1

Development of Employer Cost

	December 31, 2023	December 31, 2022
1. Payroll		
a. Member Contributory Payroll	$ 610,607,668	$ 571,796,707
b. City Contributory Payroll	585,446,432	556,072,446
2. Normal Cost Rate (of Member Contributory Payroll)		
a. Total Normal Cost Rate	15.54%	15.86%
b. Effective Member Contribution Rate (Excluding Risk-Sharing)	11.10%	11.14%
c. City Normal Cost Rate (Item 2a - Item 2b)	4.44%	4.72%
3. Actuarial Accrued Liability for Active Members		
a. Present value of future benefits for active members	$ 2,891,910,903	$ 2,801,481,732
b. Less: present value of future normal costs	(839,895,894)	(814,798,171)
c. Actuarial accrued liability	$ 2,052,015,009	$ 1,986,683,561
4. Total Actuarial Accrued Liability for:		
a. Retirees and beneficiaries	$ 2,989,210,644	$ 2,931,141,246
b. Inactive members	88,997,084	80,290,234
c. Active members (Item 3c)	2,052,015,009	1,986,683,561
d. Total	$ 5,130,222,737	$ 4,998,115,041
5. Actuarial Value of Assets (AVA)	$ 2,827,229,055	$ 2,740,773,791
6. Unfunded Actuarial Accrued Liability (UAAL) (Item 4d - Item 5)	$ 2,302,993,682	$ 2,257,341,250
7. Actuarially Determined City Contribution Needed to Fund Normal Cost, Admin Expenses and Amortize the UAAL by 2048 Disregarding Risk Sharing Contributions		
a. Total (MOY)	$ 181,488,394	$ 175,663,286
b. % of City Contributory Payroll	31.00%	31.59%
8. Funding period based on statutory contribution rates and AVA (years)	47	55
9. Funding period incorporating Risk Sharing Contributions, Conditional Ad Hoc COLAs and AVA (years)	32	36

Table 2

Actuarial Present Value of Future Benefits

		December 31, 2023	December 31, 2022
1.	Active Members		
	a. Retirement benefits	$ 2,718,592,771	$2,591,383,480
	b. Disability benefits	6,682,863	6,177,915
	c. Pre-retirement death benefits	19,258,877	19,963,498
	d. Termination	147,376,392	183,956,839
	e. Total	$ 2,891,910,903	$2,801,481,732
2.	Inactive Members	$ 88,997,084	$80,290,234
3.	Annuitants	$ 2,989,210,644	$2,931,141,246
4.	Total Actuarial Present Value of Future Benefits	$ 5,970,118,631	$5,812,913,212

Table 3

Analysis of Normal Cost

		Amount (MOY)	Percentage of Member Contributory Payroll
1.	Gross Normal Cost		
	a. Retirement benefits	$ 76,142,776	12.47%
	b. Disability benefits	488,486	0.08%
	c. Pre-retirement death benefits	976,972	0.16%
	d. Termination	17,280,198	2.83%
	e. Total	$ 94,888,432	15.54%
2.	Expected Member Contributions (Excluding Risk-Sharing Contributions)	$ 67,777,451	11.10%
3.	Net City Normal Cost	$ 27,110,981	4.44%
4.	Assumed Administrative Expenses	$ 6,300,000	1.03%

Table 4

Schedule of Funding Progress

Valuation Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll*	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
December 31, 2007	$ 1,821,688,380	$ 2,059,232,093	$ 237,543,713	88.5%	$ 359,308,283	66.1%
December 31, 2008	1,596,392,591	2,192,128,182	595,735,591	72.8%	372,942,445	159.7%
December 31, 2009	1,868,805,569	2,300,542,572	431,737,003	81.2%	368,334,524	117.2%
December 31, 2010	1,894,740,077	2,473,704,487	578,964,410	76.6%	367,639,226	157.5%
December 31, 2011	1,869,656,263	2,617,862,133	748,205,870	71.4%	383,801,802	194.9%
December 31, 2012	1,854,871,487	2,909,019,272	1,054,147,785	63.8%	375,687,978	280.6%
December 31, 2013	1,995,112,935	3,124,079,563	1,128,966,628	63.9%	373,848,113	302.0%
December 31, 2014	2,094,381,418	3,365,534,522	1,271,153,104	62.2%	389,527,874	326.3%
December 31, 2015	2,154,874,311	3,553,200,981	1,398,326,670	60.6%	404,303,585	345.9%
December 31, 2016	2,209,893,867	3,780,554,300	1,570,660,433	58.5%	433,956,825	361.9%
December 31, 2017	2,288,265,169	3,956,724,359	1,668,459,190	57.8%	460,564,650	362.3%
December 31, 2018	2,324,698,216	4,438,326,161	2,113,627,945	52.4%	485,336,445	435.5%
December 31, 2019	2,400,393,264	4,586,884,563	2,186,491,299	52.3%	504,398,247	433.5%
December 31, 2020	2,522,727,631	4,745,801,026	2,223,073,395	53.2%	511,922,873	434.3%
December 31, 2021	2,692,751,013	4,891,936,665	2,199,185,652	55.0%	534,927,039	411.1%
December 31, 2022	2,740,773,791	4,998,115,041	2,257,341,250	54.8%	556,072,446	405.9%
December 31, 2023	2,827,229,055	5,130,222,737	2,302,993,682	55.1%	585,446,432	393.4%

* City Contributory Payroll for valuation dates beginning December 31, 2016

Table 5

Reconciliation of Plan Net Assets

	Year Ending December 31, 2023 (1)	Year Ending December 31, 2022 (2)
1. Market value of assets at beginning of year	$ 2,576,294,075	$ 2,912,495,617
2. Revenue for the year		
a. Contributions for the year		
i. City Contributions	$ 155,362,315	$ 139,088,662
ii. Member Contributions	76,108,151	66,847,109
iii. Total	$ 231,470,466	$ 205,935,771
b. Net investment income	$ 225,849,518	$ (225,349,381)
c. Total revenue	$ 457,319,984	$ (19,413,610)
3. Disbursements for the year		
a. Retirement benefits	$ 282,189,010	$ 304,254,070
b. Refunds paid	5,813,899	5,932,356
c. Administrative expenses	5,969,506	6,601,506
d. Total expenditures	$ 293,972,415	$ 316,787,932
4. Increase in net assets (Item 2c - Item 3d)	$ 163,347,569	$ (336,201,542)
5. Market value of assets at end of year (Item 1 + Item 4)	$ 2,739,641,644	$ 2,576,294,075
6. Estimated dollar weighted market yield	8.9%	-7.9%

Table 6

Development of Actuarial Value of Assets

	Year Ending December 31, 2023
1. Market value of assets at beginning of year	$ 2,576,294,075
2. Net new investments	
a. Contributions	$ 231,470,466
b. Disbursements	(293,972,415)
c. Subtotal	$ (62,501,949)
3. Market value of assets at end of year	$ 2,739,641,644
4. Net earnings (3-1-2c)	$ 225,849,518
5. Assumed investment return rate	7.00%
6. Expected return	$ 178,153,017
7. Excess return (4-6)	$ 47,696,501

8. Development of amounts to be recognized as of December 31, 2023:

Year	Remaining Deferrals of Excess (Shortfall) of Investment Income (1)	Offsetting of Gains/(Losses) (2)	Net Deferrals Remaining (3) = (1) + (2)	Years Remaining (4)	Recognized for this valuation (5) = (3) / (4)	Remaining after this valuation (6) = (3) - (5)
2019	$ 0	$ 0	$ 0	1	$ 0	$ 0
2020	0	0	0	2	0	0
2021	0	0	0	3	0	0
2022	(164,479,716)	47,696,501	(116,783,215)	4	(29,195,804)	(87,587,411)
2023	47,696,501	(47,696,501)	0	5	0	0
Total	$ (116,783,215)	$ 0	$ (116,783,215)		$ (29,195,804)	$ (87,587,411)

9. Preliminary actuarial value of assets (3-8)	$ 2,827,229,055
10. 80% of market value	$ 2,191,713,316
11. 120% of market value	$ 3,287,569,972
12. Actuarial value of assets (9 not less than 10 or greater than 11)	$ 2,827,229,055
13. Actuarial value as percentage of market value	103.2%
14. Estimated actuarial value yield	5.5%

Table 7

History of Investment Return Rates

Year Ending December 31 of	Market	Actuarial
(1)	(2)	(3)
2007	5.3%	11.5%
2008	-29.1%	-11.4%
2009	21.3%	18.9%
2010	10.8%	2.7%
2011	-0.3%	0.0%
2012	11.0%	1.0%
2013	12.1%	10.0%
2014	4.7%	7.6%
2015	-0.3%	5.4%
2016	8.0%	6.2%
2017	14.6%	7.2%
2018	-3.6%	5.9%
2019	15.2%	6.4%
2020	10.0%	7.6%
2021	15.8%	9.5%
2022	-7.9%	6.0%
2023	8.9%	5.5%
Average Returns		
Last Five Years:	8.0%	7.0%
Last Ten Years:	6.2%	6.7%
Last Fifteen Years:	7.7%	6.6%

Table 8

Total Experience Gain or Loss

Item		Year Ending December 31, 2023
(1)		(2)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year		$ 2,257,341,250
2. Normal cost for the year (excluding administrative expenses)		90,686,958
3. Actual administrative expenses		5,969,506
4. Contributions for the year		(231,470,466)
5. Interest at 7.00%		
a. On UAAL		$ 158,013,888
b. On normal cost and administrative expenses		3,382,976
c. On contributions		(8,101,466)
d. Total		$ 153,295,398
6. Assumption change (Gains)/Losses		$ 6,242,574
7. Plan changes		0
8. Expected UAAL (Sum of Items 1 through 7)		2,282,065,220
9. Actual UAAL		2,302,993,682
10. Total (gain)/loss for the year (Item 9 - Item 8)		$ 20,928,462
B. Source of gains and losses	% of AAL	
11. Asset (Gain)/Loss for the year	0.79%	$ 40,709,384
12. Pay Increases (Less)/Greater than Expected	0.30%	(15,271,541)
13. Non-Retired Demographic (Gains)/Losses	0.15%	(7,457,268)
14. Post-Retirement Mortality (Gains)/Losses	0.01%	(502,681)
15. Other (Gains)/Losses	0.07%	3,450,568
16. Total (Sum of Items 11 through 15)	0.41%	$ 20,928,462

APPENDICES

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth

Membership

Membership in the Fund is a condition of employment for all City employees, except:

Elected officers and non-salaried appointed members of administrative boards and commissions,
Part-time, temporary and contract employees, and
Employees paid partly by a county, state, or other governmental agency.

Categories of Members

Tier I: General Employees hired prior to July 1, 2011
Police Officers hired prior to January 1, 2013
Firefighters hired prior to January 10, 2015

Tier II: General Employees hired on or after July 1, 2011
Police Officers hired on or after January 1, 2013
Firefighters hired on or after January 10, 2015

Benefit Service

Blue: Earned prior to October 1, 2013 for Tier I General Employees and Police Officers
Earned prior to January 10, 2015 for Tier I Firefighters

Orange: Earned between October 1, 2013 and July 19, 2019 for Tier I General Employees and Police Officers
Earned between January 10, 2015 and July 19, 2019 for Tier I Firefighters
Earned prior to July 20, 2019 for Tier II members

Gray: Earned on or after July 20, 2019 for all members

Compensation

Regular Earnings include base salary, acting pay, longevity, education incentive, assignment pay, holiday, safety award, shift differential, incentive pay, built-in overtime for firefighters, and any weekly Worker's Compensation benefits. For Tier I members, Regular Earnings also includes vacation sellback and wellness pay. Earnings with Overtime are Regular Earnings plus unscheduled overtime.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Contributions

General Employees	9.35% of Member Contributory Payroll
Police Officers	13.13% of Member Contributory Payroll
Firefighters	12.05% of Member Contributory Payroll
City	24.24% of City Contributory Payroll for General Employees and Firefighters and 24.96% of City Contributory Payroll for Police Officers

Effective July, 2019, General Employees contribute an additional 0.7% of Member Contributory Payroll until the earliest of the following: 1) the member retires; 2) the member terminates employment; or 3) the member has made additional 0.7% contributions for a period of time that is equal to the amount of credited service the member earned or purchased prior to October 1, 2013.

Member Contributory Payroll is Earnings with Overtime for all members. City Contributory Payroll is Earnings with Overtime for Tier I members and Regular Earnings for Tier II members.

If the total contribution is less than the ADC for two consecutive years, the City and member contributions will be increased as required to meet the ADC with 60% of the increases allocated to the City and the remaining 40% allocated to the members. The annual increase in the total contribution rate will be capped at 2% of pay and the aggregate increase will be capped at 4% of pay. These increases cannot commence prior to January 1, 2022. For both 2022 and 2023, City contributions were increased by 1.2% of pay and member contributions were increased by 0.8% of pay, for a total increase of 2.4% for City contributions and 1.6% for member contributions. The cap of 4% on the aggregate increase has been reached so no additional increases are scheduled.

Final Average Compensation (FAC)

Average of highest compensation as noted below:

Blue Service:	Earnings with Overtime earned over three calendar years
Orange Service:	Regular Earnings earned over five calendar years
Gray Service:	Regular Earnings earned over five calendar years

For members who were not vested on October 23, 2007, increases in calendar year earnings used to determine Final Average Compensation for Blue Service benefits are subject to a 12% cap.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Normal (Unreduced) Retirement

Eligibility

Age 65 with 5 years of eligibility service, or

Age plus years of eligibility service equal at least 80 (minimum age of 55 for Tier II General Employees), or

For Police Officers, any age with 25 years of eligibility service (Special Retirement).

Benefit Formula

3.00% of Blue Service FAC multiplied by years of Blue Benefit Service, plus
2.50% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
2.50% of Gray Service FAC multiplied by years of Gray Benefit Service.

Early (Reduced) Retirement

Eligibility

Age 50 with 5 years of eligibility service (minimum age of 55 for Tier II General Employees)

Benefit Formula

2.75% of Blue Service FAC multiplied by years of Blue Benefit Service and ERF, plus
2.25% of Orange Service FAC multiplied by years of Orange Benefit Service and ERF, plus
2.25% of Gray Service FAC multiplied by years of Gray Benefit Service and ERF.

Early Retirement Factor (ERF)

5/12% for each month the pension commences before the member's Normal Retirement Date (the date the member would have first become eligible for Normal Retirement had they remained in active service)

In Line of Duty Disability Retirement

Eligibility

No minimum age or service requirements

Benefit Formula

Tier I: 2.75% of Blue Service FAC multiplied by years of Blue Benefit Service, plus
2.75% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
2.75% of Gray Service FAC multiplied by years of Gray Benefit Service.

Tier II: 2.25% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
2.25% of Gray Service FAC multiplied by years of Gray Benefit Service.

Special Provision

Gray Benefit Service is projected to Normal Retirement Date.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Not In Line of Duty Disability Retirement

Eligibility

5 years of eligibility service

Benefit Formula

2.75% of Blue Service FAC multiplied by years of Blue Benefit Service, plus
2.25% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
2.25% of Gray Service FAC multiplied by years of Gray Benefit Service.

Deferred Vested Benefit – Normal and Early Vested Retirement

Eligibility

5 years of eligibility service

Benefit Formula

Same formula applicable to either Early Retirement or Normal Retirement

Commencement Date

Member may elect to commence on either Early Retirement Date or Normal Retirement Date (the dates the member would have first become eligible for Early or Normal Retirement had they remained in active service)

Termination Benefit

A refund of employee contributions with interest is payable in cases where a terminated member does not meet the eligibility requirements for an annuity or chooses to receive a refund of their account balance in lieu of an annuity. Interest accrues at an annual rate based on the two-year Treasury bill rate on the last pay date of the calendar year but stops accruing after termination.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

In Line of Duty Death Benefit – Active Member

Eligibility

No minimum age or service requirements

Benefit Formula

Tier I: 3.00% of Blue Service FAC multiplied by years of Blue Benefit Service, plus
3.00% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
3.00% of Gray Service FAC multiplied by years of Gray Benefit Service.

Tier II: 2.50% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
2.50% of Gray Service FAC multiplied by years of Gray Benefit Service.

Special Provision

Gray Benefit Service is projected to Normal Retirement Date. If member has reached their Normal Retirement Date, benefit formula for Normal Retirement will apply.

Benefit Options

i. Spouse receives 75% of accrued pension projected to Normal Retirement Date, but not less than $250 per month. In addition, each dependent child will receive $100 per month.
ii. If the member does not have a surviving spouse or other named survivor, beneficiary dependent children under 18 will equally share the total of 75% of accrued pension projected to Normal Retirement Date, but not less than $250 per month.
iii. If the member does not have a surviving spouse or dependent children, their dependent parent(s) will receive the pension that would have been paid to the spouse.
iv. If the member does not have a surviving spouse, dependent children or dependent parent(s), their beneficiary shall receive a refund of employee contributions with interest.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Not In Line of Duty Death Benefit – Active Member

Eligibility

5 years of eligibility service

Benefit Formula

2.75% of Blue Service FAC multiplied by years of Blue Benefit Service, plus
2.25% of Orange Service FAC multiplied by years of Orange Benefit Service, plus
2.25% of Gray Service FAC multiplied by years of Gray Benefit Service.

Special Provision

If member has reached their Normal Retirement Date, benefit formula for Normal Retirement will apply.

Benefit Options

i. Spouses receive 75% of accrued pension, but not less than $150 per month. In addition, each dependent child will receive $100 per month.
ii. If the member does not have a surviving spouse or other named survivor, beneficiary dependent children under 18 will equally share the total of 75% of accrued pension projected to Normal Retirement Date, but not less than $150 per month.
iii. If the member does not have a surviving spouse or dependent children, their dependent parent(s) will receive the pension that would have been paid to the spouse.
iv. If the member does not have a surviving spouse, dependent children or dependent parent(s), their beneficiary shall receive a refund of employee contributions with interest.

Death Benefit – Terminated Vested Member

If the member's years of age and years of eligibility service total at least 65 as of the date of the member's termination, the member's spouse and/or dependents are entitled to the same benefit as a member who dies while Not In Line of Duty.

If the member's age and years of service do not total at least 65, the surviving spouse and dependents may either:

i. Take a refund of employee contributions plus interest, or,
ii. Be eligible for the survivor benefit of 75% at the date the member would have been eligible to draw the benefit of Normal Vested Retirement or Early Vested Retirement.

If the member has no surviving spouse, dependent children or dependent parents, the beneficiary is entitled to a refund of employee contributions plus interest.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Death Benefit – Post-Retirement

Tier I

If married at least one year prior to retirement, pension benefits are paid in the form of a 75% joint and survivor annuity unless this form is rejected by the member and spouse. Unmarried members may elect to receive an actuarially reduced pension in the form of a 100%, 75%, 50% or 25% joint and survivor annuity with pop-up. Members that were not married at least one year prior to retirement may, after they have been married for two years, elect to receive an actuarially reduced pension in the form of a 75% joint and survivor annuity with pop-up.

Tier II

Members may elect an actuarially reduced pension in the form of a 100%, 75%, 50% or 25% joint and survivor annuity with pop-up.

Additionally, upon the death of the member, any children under 18 years of age will receive $100 per month until the earlier of attainment of age 18, marriage, or death. If after pension benefits cease the total amount of benefits paid to member and their survivors is less than the member's aggregate employee contributions with interest, the excess will be paid to member's designated beneficiary or estate.

Sick Leave and Major Medical Leave

In addition to regular benefit service, unused major medical leave for general employees and unused and unpaid Civil Service sick leave for police officers and firefighters is converted to benefit service at the time of retirement. This service cannot be used to reach retirement eligibility.

Only that portion of a member's accumulated sick leave and major medical leave that was earned prior to July 20, 2019 and that remains unused as of the date the person retires shall be taken into account in calculating that member's credited service, provided, however, that such balance shall never be taken into account in calculating the pension of a member receiving a line of duty disability pension.

Overtime Contribution (Cash Balance) Account

Contributions on overtime pay for Tier II General Employees who were employed between July 1, 2011 and September 30, 2013 were put in a "cash balance" account. Interest on this account accrues at an annual rate based on the two-year Treasury bill rate on the last pay date of the calendar year. Upon separating from service, the balance in this account will be paid to the member in the form of a lump sum payment. If at time of separation the member is eligible for retirement, the lump sum payout amount will be doubled.

Partial Lump Sum (Actuarial Equivalent) Option

Members eligible for Normal Retirement may elect to reduce their retirement benefit between 5% and 25% and receive the actuarial value of that reduction in a one-time lump sum payment.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Cost-of-Living Adjustment (COLA)

Tier I members are eligible for an annual increase to their Blue and Orange retirement benefits effective January 1, if they were receiving benefits prior to September 30 of the preceding year. Blue benefits may be increased by either the Guaranteed 2% COLA or the Conditional Ad Hoc COLA. Orange benefits are increased by the Guaranteed 2% COLA.

Tier II members are not eligible for a COLA.

Guaranteed 2% COLA

2% increase of base pension (simple interest)

Conditional Ad Hoc COLA

Varying increase of base pension plus aggregate COLAs (compound interest) depending on the funding period needed to pay off the Unfunded Actuarial Accrued Liability of the Plan

Funding Period	COLA Increase
28.1 or greater	0.0%
24.1 to 28.0	2.0%
18.1 to 24.0	3.0%
18.0 or less	4.0%

COLA increases are determined based on the prior year's valuation results. If the COLA increase causes the preliminary funding period to increase to a level that corresponds with a lower COLA increase, the lower COLA increase applies.

Members are not entitled to a COLA for any credited service earned on or after July 20, 2019.

Members who had not retired or entered the DROP effective January 1, 2021 had the Guaranteed and Condition Ad Hoc COLAs eliminated for all past and future service. These members may be granted a Variable COLA if the current contribution rate exceeds the closed 30-year funding policy for two consecutive years and the Variable COLA is approved by the FWERF Board of Trustees and the Fort Worth City Council.

Summary of Plan Provisions for Employees' Retirement Fund of the City of Fort Worth (continued)

Deferred Retirement Option Program (DROP)

Active members that are eligible for Normal Retirement may elect to participate in DROP. Upon entering DROP, benefit service and FAC are frozen. Then, an amount equal to the member's monthly pension benefit is credited to a DROP account. Member and City contributions continue during the DROP period. When separating from service, the member will be entitled to receive both the monthly pension benefit and payment of the DROP account balance. Interest is not credited to the DROP account.

The DROP account balance will continue to accrue for a maximum period of 72 months. Upon retirement, the member's pension benefit will be recalculated to include any additional benefit service accrued for unused sick leave and major medical leave. If the member completes at least two years of service after entering DROP, their pension benefit will include any retroactive COLAs accrued during the DROP period.

Effective September 2022, the following payment options are available for distribution of DROP account balances upon retirement:

- Lump sum payment of the entire DROP account balance
- Five equal, annual installments of the entire DROP account balance
- Convert the entire DROP account balance into an annuity and added to the pension

Summary of Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees on December 20, 2023 based on the experience investigation that covered the four-year period from January 1, 2019 through December 31, 2022. In accordance with the Administrative Rules of FWERF, all actuarial assumptions and methodologies must be adopted by the Board upon the advice of the Actuary.

I. Valuation Date

The valuation date is December 31 of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation is used to determine the adequacy of the current City contribution rate, describe the current financial condition of FWERF, analyze changes in the condition of FWERF, and provide various summaries of the data.

The actuarial valuation uses the Entry Age Normal (EAN) actuarial cost method. Under this method, the first step is to determine the contribution rate (level as a percentage of pay) required to provide the benefits to each member, or the normal cost rate. The normal cost rate consists of two pieces: (i) the member's contribution rate, and (ii) the remaining portion of the normal cost rate which is the employer's normal cost rate. Further, the total normal cost was determined using the "replacement life" application of EAN where the normal cost is based on each member's current benefit structure as though it has always been in place.

The Unfunded Actuarial Accrued Liability (UAAL) is the liability for future benefits which is in excess of (i) the actuarial value of assets, and (ii) the present value of future normal costs. The employer contribution provided in excess of the employer normal cost is applied to amortize the UAAL.

The projected funded status and the ADEC are calculated based on the assumption that: (a) future market earnings, net of investment-related expenses, will equal 7.00% per year, (b) there will be no liability gains/losses or changes in assumptions, (c) active members who leave employment will be replaced by new entrants each year such that the Member Contributory Payroll grows at the same rate as the payroll growth assumption, and (d) contributions will remain the same percentage of payroll as described in the Appendix titled Summary of Plan Provisions.

The Entry Age actuarial cost method is an "immediate gain" method (i.e., experience gains and losses are separately identified as part of the UAAL). However, they are amortized over the same period applied to all other components of the UAAL.

Summary of Actuarial Assumptions and Methods (continued)

III. *Actuarial Value of Assets*

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment returns in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continuing to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). In no event will this amount exceed 120% of market value or be less than 80% of market value.

IV. *Actuarial Assumptions*

Investment Return: 7.00% per year, net of investment-related expenses (composed of an assumed 2.50% inflation rate and a 4.50% real rate of return)

Mortality Decrements:

Pre-retirement

PubG-2010 Employee Mortality Table for General Employees and PubS-2010 Employee Mortality Table for Police Officers and Firefighters. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates from the MP-2020 tables.

Healthy Annuitants

PubG-2010 Healthy Retiree Mortality Table for General Employees and PubS-2010 Healthy Retiree Mortality Table for Police Officers and Firefighters. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates from the MP-2020 tables. The mortality for all surviving beneficiaries will be based on the PubG-2010 Healthy Retiree Mortality Table.

Disabled Annuitants

PubG-2010 Disability Mortality Table for General Employees and PubS-2010 Disability Mortality Table for Police Officers and Firefighters. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates from the MP-2020 tables.

In Line of Duty Death

The percentage of pre-retirement deaths assumed to be in the line of duty are:

General Employees:	0%
Police Officers:	10%
Firefighters:	10%

Summary of Actuarial Assumptions and Methods (continued)

Service Retirement Decrements:

Members Who Reach 80 Points Before Age 65

The following rates reflect the member's expected departure from active service and are applied based on years since first becoming eligible for Normal Retirement:

Year of Eligibility	General Employees	Police Officers	Firefighters
1st	30%	15%	10%
2nd	15	10	5
3rd	20	10	10
4th	25	20	10
5th	25	30	25
6th	25	40	40
7th	30	40	40
8th	30	40	40
9th	30	40	40
10th	100	100	100

Tier II General Employees who reach 80 points (age plus years of eligibility service) prior to age 55 will have their retirement rate increased by 20% in their first year of eligibility.

Members Who Do Not Reach 80 Points Before Age 65

The following rates reflect the member's expected departure from active service and are applied based on the member's age:

Age	General Employees	Police Officers	Firefighters
65-69	35%	100%	100%
70+	100	100	100

Summary of Actuarial Assumptions and Methods (continued)

Service Retirement Decrements (continued):

Early (Reduced) Retirement

Police Officers and Firefighters have zero assumed probability of retiring prior to eligibility for Normal (Unreduced) Retirement. The following age-based rates apply for General Employees:

Age	General Employees
50-56	1.5%
57-58	2.5
59-61	3.5
62	8.0
63-64	2.5

Deferred Retirement Option Program (DROP)

Every member who reaches Normal (Unreduced) Retirement eligibility prior to age 65 is assumed to enter DROP, leave active service in accordance with the assumed retirement rates, and have participated in DROP for the maximum possible period upon departure from active service. Members are assumed to take an immediate distribution of their entire DROP balance at retirement.

Inactive Vested Participants

Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity. Dependents of vested members that die prior to reaching Normal Retirement are assumed to elect a withdrawal of contributions.

Disability Retirement Decrements:

Disability Rates

Rates for males and females at selected ages are shown below:

Age	Rate
20	0.005%
25	0.006
30	0.009
35	0.013
40	0.018
45	0.027
50	0.044
55	0.076
60	0.100

Summary of Actuarial Assumptions and Methods (continued)

Disability Retirement Decrements (continued):

In Line of Duty Disability

The percentage of disability retirements assumed to be in the line of duty are:

General Employees:	10%
Police Officers:	70%
Firefighters:	15%

Termination Decrements for Reasons Other Than Death or Retirement:

Withdrawal Rates

The following service-based rates apply:

Years of Service	General Employees	Police Officers	Firefighters
0	22.00%	7.70%	3.00%
1	16.00	2.20	0.50
2	15.00	1.98	0.50
3	14.00	1.76	0.50
4	13.00	1.65	0.50
5	12.00	1.54	0.50
6	11.00	1.43	0.50
7	10.00	1.32	0.50
8	9.00	1.21	0.50
9	8.00	1.10	0.50
10	7.00	1.10	0.50
11	6.00	1.10	0.50
12	5.00	1.10	0.40
13	4.00	1.10	0.40
14	3.00	1.10	0.40
15	2.00	1.10	0.40
16	1.00	1.10	0.40
17	1.00	0.66	0.40
18	1.00	0.66	0.40
19	1.00	0.66	0.40
20+	1.00	0.66	0.00

All rates of termination are zero for members eligible for Normal Retirement.

Summary of Actuarial Assumptions and Methods (continued)

Salary Increases: Increases are assumed to occur at the beginning of the valuation year and vary by employee group. Salary increases include an underlying inflation component of 2.50% and a productivity component of 0.90% for general employees and 0.75% for police officers and firefighters.

Years of Service	General Employees	Police Officers	Firefighters
0	6.25%	28.25%	28.25%
1	6.05	18.25	18.25
2	5.85	8.25	8.25
3	5.65	8.25	9.75
4	5.45	8.25	9.75
5	5.25	5.75	5.75
6	5.05	4.50	3.25
7	4.85	4.50	3.25
8	4.65	4.50	4.75
9	4.45	4.50	4.75
10	4.25	4.50	3.25
11	4.05	4.50	3.25
12	3.85	4.50	3.25
13	3.65	4.50	4.75
14	3.65	5.75	4.75
15	3.65	5.75	3.25
16	3.65	5.75	3.25
17	3.65	5.75	3.25
18	3.65	4.50	3.25
19+	3.40	3.25	3.25

Valuation Payroll is the expected Regular Earnings for the calendar year following the valuation date. It is generally based on the actual pay for the prior year and increased with one year of expected salary increase.

Overtime Pay: Pay for Blue Service benefits for the upcoming year is based on the Valuation Payroll and increased by the following loads to account for unscheduled overtime pay:

General Employees:	3.50%
Police Officers:	7.50%
Firefighters:	25.00%

Summary of Actuarial Assumptions and Methods (continued)

Average Earnings Overtime Load: Blue Service benefits are loaded by the following percentages to account for higher than usual overtime worked during the final average earnings period:

General Employees:	0.00%
Police Officers:	2.00%
Firefighters:	6.00%

Sick Leave Service Conversions: Valued explicitly based on the data provided.

Cost-of-Living Adjustments (COLA): Members who have the Guaranteed 2% COLA are assumed to receive a 2% increase of their base pension amount. The open group projection associated with this valuation incorporates the provisions of the Conditional Ad Hoc COLA and the liability associated with future expected Conditional Ad Hoc COLAs.

Administrative Expenses: $6,300,000 for 2024. This amount is reviewed annually based on input from FWERF staff.

Payroll Growth: Member Contributory Payroll is assumed to grow at 3.00% per year. Future City Contributory Payroll incorporates the expected transition of the City contributing on Earnings with Overtime for Tier I members to the City contributing on Regular Earnings for Tier II members. As a result, the City Contributory Payroll is expected to increase by approximately 2.9% over the next 30 years.

Marital Assumptions: 80% of male members and 60% of female members are assumed to be married. Male member is assumed to be four years older than female beneficiary; and female member is assumed to be the same age as male beneficiary.

Decrement Timing: All decrements – mortality, service retirement, disability retirement, and termination of employment for reasons other than death or retirement – are assumed to occur at the middle of the valuation year.

Census Data and Assets

- The valuation was based on members of FWERF as of the actuarial valuation date and does not take into account future members.
- All census data was supplied by FWERF and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by FWERF.

Summary of Actuarial Assumptions and Methods (continued)

Actuarial Model: This report was prepared using ProVal's valuation model, a software product of Winklevoss Technologies. We are relying on the ProVal model. We performed tests of the ProVal model with this assignment and made a reasonable attempt to understand the developer's intended purpose of, general operation of, major sensitivities and dependencies within, and key strengths and limitations of the ProVal model. In our professional judgment, the ProVal valuation model has the capability to provide results that are consistent with the purposes of the valuation.

Summaries of Membership Data

Table A

Summary of Membership Data

		December 31, 2023 (1)	December 31, 2022 (2)
1.	Active members		
	a. Number	6,954	6,656
	b. Member Contributory Payroll	$ 610,607,668	$ 571,796,707
	c. Average salary	$ 87,807	$ 85,907
	d. Average age	43.9	44.1
	e. Average service	10.5	10.8
2.	Vested inactive members		
	a. Number	539	491
	b. Total annual deferred benefits	$ 10,046,399	$ 9,202,817
	c. Average annual deferred benefit	$ 18,639	$ 18,743
3.	Nonvested inactive members		
	a. Number	1,533	1,247
	b. Member contributions with interest due	$ 5,033,780	$ 4,173,870
	c. Average refund due	$ 3,284	$ 3,347
4.	Service retirees		
	a. Number	4,153	4,044
	b. Total annual benefits	$ 217,062,934	$ 208,137,179
	c. Average annual benefit	$ 52,267	$ 51,468
5.	Disabled retirees		
	a. Number	167	169
	b. Total annual benefits	$ 5,272,776	$ 5,039,795
	c. Average annual benefit	$ 31,574	$ 29,821
6.	Beneficiaries and spouses		
	a. Number[1]	857	824
	b. Total annual benefits	$ 24,478,132	$ 22,911,740
	c. Average annual benefit	$ 29,635	$ 28,676

[1] As of December 31, 2023, there were 30 beneficiaries who were expected to receive a refund of employee contributions with interest of $1,037,976 and one beneficiary with an annual deferred benefit of $13,716. As of December 31, 2022, there were 24 beneficiaries who were expected to receive a refund of employee contributions with interest of $1,145,054 and one beneficiary with an annual deferred benefit of $13,716.

Table B

Active Members: Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25	238	1								239
	$ 52,470	$ 53,059								$ 52,472
25 - 29	517	80								597
	$ 67,728	$ 84,774								$ 70,012
30 - 34	462	300	65	3						830
	$ 70,712	$ 91,436	$ 99,803	$ 86,749						$ 80,539
35 - 39	355	312	197	125	4					993
	$ 69,638	$ 90,064	$104,870	$112,491	$ 85,425					$ 88,503
40 - 44	234	236	168	248	112	2				1,000
	$ 67,894	$ 89,763	$101,074	$114,496	$115,571	$ 64,157				$ 95,519
45 - 49	204	125	111	186	197	69				892
	$ 64,061	$ 81,935	$ 94,626	$108,432	$117,903	$111,118				$ 95,153
50 - 54	173	128	79	157	206	195	28			966
	$ 66,650	$ 81,345	$ 82,743	$ 95,880	$114,064	$128,779	$127,564			$ 99,082
55 - 59	122	113	65	116	120	144	49	2		731
	$ 67,179	$ 70,549	$ 70,458	$ 83,479	$102,784	$121,016	$127,025	$147,219		$ 91,259
60 - 64	104	81	56	95	50	79	18	7	2	492
	$ 69,028	$ 78,858	$ 77,505	$ 76,870	$ 96,763	$112,295	$114,649	$134,585	$108,430	$ 85,653
Over 64	37	54	34	36	19	18	9	5	2	214
	$ 62,165	$ 66,574	$ 68,385	$ 81,488	$ 83,504	$109,917	$110,263	$114,221	$148,029	$ 77,469
Total	2,446	1,430	775	966	708	507	104	14	4	6,954
	$ 66,662	$ 85,426	$ 93,435	$101,302	$111,255	$120,677	$123,578	$129,117	$128,229	$ 87,807

Dollar amounts shown correspond to the average compensation for each grouping.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. 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;
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;
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 than the assumed rate then the cost of the plan can be expected to increase. Likewise, if longevity is improving then increases in cost can be anticipated.

The statutory contribution rate shown in the Summary of Plan Provisions may be considered as a minimum contribution rate that complies with the plan terms. 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.

FWERF SPECIFIC RELATIONSHIP TO CERTAIN RISKS

While FWERF has various levels of exposure to all of the risks listed above, in our opinion the three that warrant the most observation for the FWERF Board specifically are assumption change risk, investment risk, and contribution risk stemming from payroll growth not meeting the assumption.

Assumption Change Risk is the potential for the environment to change such that future valuation assumptions are adjusted to be different than the current assumptions. For example, declines in interest rates or increases in earnings multiples over time may result in a change in the assumed rates of return used in the valuation. A healthier workforce may result in changes in employee behavior such that retirement rates are adjusted to reflect employees working longer. And the difference in changing an assumption versus the other experience related risks listed above is instead of the loss slowly building over time, there is the immediate recognition of the change. Over the past decade, the changing of assumptions has increased the liabilities of FWERF more than any other source. While those changes were warranted and put FWERF on a stronger path going forward, it did cause a set-back in many of the actuarial measurements and at least gives the appearance of a weaker System. We do not currently anticipate any significant changes to assumptions in the future and will continue to communicate with the Board if any issues beginning to show.

Investment Risk is the largest of the experience related risks. Even a small deviation from the assumed 7% could potentially extend the funding period by decades. Likewise with projections of payroll growth, which contributions are received upon. If payroll were to grow slower over time, especially due to a contraction in headcount, it could have a negative impact on the funding period and the rate at which the funding status improves.

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:

	December 31,							
	2023	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**
Ratio of the market value of assets to City Contributory Payroll	4.7	4.6	5.4	5.0	4.8	4.4	5.0	4.8
Ratio of actuarial accrued liability to City Contributory Payroll	8.8	9.0	9.1	9.3	9.1	9.1	8.6	8.7
Ratio of actives to retirees and beneficiaries	1.3	1.3	1.4	1.3	1.4	1.4	1.5	1.5
Ratio of net cash flow to market value of assets	-2.3%	-4.3%	-2.3%	-2.2%	-3.0%	-4.4%	-3.4%	-3.7%
Duration of the actuarial accrued liability	11.1	11.2	11.3	11.4	11.5	11.7		

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 then 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.

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. 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.

Duration of Actuarial Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%. This information is presented beginning at December 31, 2018 which is consistent with the implementation of the Individual Entry Age Normal actuarial cost method.

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.

Low-Default-Risk Obligation Measure

Actuarial Standards of Practice No. 4 (ASOP No. 4) was revised and reissued in December 2021 by the Actuarial Standards Board (ASB). It includes a new calculation called a low-default-risk obligation measure (LDROM) to be prepared and issued annually for defined benefit pension plans. The transmittal memorandum for ASOP No. 4 includes the following explanation:

"The ASB believes that the calculation and disclosure of this measure provides appropriate, useful information for the intended user regarding the funded status of a pension plan. The calculation and disclosure of this additional measure is not intended to suggest that this is the "right" liability measure for a pension plan. However, the ASB does believe that this additional disclosure provides a more complete assessment of a plan's funded status and provides additional information regarding the security of benefits that members have earned as of the measurement date."

The LDROM estimates the amount of money the plan would need to invest in low-risk securities to provide the benefits with greater certainty. The current model expects lower costs but with higher risk, which creates less certainty and a possibility of higher costs. The LDROM model creates higher expected costs but more predictability when compared to the current model. Thus, the difference between the two measures (Valuation and LDROM) is one illustration of the possible costs the sponsor could incur if there was a reduction in the investment risk in comparison to the current diversified portfolio. However, the downside risk would be limited in the scenarios where the current portfolio would fail to achieve returns in excess of the low-default-risk discount, in this case 4.80%.

The following information has been prepared in compliance with this new requirement. Unless otherwise noted, the measurement date, actuarial cost methods, and assumptions used are the same as for the funding valuation covered in this actuarial valuation report.

A.	LDROM measure of benefits earned as of the measurement date:	$ 6,651 million
B.	Valuation liability at 7% on measurement date:	5,130 million
C.	Cost to mitigate investment risk in the System's portfolio:	$ 1,521 million

Disclosures: Discount rate used to calculate LDROM: 4.80% Intermediate FTSE Pension Discount Curve as of December 31, 2023. This measure may not be appropriate for assessing the need for or amount of future contributions as the current portfolio is expected to generate significantly more investment earnings than the low-default-risk portfolio. This measure is also not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation as this measure includes projections of salary increases and the ability for current members to continue to accrue eligibility and vesting service.

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or ***Funding Method:*** A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Actuarially Determined Contribution (ADC) or ***Annual Required Contribution (ARC):*** A calculated contribution for a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the calculated contribution has a normal cost payment and an amortization payment.

Actuarially Determined Employer Contribution (ADEC): The portion of the ADC that is attributable to the employer.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Glossary (continued)

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

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.),
b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB.

Actuarial Value of Assets or ***Valuation Assets:*** The value of the Fund’s assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Glossary (continued)

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: That portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Closed Amortization Period: A specific number of years that is counted down by one each year and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: An employer-sponsored retirement benefit that provides workers, upon attainment of designated age and service thresholds, with a monthly benefit based on the employee's salary and length of service. The value of a benefit from a defined benefit plan is generally not affected by the return on the assets that are invested to fund the benefit.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457(b) plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Glossary (continued)

Funding Period or ***Amortization Period:*** The term "Funding Period" is used it two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is chosen by the Board of Trustees. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.

Unfunded Actuarial Accrued Liability (UAAL): The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or ***Actuarial Valuation Date:*** The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.