
Midland Firemen's Relief and Retirement Fund

Actuarial Valuation as of December 31, 2021

February 17, 2023



R&W

Rudd and Wisdom, Inc.

Mitchell L. Bilbe, F.S.A.
Evan L. Dial, F.S.A.
Philip S. Dial, F.S.A.
Charles V. Faerber, F.S.A., A.C.A.S.
Mark R. Fenlaw, F.S.A.
Brandon L. Fuller, F.S.A.
Shannon R. Hatfield, F.S.A.
Christopher S. Johnson, F.S.A.
Oliver B. Kiel, F.S.A.
Dustin J. Kim, F.S.A.



Rudd and Wisdom, Inc.
Consulting Actuaries

Edward A. Mire, F.S.A.
Rebecca B. Morris, A.S.A.
Amanda L. Murphy, F.S.A.
Michael J. Muth, F.S.A.
Khiem Ngo, F.S.A., A.C.A.S.
Timothy B. Seifert, F.S.A.
Chelsea E. Stewart, F.S.A.
Raymond W. Tilotta
Ronald W. Tobleman, F.S.A.
David G. Wilkes, F.S.A.

February 17, 2023

Board of Trustees
Midland Firemen's Relief and
Retirement Fund
c/o Ms. Shera Crow
Post Office Box 4296
Midland, TX 79704

Members of the Board of Trustees:

At your request, we have prepared this report of the results of the actuarial valuation of the fund as of December 31, 2021. This valuation was prepared to determine whether the fund has an adequate contribution arrangement.

In a separate report later this year, we will provide the necessary disclosures for the fund's compliance with the Governmental Accounting Standards Board (GASB) Statement No. 67 for the plan year ending December 31, 2022. Similarly, we will provide a separate report as soon as possible containing the pension expense, net pension liability, and disclosure information for the city's compliance with GASB 68 for the fiscal year ending September 30, 2022. GASB 68 prescribes the city's accounting for your fund, while this actuarial valuation report reflects the assumed continuation of the current funding policy.

We certify that we are members of the American Academy of Actuaries who meet Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report.

Sincerely,

A handwritten signature in black ink that reads "Mark R. Fenlaw". The signature is written in a cursive, slightly slanted style.

Mark R. Fenlaw, F.S.A.

A handwritten signature in black ink that reads "Rebecca B. Morris". The signature is written in a cursive, slightly slanted style.

Rebecca B. Morris, A.S.A.

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Section I Valuation Summary

An actuarial valuation of the assets and liabilities of the Midland Firemen's Relief and Retirement Fund as of December 31, 2021 has been completed. The valuation was based on the Present Plan (plan effective December 14, 2011) and the provisions of the Texas Local Fire Fighters' Retirement Act (TLFFRA) which were in effect on December 31, 2021. Section II shows the key results of the actuarial valuation as of December 31, 2021 and discusses the changes since the prior valuation as of December 31, 2019.

This valuation reflects an actuarially assumed total contribution rate of 36.4%, comprised of 14.2% by the firefighters and 22.2% by the city. The total contribution rate of 36.4% exceeds the normal cost rate of 31.54%, leaving 4.86% available to amortize the unfunded actuarial accrued liability (UAAL) of \$109,123,112. Assuming that the total payroll increases at the rate of 3% per year in the future, the contributions in excess of the normal cost **will never amortize the UAAL.**

In order for a retirement plan to have an adequate contribution arrangement, contributions must be made that are sufficient to pay the plan's normal cost and to amortize the plan's UAAL over a reasonable period of time. Based on the Texas State Pension Review Board guidelines for pension funding, our professional judgment, and the actuarial assumptions and methods used in making this valuation, we consider amortization periods of 10 years to 25 years to be preferable and 40 years to be the current maximum acceptable amortization period. The PRB guidelines are changing to a maximum of 30 years in 2025. Since the total contributions are not sufficient to pay the fund's normal cost and to amortize the fund's UAAL within the maximum acceptable period, we are of the opinion that the fund, based on present levels of benefits and contributions, **has an inadequate contribution arrangement. Section III presents considerations for restoring an adequate contribution arrangement.**

The below chart shows what the increased city contribution would need to be in effect on the respective valuation dates in order for the fund to have a 25-year or a 30-year amortization period.

	City Contribution Rate	
	12/31/2019 Valuation	12/31/2021 Valuation
Current actual contribution rate	22.2%	22.2%
Hypothetical rate for a 25-year amortization period	40.0%	48.5%
Hypothetical rate for a 30-year amortization period	37.4%	45.5%

Projected Actuarial Valuation Results

In addition to completing this actuarial valuation, we estimated the amortization periods as of December 31, 2023 and as of December 31, 2025 by making projections from the December 31, 2021 actuarial valuation. These projections examine the effect on the amortization period in the next two biennial actuarial valuations of the actuarial investment

gains and losses that the fund experienced in the four years prior to the valuation date (losses in 2018 and 2020, and gains in 2019 and 2021) that have been only partially recognized as of December 31, 2021. As shown in Exhibit 8, a smoothing method is used to determine the actuarial value of assets (AVA) for this valuation. This method phases in over a five-year period any investment gains or losses (net actual investment return greater or less than the actuarially assumed investment return) that the fund has had. The AVA used in this current valuation is deferring recognition of various portions of the gains and losses in 2018-2021 that the fund experienced. The AVA used in this valuation is \$91.7 million. The market value of assets (MVA) is \$93.8 million. The \$2.1 million difference between the MVA and the AVA is the deferred net gain over the past four years that will be recognized in the next two biennial actuarial valuations.

The theory behind the AVA method is to allow time for investment gains and losses to partially offset each other and thereby dampen the volatility associated with the progression of the MVA over time. In practice, the timing and amounts of investment gains and losses can result in irregular effects on the AVA in a given year. However, as intended, the pattern of the AVA is smoother over time than the pattern of the MVA, as seen in Exhibit 9.

For the purpose of projecting the amortization period through 2025 we used six scenarios of various assumed annual rates of investment return, net of investment-related expenses, over the 2022-2025 projection period. These projections show the expected effects over the next four years after the valuation date (1) of the recognition of the portions of the investment gains and losses over the past four years that are deferred as of December 31, 2021, (2) of investment returns over the next four years different from the 7% assumption used in this valuation, and (3) the city contribution rate of 48.5% if it had been contributed beginning January 1, 2022 that would have been required to have an amortization period of 25 years. That is more than double the current city contribution rate of 22.2%.

	Scenario					
	1	2	3	4	5	6
Assumed Investment Return for Calendar Year						
2022	7%	-20%	-20%	-15%	-15%	-15%
2023	7	0	4	0	4	7
2024	7	15	10	10	7	7
2025	7	15	10	10	7	7
2026 and later	7	7	7	7	7	7
City Contribution Rate	48.5%	48.5%	48.5%	48.5%	48.5%	48.5%
Amortization Period in Years as of December 31:						
2021 (actual)	25.0	25.0	25.0	25.0	25.0	25.0
2023 (projected)	23.0	28.6	27.4	26.8	26.6	26.4
2025 (projected)	20.2	28.9	28.9	28.0	27.7	27.0

The projected future December 31, 2025 valuation in Scenario 1 reveals that instead of decreasing by the expected four years to 21.0 years, the amortization period is projected to decrease by 4.8 years to 20.2 years because of the recognition of the relatively small deferred net gain. However, because of the very adverse year in 2022, and the uncertainty of 2023,

we have shown in Scenarios 2-6 two very adverse possible returns for 2022, a variety of mostly adverse scenarios for 2023, with some recovery scenarios for 2024 and 2025.

We do not know what the investment experience will be for the four-year projection period. Variations in experience from the underlying assumptions, other than investment return, will cause the actual amortization periods to be different from the periods shown above. Once changes are made to establish an adequate contribution arrangement, investment experience will be a big influence on future actuarial valuations. In addition, the future investment experience in each of the four years could be better or worse than the assumed rates shown. These scenarios present a range of scenarios for the next two actuarial valuations assuming a dramatic increase in the city contribution rate and no changes in benefits just to illustrate the severity of the fund's condition.

The primary conclusion from the scenarios is that since the fund has a dramatically inadequate contribution arrangement and a very significant loss in 2022 that will hinder the amortization of the UAAL, the board needs to convince the firefighters that action needs to be taken soon to reduce future benefits. The magnitude of the increase in the city contribution rate is too great. We address this subject in more detail in Section III.

Participant and Asset Data

We have relied on and based our valuation on the active firefighter data, pensioner data, and asset data provided on behalf of the board of trustees by Ms. Shera Crow, the administrator of the fund. We have not audited the data provided but have reviewed it for reasonableness and consistency relative to the data provided for the December 31, 2019 actuarial valuation. Exhibit 1 is a distribution of the active firefighters by age and service. In general, the assumed 2022 compensation used for projecting future contributions and benefits for each active firefighter in the valuation was the actual pay for calendar year 2021 without adjustment. This approach is based on the assumption that a reduction in unscheduled overtime compensation will approximately offset the effect of the 3% general pay increase effective October 1, 2021. The total of these assumed compensation amounts is our assumed annualized covered payroll for the plan year beginning January 1, 2022 and is used in the valuation to determine the UAAL amortization period and to calculate the actuarially determined contribution (ADC) rate. The averages of the assumed compensation amounts for the 2022 plan year are shown in Exhibit 1.

Exhibit 2 contains summary information on the pensioners. The monthly benefit payments are generally based on the amounts paid January 31, 2022. Exhibit 3 is a reconciliation of firefighters and pensioners from December 31, 2019 to December 31, 2021. Exhibit 4 shows a breakdown of the dollar amount of the monthly benefits for retirees and surviving spouses. Exhibit 5 shows a historical comparison of the actuarial accrued liability and the actuarial value of assets.

Asset information is contained in exhibits 6 through 10. The summary of assets contained in Exhibit 6 is based on the allocation in the December 31, 2021 audited financial report. This exhibit also shows a comparison with the market values and actuarial values of assets as of December 31, 2019 and December 31, 2021. Exhibit 7 contains the statement of changes in assets for 2021 and 2020. Exhibit 8 shows the development of the actuarial value of assets. Exhibit 9 shows a historical comparison between the market value and actuarial value of

assets. A comparison of the market value asset allocation by major asset class as of December 31, 2019 and December 31, 2021 is in a pie chart shown in Exhibit 10.

Assumptions

As a part of each actuarial valuation, we review the actuarial assumptions used in the prior actuarial valuation. As a result of our review, we have selected actuarial assumptions we consider to be reasonable and appropriate estimates of future experience for the fund for the long-term future. Their selection complies with the applicable actuarial standards of practice. Significant actuarial assumptions used in this valuation are:

1. 7% annual investment return net of investment-related expenses;
2. 3% general annual compensation increase combined with promotion, step, and longevity increases that average 2.89% per year over a 30-year career;
3. 3% aggregate payroll growth (for the purpose of amortizing the UAAL and calculating the ADC rate);
4. Retirement rates which result in an average expected age at retirement of 53.4; and
5. PubS-2010 (public safety) total dataset mortality tables for employees and for retirees, projected for mortality improvement generationally using the projection scale MP-2019.

The following actuarial assumption changes have been made, and the new assumptions are compared to those used in the December 31, 2019 valuation:

1. We changed the investment return assumption from 7.5% to 7% net of investment-related expenses by lowering the inflation assumption from 3% to 2.75% and reducing the net real rate of return from 4.5% to 4.25%. We believe these assumptions are more reasonable for the long-term future.
2. We reduced the general compensation increase assumption for projecting future benefits from 3.25% to 3%, reflecting the 0.25% reduction in inflation.
3. We reduced the aggregate payroll increase assumption used for determining the UAAL amortization period from 3.25% to 3%. We believe this assumption should usually be the same as the general compensation increase assumption, assuming no growth in the number of active firefighters.
4. We changed the assumed compensation increases for promotion, step, and longevity increases to better reflect the recent pattern by years of service.

The effects of these changes in assumptions in the UAAL and the ADC are mentioned in Section II. A summary of all the assumptions and methods used in the valuation is shown in Exhibits 11 and 12. In our opinion, the assumptions used, both in the aggregate and individually, are reasonably related to the experience of the fund and to reasonable expectations. The assumptions represent a reasonable estimate of anticipated experience of the fund over the long-term future.

Supporting Exhibits

Exhibit 13 contains definitions of terms used in this actuarial valuation report. Exhibit 14 summarizes the plan provisions of the Present Plan. Appendix A documents our review of the economic assumptions.

Funding Policy

A funding policy in compliance with state law would say that each actuarial valuation will include a benchmark actuarially determined contribution (ADC) rate using a closed amortization period of 30 years beginning January 1, 2020. The components of the ADC rate are the normal cost and the amortization cost, both expressed as contribution rates. Then the fund's actuary is to compare the benchmark ADC rate and the total contribution rate. The table below shows the actuarial valuation results in two key metrics, the amortization period and the total contribution rate. The amortization period for the benchmark ADC began at 30 years for the December 31, 2019 valuation and declines by one each year; so it is at 28 years for this actuarial valuation.

	Amortization Period	Total Contribution Rate
Benchmark ADC rate	28.0 years	60.75%
Actuarial valuation	never	36.40%
Difference	(immeasurable)	(24.35)%

That much negative divergence from the benchmark means that the board's next steps include (1) working with Rudd and Wisdom to develop potential changes that would reestablish an appropriate balance between benefits and contributions and (2) working with the firefighters and the city to achieve the necessary changes. Section III of this report gives the board some recommended changes and some examples of other potential changes.

Variability in Future Actuarial Measurement

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 current economic or demographic assumptions;
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements;
- Changes in economic or demographic assumptions; and
- Changes in plan provisions.

Analysis of the potential range of such future measurements resulting from the possible sources of measurement variability was provided on pages 1-3 in the projected amortization periods for the next two biennial actuarial valuations under six scenarios. These projections were designed to assess the risk of variance of potential future investment rates of return in the four years following the actuarial valuation date from the assumed 7% rate and the potential effect on the amortization period. Additional or other sensitivity analysis could be performed in a subsequent report if desired by the board of trustees.

Respectfully submitted,
RUDD AND WISDOM, INC.

Mark R. Fenlaw

Mark R. Fenlaw
Fellow, Society of Actuaries
Member, American Academy of Actuaries

Rebecca B. Morris

Rebecca B. Morris
Associate, Society of Actuaries
Member, American Academy of Actuaries

Section II

Key Results of the Actuarial Valuation

	December 31, 2019 ¹	December 31, 2021
1. Actuarial present value of future benefits		
a. Those now receiving benefits or former firefighters entitled to receive benefits	\$ 91,672,314	\$ 106,761,734
b. Firefighters	<u>133,663,297</u>	<u>164,001,081</u>
c. Total	<u>\$ 225,335,611</u>	<u>\$ 270,762,815</u>
2. Actuarial present value of future normal cost contributions	\$ 47,733,550	\$ 69,985,878
3. Actuarial accrued liability (Item 1c – Item 2)	\$ 177,602,061	\$ 200,776,937
4. Actuarial value of assets	\$ 90,753,400	\$ 91,653,825
5. Unfunded actuarial accrued liability (UAAL) (Item 3 - Item 4)	\$ 86,848,661	\$ 109,123,112
6. Contributions (percent of pay)		
a. Firefighters	14.20%	14.20%
b. City of Midland	<u>22.20%</u>	<u>22.20%</u>
c. Total	36.40%	36.40%
7. Normal cost (percent of payroll)	26.30%	31.54%
8. Percent of payroll available to amortize the UAAL (Item 6c - Item 7)	10.10%	4.86%
9. Annualized covered payroll	\$ 20,092,471	\$ 22,052,445
10. Years to amortize the UAAL	never	never
11. Funded ratio (Item 4 ÷ Item 3) ²	51.1%	45.6%
12. Retiree funded ratio (Item 4 ÷ Item 1a)	99.0%	85.8%

¹ All items are from the December 31, 2019 actuarial valuation and reflect the Present Plan.

² The funded ratio is not appropriate for assessing either the need for or the amount of future contributions or the adequacy of the assumed contribution rates. Using the market value of assets instead of the actuarial value of assets for Item 11 would have resulted in funded ratios of 47.8% as of December 31, 2019 and 46.7% as of December 31, 2021. **The best indicator of the fund's health is Item 10.**

Changes in the Unfunded Actuarial Accrued Liability

In comparing this actuarial valuation to the prior one, the UAAL increased by \$22,274,451 from \$86,848,661 as of December 31, 2019 to \$109,123,112 as of December 31, 2021. The table below summarizes the reasons for the increase.

Reason for Change	Amount
<ul style="list-style-type: none"> Expected increase (interest on UAAL more than expected ADC amortization payments, accumulated with interest) 	\$ 2,434,261
<ul style="list-style-type: none"> Expected increase (shortfall in contributions compared to the ADC) 	6,652,445
<ul style="list-style-type: none"> Investment loss for the two years (based on the AVA average annual return of 5.2%) 	4,285,378
<ul style="list-style-type: none"> Experience gain (net difference between actual experience and assumed experience for pay increases, retirements, mortality, and terminations) 	(3,100,310)
<ul style="list-style-type: none"> Change in assumptions 	<u>12,002,677</u>
Total	\$ 22,274,451

Changes in the ADC

Since the UAAL will never be amortized based on the benefit provisions and the contribution arrangement reflected in this December 31, 2021 actuarial valuation, it is impossible to analyze changes since the December 31, 2019 actuarial valuation in terms of the amortization period as we usually do. Instead, the below shows an analysis in terms of an actuarially determined contribution rate by the city (ADC) that with the 14.2% contribution rate by the firefighters would be adequate to pay the normal cost and to amortize the UAAL in 30 years beginning January 1, 2020. The beginning point in the December 31, 2019 actuarial valuation report was an ADC of 37.4%. The ending point is the December 31, 2021 actuarial valuation with an ADC of 45.5%. The items below identify changes and experience since the prior actuarial valuation and the resulting increase in the ADC of 8.1% from the 37.4% two years ago to the 45.5% in this actuarial valuation.

1. The average annual rate of investment return, net of investment-related expenses, on the market value of assets during the two plan years 2020 and 2021 was 10.2%. However, the actuarial value of assets (AVA) used in the valuation and the determination of the amortization period is based on an adjusted market value. The average annual rate of return on the AVA, net of investment-related expenses, for plan years 2020 and 2021 was 5.2%, less than the assumed rate of return for those years of 7.5%. This resulted in an increase in the ADC of 1.2%.
2. The shortfall in contributions due to the starting 37.4% ADC not being contributed in 2020 and 2021 increased the ADC by 1.9%.

3. The aggregate payroll increased at an average rate of 4.76% per year instead of the assumed 3.25% per year rate, which caused the ADC to decrease by 0.8%.
4. The net result of all experience compared to the assumptions, other than the investment experience and the aggregate payroll experience, had the combined effect of decreasing the ADC by less than 0.1%.
5. All of the changes in assumptions (investment return, compensation increases, and aggregate payroll increase) resulted in an increase in the ADC of 6.9%.
6. Starting over with a new 30-year amortization period instead of staying at 28-years with the elapse of two years between the actuarial valuation dates decreased the ADC by 1.1%

Section III

Restoring an Adequate Contribution Arrangement

The results of this actuarial valuation as of December 31, 2021 reveal that the fund, based on the Present Plan of benefits and the current contribution rates, has an inadequate contribution arrangement. There are three options for restoring an adequate contribution arrangement: (1) a sufficient increase in the total contribution rate, (2) a package of sufficient decreases in benefits, or (3) a sufficient combination of increases in contributions and decreases in benefits. A sufficient lump sum contribution would be unusual but is also a possibility by itself or in combination with any of the three normal options.

Regardless of what increases in contributions and/or decreases in benefits are and when they are made, **there are two changes that we strongly recommend be made as soon as possible.** The first recommendation is to correct a deficiency in benefit design. The definition of Highest 60-Month Average Salary should be improved. Using the 60 highest months of pay allows months with unusual amounts of overtime to enhance the retirement benefit. The definition allows for some manipulations of overtime in the later part of a firefighter's career to increase the retirement benefit. In other words, the current definition allows for "spiking", as some people label it. Given the significant overtime the department has had in the last several years, the "spiking" effect has been magnified. A better definition with a much better perception is to use **consecutive** pay periods.

A 2017 change in the city's pay practices has magnified the deficiency in the current definition. Through the end of 2016, the city paid compensation monthly. Beginning in 2017, firefighters are paid biweekly. However, the plan document has not been changed, and the definition of average salary is based on calendar month of pay. We have been told that the administrative practice for calculating a retirement benefit is to treat a month of pay that includes two biweekly pay periods as a full month and the same as a month with three biweekly pay periods. These months with three biweekly pay periods will amplify the "cherry-picking" nature of the current definition and increase the Highest 60-Month Average Salary. In addition, it is our understanding that the hours reflected in each biweekly pay period are not uniform but are actual hours worked based on the firefighters' schedules. This will also lead to swings in monthly pay amounts. This change in the city's pay practices has resulted and will continue to result in an unintended increase in benefits which we have attempted to anticipate with an assumed average adjustment factor based on the continuation of the pay practices and of the administrative practice for benefit calculations.

We strongly recommend an amendment to the plan to change the definition of Highest 60-Month Average Salary to be "the sum of the firefighter's pay in the **130 consecutive biweekly pay periods** with the highest pay out of the last 156 biweekly pay periods divided by 60." This definition would need a transition to bridge from monthly pay through 2016 to biweekly pay since then. Alternatively, the definition could be changed to "the sum of the firefighter's pay in the **60 consecutive calendar months** with the highest pay out of the last 72 months divided by 60." No transition would be needed for the change to consecutive months as would be needed for the change to biweekly pay periods. Either way, the amendment would be worded to protect the vested accrued benefit on the effective date of the change based on the Present Plan provisions and on the service and pay history up to the effective date.

We also recommend an additional change to treat a one-time lump sum of extra pay that is a percentage of an annual rate of pay as if it had been paid uniformly over the 26 biweekly pay periods ending with the pay period in which the payment was made. Both of these changes are needed to remove the distorting effects of city pay practices which result in significant unintended increases in pension benefits. **These two recommended changes should be made as soon as possible. These two changes are important steps, in addition to other changes that will need to be studied and examined, to restore an adequate contribution arrangement for the fund and to make it sustainable for the long-term future for all current pensioners and all future pensioners.**

Without any changes in plan provisions, we showed in Section I the higher city contribution rate of 45.5% (assumed effective December 31, 2021) that would result in an amortization period of 30 years as of December 31, 2021. Reflecting a delay in the effective date to January 1, 2024, the city contribution rate for a 30-year amortization period would be 48.2%. An increase of 26% in the city's contribution rate is unrealistic. Even a phased-in increase in the firefighter contribution rate from 14.2% to 20% would still leave the required increase in the city rate around 21%.

Because of these unrealistic contribution rate increases, the board will need to consider combining contribution rate increases with a package of decreases in benefits, in addition to the two changes above we recommended. Changes in benefit provisions that would help the fund are painful, but here are some examples of changes to be part of package:

- Exclude compensation for unscheduled overtime from the determination of benefits but not for determining contributions.
- Reduce the benefit formula from 75% of average salary for the first 20 years of service plus the \$80 benefit for each year over 20 to a level percentage of average salary for each year of service. Potentially in the range of 2.2% to 2.5%, depending upon the other changes made.
- Increase the minimum age and service requirement for all of the DROP plan benefits from age 50 and 20 years of service or 25 years of service at any age to age 52 and 22 years of service.
- Discontinue the crediting of any interest in the determination of a DROP lump sum.
- Exclude firefighter contributions from the determination of the DROP lump sum.
- Make the Reverse DROP actuarially equivalent to the normal retirement benefit by changing the reduction factor from 90% to 80% for those retiring after the effective date of changes.
- Discontinue the supplemental \$500 per month benefit for those who retire after the effective date of changes.
- Change the normal surviving spouse benefit as a percentage of the retiree's benefit from 75% to 66.67% for those retiring after the effective date of changes.
- Amend Section F of the plan that provides for a 2% increase in benefits to certain pensions when the fund's investment rate of return averages at least 8.25% over the most recent five consecutive years to add the requirement that the period required to amortize the resulting UAAL would not exceed 15 years.
- Discontinue the \$10,000 death benefit.

Any changes in plan provisions to reduce future benefit accruals would be designed by the board of trustees and Rudd and Wisdom working together to protect vested accrued benefits as of the effective date of change. The effect of any of these potential changes would have to be studied before any vote of the firefighters so the board and firefighters would know the potential effect and how it might be combined with other potential changes and with an increase in contribution rates in order to restore an adequate contribution arrangement.

The fund is subject to the state law known as the Funding Soundness Protection Plan. It requires the board and the city to work together to finalize a package of changes that will result in an amortization period of 30 years or less by September 1, 2025. For the fund, that effectively means by the December 31, 2023 actuarial valuation. We recommend targeting 25 years because of the very adverse investment experience of 2022 that will be partially recognized in the December 31, 2023 actuarial valuation.

Exhibit 1
Distribution of Firefighters by Age and Service on December 31, 2021
with Average Annual Compensation

Years of Service	Age									Total	Average Compensation
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60 or Over		
0	0	0	0	0	0	0	0	0	0	0	\$ 0
1	7	9	9	4	0	0	0	0	0	29	61,639
2	7	10	10	3	0	0	0	0	0	30	75,006
3	2	5	7	1	0	0	0	0	0	15	80,922
4	1	5	6	6	0	0	0	0	0	18	81,128
5	0	4	3	0	0	0	0	0	0	7	88,134
6	0	4	3	2	1	0	0	0	0	10	87,173
7	0	4	5	1	1	0	0	0	0	11	93,335
8	0	1	5	3	4	0	0	0	0	13	95,920
9	0	0	2	4	1	0	0	0	0	7	90,999
10	0	0	2	4	1	0	0	0	0	7	98,811
11	0	0	0	1	0	0	0	0	0	1	126,301
12	0	0	0	0	1	1	0	1	0	3	113,571
13	0	0	0	3	1	0	0	0	0	4	112,748
14	0	0	0	4	3	1	1	0	0	9	114,484
15	0	0	0	6	6	1	0	0	0	13	111,658
16	0	0	0	3	3	0	1	0	0	7	120,909
17	0	0	0	1	2	0	0	0	0	3	107,711
18	0	0	0	0	2	1	1	0	0	4	127,958
19	0	0	0	0	2	0	0	0	0	2	140,146
20-24	0	0	0	0	4	12	5	2	0	23	129,308
25-29	0	0	0	0	0	3	7	1	0	11	134,077
30-34	0	0	0	0	0	0	0	1	1	2	159,299
35+	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	120,545
Totals	17	42	52	46	32	19	15	5	2	230	\$ 95,880

Average Compensation	\$69,838	\$80,795	\$98,677	\$109,044	\$129,882	\$136,465	\$95,880
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Average age	36.1
Average years of service	9.6
Average age at hire	26.5

Exhibit 2
Summary of Pensioner Data

Type of Benefit	Pensioner Data Used in December 31, 2021 Valuation	
	Number of Recipients	Total Monthly Benefit Payments
Service Retirement	150 ¹	\$ 665,669
Disability Retirement	4	13,607
Vested Terminated (Deferred)	7	15,938
Surviving Spouse	33	69,398
Surviving Child	<u>6</u>	<u>5,099</u>
Total	200	\$ 769,711

Type of Benefit	Comparison of Pensioner Count by Type as of The Prior and Current Actuarial Valuations			
	December 31, 2019	New	Ceased	December 31, 2021
Service Retirement	146 ¹	+14	-10	150 ¹
Disability Retirement	4	0	0	4
Vested Terminated (Deferred)	8	+1	-2	7
Surviving Spouse	29	+7	-3	33
Surviving Child	<u>6</u>	<u>0</u>	<u>0</u>	<u>6</u>
Total	193	+22	-15	200

¹ Includes seven alternate payees receiving benefits according to the terms of a Qualified Domestic Relations Order (QDRO).

Exhibit 3
Firefighter and Pensioner Reconciliation

	Firefighters	Current Payment Status	Vested Terminated Firefighters	Total
1. As of December 31, 2019	227	185 ¹	8	420
2. Change of status				
a. retirement	(12)	14	(2)	0
b. disability	0	0	0	0
c. death	0	(13)	0	(13)
d. survivor payment begins	0	7	0	7
e. withdrawal	(15)	0	0	(15)
f. vested termination	(1)	0	1	0
g. QDRO alternate payee	0	0	0	0
h. child benefit ceases	0	0	0	0
i. correction	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
j. net changes	(28)	8	(1)	(21)
3. New firefighters	<u>31²</u>	<u>0</u>	<u>0</u>	<u>31</u>
4. As of December 31, 2021	230	193 ¹	7	430

¹ Includes seven alternate payees receiving benefits according to the terms of a Qualified Domestic Relations Order (QDRO).

² There were 51 total minus the 20 John Does included in the December 31, 2019 actives to reflect the average staffing level during 2020.

Exhibit 4

Breakdown of Monthly Benefit Payment Amounts as of December 31, 2021

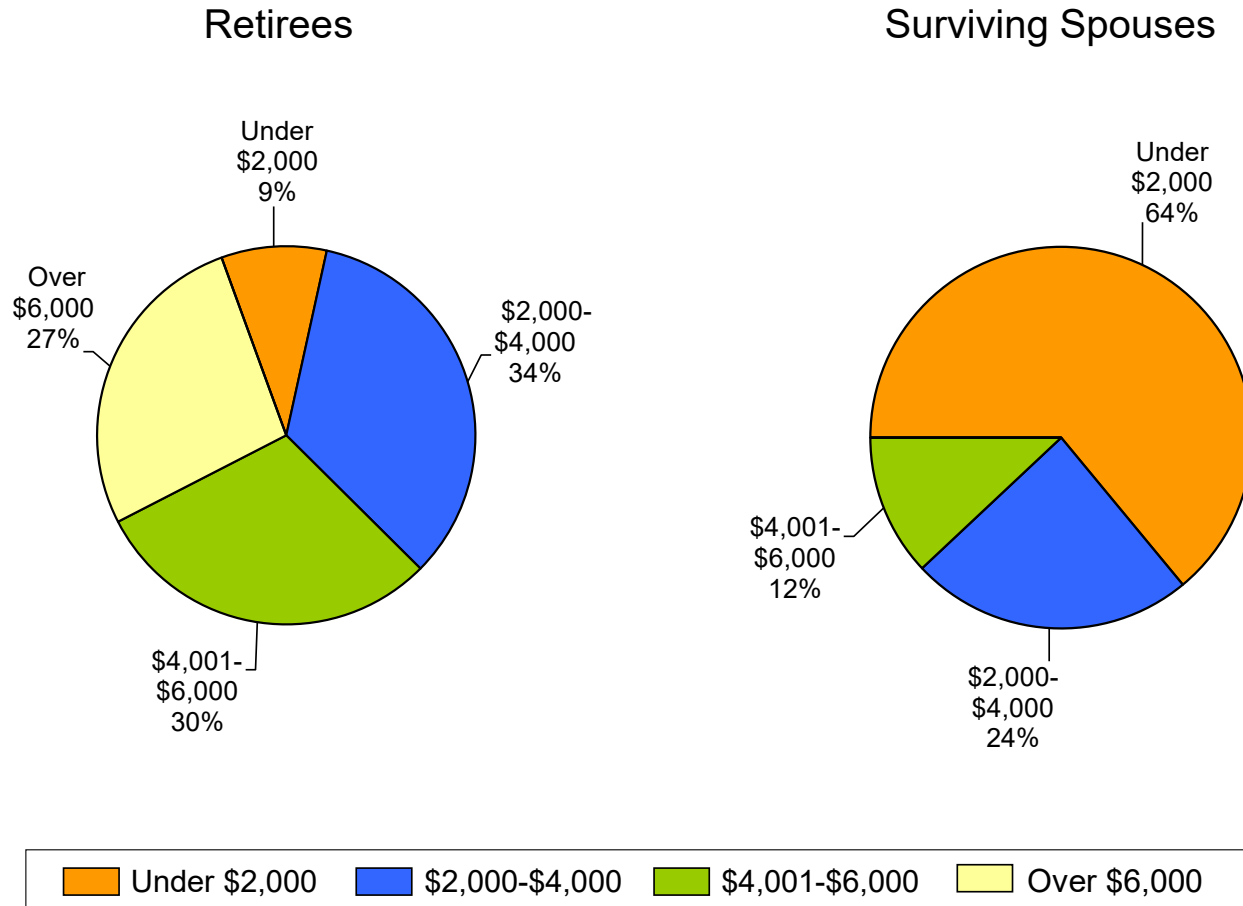


Exhibit 5

Historical Comparison of Actuarial Accrued Liability and Actuarial Value of Assets
(Present Plan Valuations as of December 31)

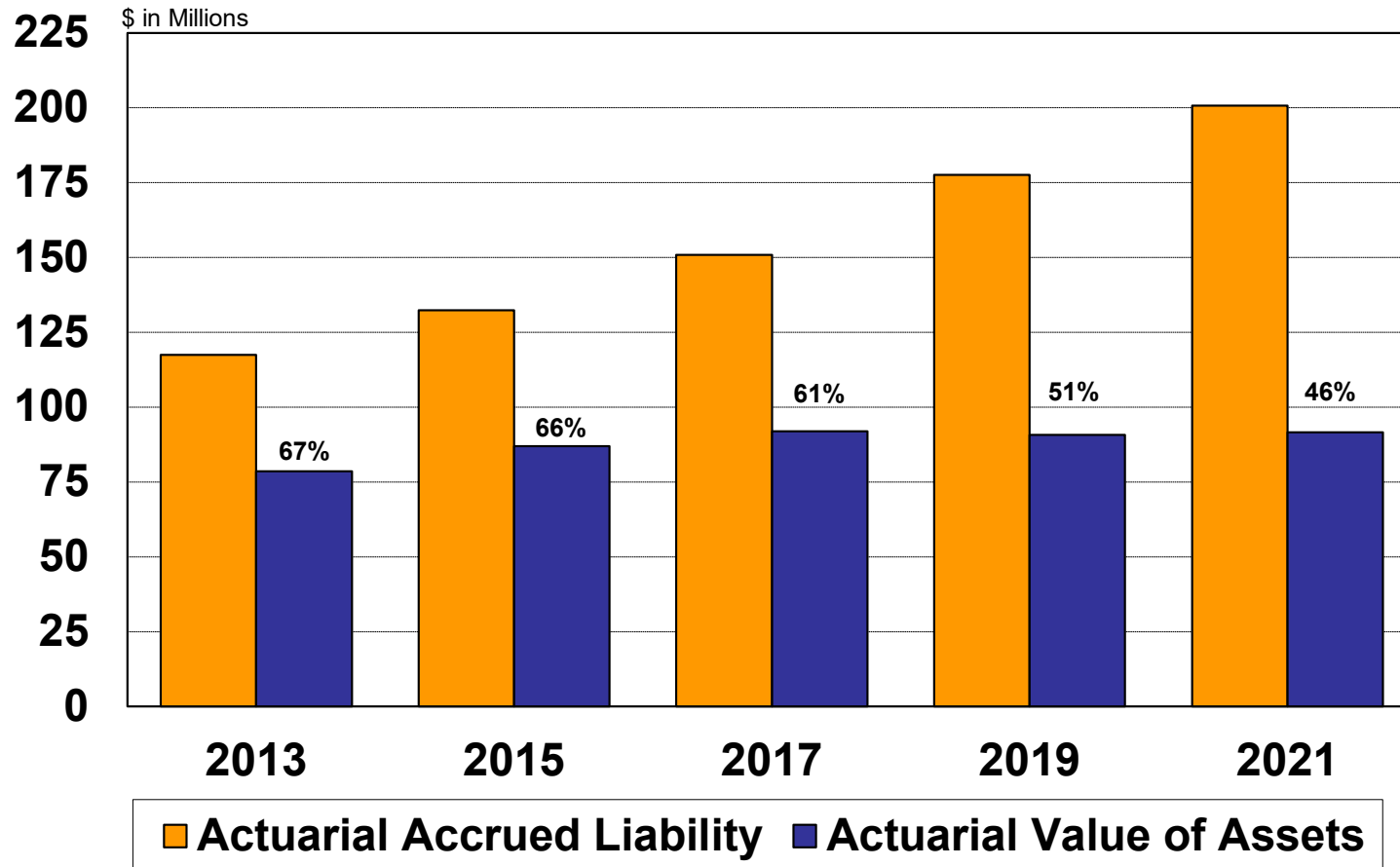


Exhibit 6
Summary of Asset Data

Asset Type	Market Value as of December 31, 2021	Allocation As a Percent of Grand Total
Equities		
U.S. Large Cap	\$ 9,880,191	10.6%
U.S. Small/Mid Cap	3,598,382	3.8
International	<u>23,454,763</u>	<u>25.0</u>
Total	36,933,336	39.4
Alternatives		
Venture Capital	17,818,134	19.0
Real Estate	<u>14,879,214</u>	<u>15.9</u>
Total	32,697,348	34.9
Fixed Income	11,010,032	11.7
Cash Equivalents, Net of Payables	<u>13,131,131</u>	<u>14.0</u>
Grand Total	\$93,771,847 ¹	100.0%

¹ The grand total is the audited amount. All of the invested amounts are from December 31, 2021 audited financial report.

Comparison of Asset Values as of the Prior and Current Actuarial Valuation Dates		
	<u>December 31, 2019</u>	<u>December 31, 2021</u>
Market Value	\$84,848,966	\$93,771,847
Actuarial Value	\$90,753,400	\$91,653,825
Actuarial Value as a Percent of Market Value	107.0%	97.7%

Exhibit 7
Statement of Changes in Audited Assets
for the Years Ended December 31, 2021 and 2020

	<u>12/31/2021</u>	<u>12/31/2020</u>
Additions		
1. Contributions		
a. Employer	\$ 4,907,065	\$ 4,483,675
b. Employees	<u>3,138,754</u>	<u>2,867,985</u>
c. Total	\$ 8,045,819	\$ 7,351,660
2. Investment Income		
a. Interest and dividends	\$ 680,022	\$ 993,760
b. Net appreciation in fair value	<u>13,202,973</u>	<u>4,693,757</u>
c. Total	\$ 13,882,995	\$ 5,687,517
3. Other Additions	<u>124</u>	<u>1,162</u>
Total Additions	\$ 21,928,938	\$ 13,040,339
Deductions		
4. Benefit Payments	\$ 12,669,033	\$ 10,356,445
5. Expenses		
a. Investment-related	\$ 1,426,877	\$ 857,506
b. General administrative	<u>406,490</u>	<u>330,045</u>
c. Total	\$ 1,833,367	\$ 1,187,551
Total Deductions	\$ 14,502,400	\$ 11,543,996
Net Increase in Assets	\$ 7,426,538	\$ 1,496,343
Market Value of Assets (Fiduciary Net Position)		
Beginning of Year	\$ 86,345,309	\$ 84,848,966
End of Year	\$ 93,771,847	\$ 86,345,309
Rate of Return		
Net of All Expenses	14.34%	5.40%
Net of Investment-Related Expenses	14.86%	5.81%
Gross	16.70%	6.87%
Direct Investment-Related Expenses	1.84%	1.06%

Exhibit 8
Development of Actuarial Value of Assets

Calculation of Actuarial Investment Gain/(Loss) Based on Market Value for Plan Years Ending December 31				
	2021	2020	2019	2018
1. Market Value of Assets as of beginning of year	\$86,345,309	\$84,848,966	\$80,013,420	\$89,754,731
2. Firefighter Contributions	3,138,754	2,867,985	2,755,199	2,339,699
3. City Contributions	4,907,065	4,483,675	4,307,624	3,900,148
4. Benefit Payments and Administrative Expenses ¹	(13,075,523)	(10,686,490)	(10,366,785)	(8,840,015)
5. Expected Investment Return ²	<u>6,287,284</u>	<u>6,238,616</u>	<u>6,073,012</u>	<u>6,855,235</u>
6. Expected Market Value of Assets as of end of year	87,602,889	87,752,752	82,782,470	94,009,798
7. Actual Market Value of Assets as of end of year	<u>93,771,847</u>	<u>86,345,309</u>	<u>84,848,966</u>	<u>80,013,420</u>
8. Actuarial Investment Gain/(Loss)	6,168,958	(1,407,443)	2,066,496	(13,996,378)
9. Market Value Rate of Return Net of Expenses	14.86%	5.81%	10.39%	(8.07)%
10. Rate of Actuarial Investment Gain/(Loss)	7.36%	(1.69)%	2.64%	(15.82)%

¹ Administrative expenses are included for all years to retroactively make the investment return assumption net of investment-related expenses.

² Assuming uniform distribution of contributions and payments during the plan year; annual investment return assumed to be 7.75% for 2018 and 2019 and 7.5% for 2020 and 2021.

Plan Year	Investment Gain/(Loss)	Deferral Percentage	Deferred Gain/(Loss) as of 12/31/2021
2021	\$ 6,168,958	80%	\$ 4,935,166
2020	(1,407,443)	60%	(844,466)
2019	2,066,496	40%	826,958
2018	(13,996,378)	20%	<u>(2,799,276)</u>
Total			\$ 2,118,022

Actuarial Value of Assets as of December 31, 2021	
11. Market Value of Assets as of December 31, 2021	\$ 93,771,847
12. Deferred Gain/(Loss) to be Recognized in Future	<u>2,118,022</u>
13. Preliminary Value (Item 11 – Item 12)	\$ 91,653,825
14. Corridor for Actuarial Value of Assets	
a. 80% of Market Value as of December 31, 2021 (minimum)	\$ 75,017,478
b. 120% of Market Value as of December 31, 2021 (maximum)	\$112,526,216
15. Actuarial Value as of December 31, 2021	\$ 91,653,825
16. Write Up/(Down) of Assets (Item 15 – Item 11)	\$ (2,118,022)

Exhibit 9

Historical Comparison of Market and Actuarial Value of Assets
(Valuation as of December 31)

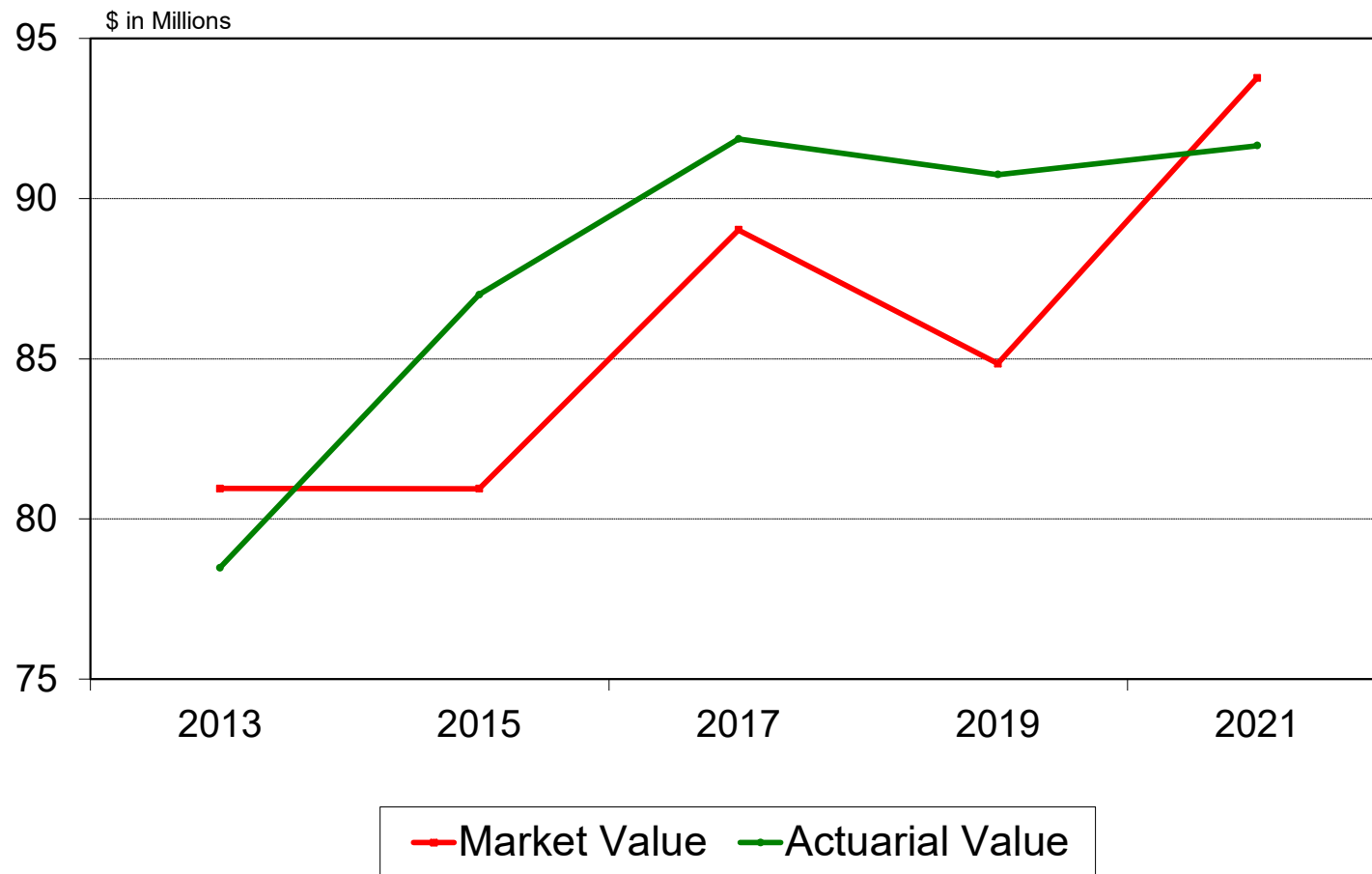
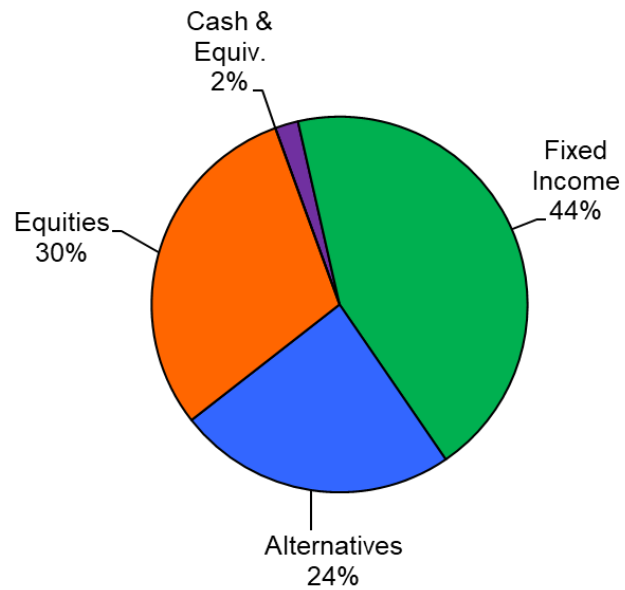


Exhibit 10

Market Value Asset Allocation for Prior and Current Actuarial Valuation Dates

December 31, 2019



December 31, 2021

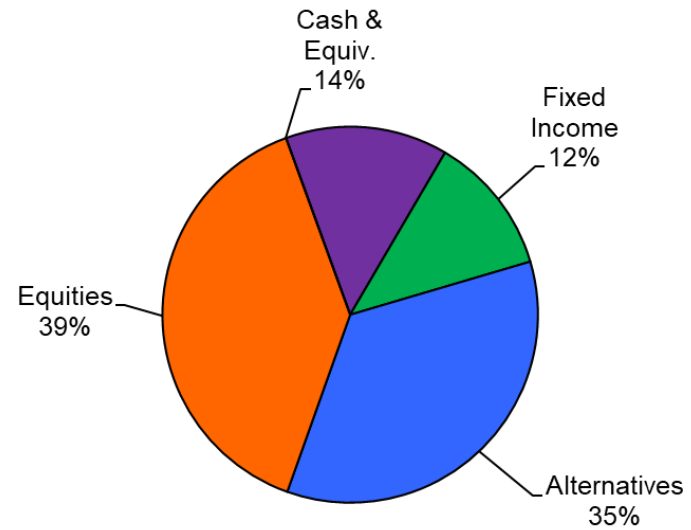


Exhibit 11

Actuarial Methods and Assumptions

A. Actuarial Methods

1. Actuarial Cost Method

The Entry Age Actuarial Cost Method is an actuarial cost method in which the actuarial present value of projected benefits of each active firefighter included in the valuation is allocated as a level percentage of compensation over the period from age at hire to the last age before 100% assumed retirement. Each active firefighter's normal cost is the current annual contribution in a series of annual contributions which, if made throughout the firefighter's total period of employment, would fund his expected benefits. Each firefighter's normal cost is calculated to be a constant percentage of his expected compensation in each year of employment. The normal cost for the fund is the sum of the normal costs for each active firefighter for the year following the valuation date. The normal cost as a percent of payroll reflects that contributions are made biweekly.

The fund's actuarial accrued liability is the excess of the actuarial present value of projected benefits over the actuarial present value of all future remaining normal cost contributions. The unfunded actuarial accrued liability (UAAL) is the amount by which the actuarial accrued liability exceeds the actuarial value of assets. The UAAL is recalculated each time a valuation is performed. Experience gains and losses, which represent deviations of the UAAL from its expected value based on the prior valuation, are determined at each valuation and are amortized as part of the newly calculated UAAL.

2. Amortization Method

The UAAL is assumed to be amortized with level percentage of payroll contributions (total assumed contribution rate less normal cost contribution rate) based on assumed payroll growth of 3% per year. The actuarial determination of the amortization period reflects that contributions are made biweekly.

3. Actuarial Value of Assets Method

All assets are valued at market value with an adjustment made to uniformly spread actuarial gains or losses (as measured by actual market value investment return vs. expected market value investment return) over a five-year period. The total adjustment amount shall be limited as necessary such that the actuarial value of assets shall not be less than 80% of market value nor greater than 120% of market value. See Exhibit 8.

B. Actuarial Assumptions

As a part of each actuarial valuation, we review the actuarial assumptions used in the prior actuarial valuation. The investment return assumption is reviewed using the building block approach that includes several asset allocations, assumed real rates of return for each asset class, an assumed rate of investment-related expenses, and an assumed rate

of inflation, with all assumptions for the long-term future. Our economic assumptions are influenced both by long-term historical experience and by future expectations of investment consultants and economists, but we select the economic assumptions and try to discuss them with the board before completing the actuarial valuation. See our review of the economic assumptions in Appendix A.

We review the termination and retirement experience since the prior valuation and periodically look back more than two years. We also periodically review the average salaries by years of service to get insights into the promotion, step, and longevity compensation patterns for the purpose of reviewing our compensation increase assumption. For the mortality assumptions, we use an appropriate published mortality table with projections for improvement beyond the valuation date. We are guided in our review and selection of assumptions by the relevant actuarial standards of practice. As a result of our review, we have selected actuarial assumptions we consider to be reasonable and appropriate estimates of future experience for the fund for the long-term future.

1. Investment Return

7% per year net of investment-related expenses.

2. Inflation

2.75% per year included in compensation increases and investment return assumptions.

3. Mortality Rates

PubS-2010 (public safety) total dataset mortality tables for employees and for retirees (sex distinct), projected for mortality improvement generationally using the projection scale MP-2019.

4. Compensation Increases

General increases of 3% per year combined with promotion, step, and longevity increases that average 2.89% per year over a 30-year career. See Exhibit 12.

5. Retirement Rates

Age	Rate per Year for Firefighters Eligible to Retire
50	30%
51-52	10
53	40
54-55	25
56-59	50
60	100

The average expected retirement age for paid firefighters not yet eligible to retire based on these rates is 53.4.

6. DROP Elections

- a. Percent of firefighters eligible electing Retroactive DROP: 100% of service retirements eligible to elect at least a 24-month lump sum.
- b. Months assumed for Retroactive DROP lump sum: Maximum they are eligible for, up to 36 months.
- c. Percent of firefighters electing Reverse DROP: 100% of service retirements not eligible to elect at least a 24-month lump sum Retroactive DROP.
- d. Percent of firefighters electing Forward DROP and Combined DROP: 0%

7. Termination Rates

See Exhibit 12.

8. Disability Rates

See Exhibit 12.

9. Reduction in Benefit after 2½ Years of Disability Retirement

15% weighted average reduction in benefit.

10. Percent Married

90% of the firefighters are assumed to be married at retirement, disability, or death while employed, with male firefighters having a spouse three years younger and female firefighters having a spouse three years older.

11. Payment Form for Retirement Benefits Due to Service Retirement, Disability Retirement, or Vested Termination

- Joint and 75% to surviving spouse for the 90% assumed to be married
- Life annuity for the 10% assumed to be single

12. Surviving Child's Death Benefit

None are assumed as a result of future deaths.

13. Firefighters' Contribution Rate

14.2% of covered pay.

14. City's Contribution Rate

22.2% of covered pay for at least as long as the period required to amortize the UAAL.

15. Covered Payroll for First Year Following Valuation Date

In general, actual (or annualized) pay for 2021 without an adjustment for each firefighter to anticipate lower amounts of unscheduled overtime pay in 2022 compared to 2021 that will approximately offset the general pay increases effective October 1, 2021 and 2022.

16. Administrative Expenses

The expenses paid by fund assets for other than investment-related expenses are assumed to be 1.7% of payroll. The normal cost rate as a percent of payroll is assumed to be 1.7% of payroll higher to reflect these expenses.

17. Increase in Future Pay-Related Benefits Due to Definition of Average Salary in Combination with Unusual Amounts of Overtime

2.0%

18. Increase in Future Pay-Related Benefits Due to Combined Effect of Pay Practices and the Definitions of Salary and of Average Salary

8.5%

19. Conditional 2% Increase in Benefits

The Present Plan's Section F conditional 2% increase in benefits to certain pensions when the fund's investment rate of return averages at least 8.25% over the most recent five consecutive years will never be triggered.

Exhibit 12

**Disability and Termination Rates per 1,000 Active Members
Compensation Increases by Years of Service**

Disability Rates		Termination Rates		Compensation Increases	
Attained Age	Rate per 1,000	Years of Service	Rate per 1,000	Years of Service	Increase Percent
20	0.14	0	119	1	15.88%
21	0.15	1	107	2	15.88
22	0.16	2	95	3	15.88
23	0.17	3	84	4	6.09
24	0.18	4	73	5	6.09
25	0.19	5	63	6	6.09
26	0.21	6	54	7	6.09
27	0.23	7	48	8	6.09
28	0.25	8	42	9	6.09
29	0.28	9	38	10	6.09
30	0.31	10	33	11	6.09
31	0.35	11	28	12	6.09
32	0.40	12	24	13	6.09
33	0.45	13	21	14	6.09
34	0.49	14	19	15	6.09
35	0.52	15	18	16	6.09
36	0.54	16	18	17	6.09
37	0.57	17	16	18	6.09
38	0.62	18	15	19	6.09
39	0.73	19	15	20	6.09
40	0.92	20 & Over	0	21	3.00
41	1.14			22	3.00
42	1.32			23	3.00
43	1.48			24	3.00
44	1.73			25	3.00
45	2.09			26	3.00
46	2.55			27	3.00
47	2.98			28	3.00
48	3.34			29	3.00
49	3.62			30	3.00
50	3.79			31	3.00
51	3.92			32	3.00
52	4.04			33	3.00
53	4.24			34	3.00
54	4.56			35	3.00
55	0.00			36	3.00
56	0.00			37	3.00
57	0.00			38	3.00
58	0.00			39	3.00
59	0.00			40	3.00

Exhibit 13

Definitions

1. Actuarial Accrued Liability That portion, as determined by the particular actuarial cost method used, of the Actuarial Present Value of future pension plan benefits as of the Valuation Date that is not provided for by the Actuarial Present Value of future Normal Costs.
2. Actuarial Assumptions Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, termination, disablement and retirement; changes in compensation; rates of investment earnings and asset appreciation; and other relevant items.
3. Actuarially Equivalent Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.
4. Actuarial Gain (Loss) A measure of the difference between actual experience and that expected based on the Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with the particular actuarial cost method used.
5. Actuarial Present Value The value of an amount or series of amounts payable or receivable at various times, determined as of a given date (the Valuation Date) by the application of the Actuarial Assumptions.
6. 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 pension plan.
7. Actuarial Value of Assets The value of cash, investments and other property belonging to a pension plan, as determined by a method and used by the actuary for the purpose of an Actuarial Valuation.

8. Entry Age Actuarial Cost Method
- An actuarial cost method under which the Actuarial Present Value of the Projected Benefits of each individual included in the Actuarial Valuation is allocated as a level percentage of compensation over the period from age at hire to the last age before 100% assumed retirement. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a Valuation Date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability. Under this method, Actuarial Gains (Losses), as they occur, reduce (increase) the Unfunded Actuarial Accrued Liability.
9. Plan Year
- A 12-month period beginning January 1 and ending December 31.
10. Normal Cost
- That portion of the Actuarial Present Value of pension plan benefits that is allocated to a valuation year by the actuarial cost method.
11. Projected Benefits
- Those pension plan benefit amounts that are expected to be paid at various future times according to the Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future qualified service.
12. Overfunded Actuarial Accrued Liability
- The excess, if any, of the Actuarial Value of Assets over the Actuarial Accrued Liability.
13. Unfunded Actuarial Accrued Liability
- The excess, if any, of the Actuarial Accrued Liability over the Actuarial Value of Assets.
14. Valuation Date
- The date upon which the Normal Cost, Actuarial Accrued Liability and Actuarial Value of Assets are determined. Generally, the Valuation Date will coincide with the end of a Plan Year.
15. Years to Amortize the Unfunded Actuarial Accrued Liability
- The period is determined in each Actuarial Valuation as the number of years, beginning with the Valuation Date, to amortize the Unfunded Actuarial Accrued Liability with a level percent of payroll that is the difference between the expected total contribution rate and the Normal Cost contribution rate.

Exhibit 14
Summary of Present Plan

- | | |
|---|---|
| 1. Normal Service or Disability Retirement Monthly Benefit | |
| (a) Percentage of Highest 60-Month Average Salary | 75% |
| (b) Additional amount per year of service over 20 years | \$80.00 |
| 2. Normal Service Retirement Eligibility (Minimum) | Age 50 and 20 Years or
25 Years and Under 50 |
| 3. Supplemental Monthly Benefit | |
| (a) Monthly amount | \$500.00 |
| (b) Eligibility requirement (Minimum) | Age 50 and 20 Years |
| 4. Actuarially Equivalent Early Service Retirement Eligibility | Age 45 and 20 Years |
| 5. Retroactive Deferred Retirement Option Plan (RETRO DROP) | |
| (a) Earliest RETRO DROP benefit calculation date | Normal Service
Retirement Eligibility |
| (b) Maximum RETRO DROP benefit accumulation period | 36 Months |
| (c) RETRO DROP lump sum includes | |
| (i) Monthly benefits that would have been received
between RETRO DROP benefit calculation date
and termination of employment, | |
| (ii) accumulated contributions made by the firefighter
after the RETRO DROP benefit calculation date, and | |
| (iii) 4% annual interest | |
| 6. Reverse DROP | |
| (a) Eligible upon attaining Normal Service Retirement Eligibility | |
| (b) Monthly benefit of 90% of regular benefit | |
| (c) Lump sum of 24 times the reduced monthly benefit | |
| (d) No return of accumulated contributions and no interest | |

- | | |
|---|---------------------------------------|
| 7. Forward DROP | |
| (a) Earliest Forward DROP irrevocable election | Normal Service Retirement Eligibility |
| (b) Maximum Forward DROP accumulation period | 36 months |
| (c) Forward DROP lump sum includes | |
| (i) Monthly benefits that would have been received between the DROP election date and termination of employment, | |
| (ii) accumulated contributions made by the firefighter after the DROP election date, and | |
| (iii) 4% annual interest | |
| 8. Vested Terminated Benefit | |
| (a) Eligibility for firefighters | 10 Years |
| (b) Percent vested with 10 years | 50% |
| (c) Additional percent vested for each year above 10 years | 5% |
| (d) Percent vested with 20 or more years | 100% |
| (e) Benefit is deferred to date person would have satisfied normal service retirement eligibility date | |
| (f) Benefit is percent vested times service retirement benefit | |
| 9. Disability Retirement Monthly Benefit for Firefighters Who Become Totally Disabled while Employed | |
| (a) For initial 30-month period is (i) plus (ii) if not able to perform job in fire department | |
| (i) Minimum monthly amount based on 20 years | |
| (ii) Additional amount per year of service over 20 years | |
| (b) Following initial 30-month period is (i), or (ii), or (iii), depending upon status | |
| (i) Initial benefit | |
| (ii) Initial benefit multiplied by one-half | |
| (iii) Zero | |
| (c) Upon attaining eligibility for normal retirement, the member's vested retirement benefit becomes payable if the disability benefit has been reduced or terminated | |
| 10. Surviving Spouse's Monthly Benefit as a Percentage of Benefit Active Would Have Been Entitled to as a Normal Service Retirement Benefit | 75% |
| 11. Surviving Children's Monthly Benefit as a Percentage of Highest 60-Month Average Salary | |
| (a) Where the spouse is receiving a benefit | 11.25% |
| (b) Where the spouse is not receiving a benefit or there is no spouse | 22.50% |
| 12. Contributions as a Percent of Payroll by: | |
| (a) Firefighters | 14.20% |
| (b) City of Midland | 22.20% |

13. The normal form of annuity payment at retirement is a Joint and 75% to Surviving Spouse. In lieu of the normal form, an optional reduced Joint and 100% to Surviving Spouse may be elected. Payment is the last day of each month.
14. Salary used to determine the Highest 60-Month Average Salary includes total pay except any lump sum distributions for unused sick leave or vacation are excluded. The average is based on the pay for the 60 months during which the total pay was highest.
15. Refund of firefighters' accumulated contributions without interest will be made to firefighters who terminate employment and either are not eligible for any other benefit from the fund or request a refund from the fund.
16. Pensioners who have received benefits for five full plan years or more will receive a 2% cost-of-living adjustment on August 1 provided the fund's investment performance over the five plan years ending the previous December 31 averages 8.25% or more. DROP participation does not constitute time credited to the five-year requirement. The \$500 per month supplemental benefit will not be increased by the 2% cost-of-living adjustments.
17. A lump sum death benefit of \$10,000 will be paid to the designated beneficiary of a deceased firefighter, whether active or inactive (retired firefighter or a vested terminated firefighter).

Appendix A

Review of the Actuarial Economic Assumptions
for the December 31, 2021 Actuarial Valuation

Theoretical Investment Return Assumption Development

Asset Class	Gross Annual Real Rate of Investment Return (ROR) ¹	Asset Allocation		
		Draft 12/31/2021 ²	Estimated Target ³	Audited Actual 12/31/2021 ⁴
Domestic Equities				
Large Cap	6.5%	17.9%	17%	10.6%
Small/Mid Cap	7.0	<u>3.8</u>	<u>3</u>	<u>3.8</u>
		21.7	20	14.4
International Equities				
Developed	7.0	15.5	15	19.7
Emerging Markets	8.5	<u>5.2</u>	<u>5</u>	<u>5.3</u>
		20.7	20	25.0
Fixed Income	2.3	11.6	15	11.7
Alternatives				
Real Estate	5.5	15.4	17	15.9
Venture Capital	8.5	<u>15.9</u>	<u>18</u>	<u>19.0</u>
		31.3	35	34.9
Cash	0.0	<u>14.7</u>	<u>10</u>	<u>14.0</u>
Total		100.0%	100%	100.0%
<u>Weighted Average Gross Real ROR Assumption</u>		5.43%	5.60%	5.54%
<u>Weighted Average Net Real ROR Assumption⁵</u>		4.18%	4.35%	4.29%
Possible Theoretical Annual Investment Return Assumption: <u>Net Real ROR Plus Assumed Annual Rate of Inflation</u>				
Assumed 3.00% Inflation		7.18%	7.35%	7.29%
Assumed 2.75% Inflation		6.93%	7.10%	7.04%

¹ A gross **real** rate of return is an assumed total annual rate of investment return, before expenses, that is in excess of the assumed annual inflation rate. These are long-term assumptions made by Rudd and Wisdom, Inc.

² This allocation is based on the draft 12/31/2021 investment consultant's report.

³ This is an estimated target allocation reflecting a combination of the target allocation in the October 25, 2021 investment policy statement and the draft December 31, 2021 allocation.

⁴ This allocation is based on the 12/31/2021 audited financial report.

⁵ A weighted average Net Real ROR is an annual rate equal to the weighted average Gross Real ROR reduced by investment-related expenses of an assumed annual rate of 1.25%. The average for the last four years was 1.27% as shown on the next page. This was a significant increase from the assumed rate of 1.00% used in the December 31, 2019 actuarial valuation based on the average of 1.02% for the four years 2016-2019.

Appendix A (continued)

Price Inflation in the USA - Average Annual Rates of Increase in the CPI-U

<u>Years (Dec. to Dec.)</u>	<u>Number of Years</u>	<u>Average Annual Increase</u>
1957 – 2022	65	3.68%
1962 – 2022	60	3.87
1967 – 2022	55	4.02
1972 – 2022	50	3.96
1977 – 2022	45	3.54
1982 – 2022	40	2.82
1987 – 2022	35	2.74
1992 – 2022	30	2.49
1997 – 2022	25	2.47
2002 – 2022	20	2.51

Most inflation forecasts are for 10 years or less. For example, the average 10-year forecast in the December 2022 Livingston Survey published by the Federal Reserve Bank of Philadelphia was 2.50%. However, 10 years is too short a forecast period for a public employee defined benefit pension plan. In the 2022 annual report of the OASDI Trust Funds (Social Security), the ultimate inflation assumptions for their 75-year projections are 3.0%, 2.4%, and 1.8% for the low-cost, intermediate, and high-cost assumptions, respectively. Looking at the average annual increase in the CPI-U over historical periods of 30 to 65 years above and considering the Social Security forecasts, we believe that reasonable assumed rates of inflation for the long-term future would range from 2.25% to 3.25%.

Expenses Paid from Fund

<u>Plan Year Ending 12/31</u>	<u>Beginning of Year Assets</u>	<u>Expenses</u>		<u>Expenses as a % of Assets</u>	
		<u>Admin.</u>	<u>Direct Investmt</u>	<u>Admin. (3) ÷ (2)</u>	<u>Investmt (4) ÷ (2)</u>
(1)	(2)	(3)	(4)	(5)	(6)
2021	\$ 86,345,309	\$406,490	\$1,426,877	0.47%	1.65%
2020	84,848,966	330,045	857,506	0.39	1.01
2019	80,013,420	390,407	1,215,007	0.49	1.52
2018	89,754,731	230,738	814,762	0.26	0.91
2017	82,664,948	279,569	735,812	0.34	0.89
2016	80,942,385	251,621	631,166	0.31	0.78
2018-2021	\$340,962,426		\$4,314,152		1.27%
2016-2019	\$333,375,484		\$3,396,747		1.02%

Appendix A (continued)

Administrative Expenses Paid by the Fund

Plan Year Ending 12/31 (1)	Administrative Expenses Paid by the Fund (2)	Covered Payroll (3)	% of Payroll (2) ÷ (3) (4)
2021	\$ 406,490	\$22,103,901	1.84%
2020	330,045	20,196,734	1.63
2019	390,407	19,403,712	2.01
2018	230,738	17,568,234	1.31
2018-2021	\$1,357,680	\$79,272,581	1.71%

The administrative expenses are not reflected in the investment return assumption but are reflected as a percent of payroll that is added to the normal cost contribution rate. We recommend 1.70%, the average developed above for the last four plan years, rounded down to a multiple of 0.05%. (The covered payroll was determined as the contributions by the firefighters or the city for the plan year divided by the appropriate contribution rate during the plan year.) This is the same as the 1.70% assumption for the prior valuation.

**Comparison of 12/31/2019 Actuarial Economic Assumptions
with 12/31/2021 Actuarial Economic Assumptions**

Actuarial Assumption ¹	12/31/2019 Actuarial Economic Assumptions	12/31/2021 Actuarial Economic Assumptions
Inflation (Price)	3.00%	2.75%
Net real rate of return ²	<u>4.50</u>	<u>4.25</u>
Net total investment return ²	7.50%	7.00%
Firefighter pay increase ³	5.39%	5.89%
Aggregate payroll increase	3.25%	3.00%
Administrative expenses	1.70% of payroll	1.70% of payroll

¹ All assumptions are annual rates.

² Net of all investment-related expenses.

³ For 12/31/2019, an annual general compensation increase of 3.25% combined with annual promotion, step, and longevity pay increases that vary by length of service, which together average 5.39% over a 30-year career. For 12/31/2021, a 3% annual general compensation increase combined with annual promotion, step, and longevity pay increases that vary by length of service, which together average 5.89% over a 30-year career.