
Corpus Christi Fire Fighters' Retirement System

Actuarial Valuation as of December 31, 2020

October 8, 2021



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CONSULTING ACTUARIES

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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.
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October 8, 2021

Board of Trustees
Corpus Christi Fire Fighters'
Retirement System
American Bank Plaza
711 N. Carancahua, Suite 724
Corpus Christi, TX 78475

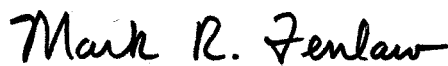
Members of the Board of Trustees:

At the request of the Board of Trustees of the Corpus Christi Fire Fighters' Retirement System, we have prepared this report of the results of the actuarial valuation of the system as of December 31, 2020. This valuation was prepared to determine whether the system has an adequate contribution arrangement.

In a separate June 3, 2021 report, we provided the necessary disclosures for the system's compliance with the Governmental Accounting Standards Board (GASB) Statement No. 67 for the plan year ending December 31, 2020. Similarly, we will provide a separate report later this year 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, 2021. GASB 68 prescribes the city's accounting for your system, while this actuarial valuation report reflects the assumed continuation of the anticipated contribution 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,



Mark R. Fenlaw, F.S.A.



Rebecca B. Morris, A.S.A.

MRF/RBM:nlg

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Section I Valuation Summary

An actuarial valuation of the assets and liabilities of the Corpus Christi Fire Fighters' Retirement System as of December 31, 2020 has been completed. The valuation was based on the Present Plan (plan effective January 1, 2016) and the provisions of the Texas Local Fire Fighters' Retirement Act (TLFFRA) which were in effect on December 31, 2020. Section II shows the key results of the actuarial valuation as of December 31, 2020 and discusses the changes since the prior valuation that we prepared as of December 30, 2018.

This valuation reflects an actuarially assumed total contribution rate of 39.3%, comprised of 13.1% by the firefighters and a phase-in from 21.28% to 26.2% by the city. The total contribution ultimate rate of 39.3% exceeds the normal cost rate of 16.7%, leaving 22.6% available to amortize the unfunded actuarial accrued liability (UAAL) of \$107,525,430. Assuming that the total payroll increases at the rate of 2.75% per year in the future, the contributions in excess of the normal cost **will amortize the UAAL in 21.5 years.**

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 (PRB) pension funding guidelines, our professional judgment, and the actuarial assumptions and methods used in making this valuation, we consider periods of 10 years to 25 years to be preferable and 40 years to be the maximum acceptable period. The PRB guidelines will be changing to a maximum of 30 years in 2025. Since the total contributions are sufficient to pay the system's normal cost and to amortize the system's UAAL within the maximum acceptable period, we are of the opinion that the system, based on present levels of benefits and contributions, **has an adequate contribution arrangement. Section III presents considerations for future benefit improvements.**

Projected Actuarial Valuation Results

In addition to completing this actuarial valuation, we estimated the amortization periods as of December 31, 2022 and as of December 31, 2024 by making projections from the December 31, 2020 actuarial valuation. These projections examine the effect on the amortization period in the next two actuarial valuations of the actuarial investment gains and losses that the system experienced in the four years prior to the valuation date (gains in 2017, 2019 and 2020 and a loss in 2018) that have been only partially recognized as of December 31, 2020. 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 system has had. The AVA used in this current valuation is deferring recognition of various portions of the gains and losses in

2017-2020 that the system experienced. The AVA used in this valuation is \$167,695,254. The market value of assets (MVA) is \$176,686,804. The \$9.0 million difference between the MVA and the AVA is the net deferred gain that will be recognized in the next two 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 2024, we used six scenarios of various assumed annual rates of investment return, net of investment-related expenses, over the 2021-2024 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, 2020, and (2) of investment returns over the next four years different from the 7.25% assumption used in this valuation.

	Scenario					
	1	2	3	4	5	6
Assumed Investment Return for Calendar Year						
2021	7.25%	15.00%	10.00%	10.00%	0.00%	0.00%
2022	7.25	12.00	10.00	-4.00	0.00	-5.00
2023	7.25	7.25	7.25	7.25	7.25	12.00
2024	7.25	7.25	7.25	7.25	7.25	7.25
2025 and later	7.25	7.25	7.25	7.25	7.25	7.25
Amortization Period in Years as of December 31:						
2020 (actual)	21.5	21.5	21.5	21.5	21.5	21.5
2022 (projected)	17.5	15.5	16.7	18.0	19.7	20.2
2024 (projected)	13.6	9.7	11.9	16.0	18.7	19.4

The projected future December 31, 2024 valuation in Scenario 1 reveals that instead of decreasing by the expected four years from 21.5 years to 17.5 years, the amortization period is projected to decrease to 13.6 years due to the recognition of the net deferred gain as of December 31, 2020. This result is not surprising when you consider that if the AVA were set equal to the MVA, recognizing all of the past gains and losses in this December 31, 2020 actuarial valuation, the amortization period would have been 17.6 years instead of 21.5 years. The primary conclusion from Scenario 1 is that without any future gains or losses, the amortization period would decrease twice as fast as expected

because of the deferred net investment gain. Scenarios 2 and 3 show examples of favorable rates of return in 2021 and 2022 that would accelerate the amortization period decreases.

Scenarios 4, 5 and 6 show the effects of some adverse investment experience. The system's amortization period is not very sensitive in these scenarios because of the starting 21.5-year amortization period, the net deferred gain, and the large contribution rate going to pay off the unfunded liability.

We do not know what the investment experience will be for each of the next four fiscal years. 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. In addition, the future investment experience in each of the next four fiscal years could be better or worse than the assumed rates shown. These scenarios present a range of plausible scenarios for the next two valuations assuming no changes in benefits or in the expected city contribution policy.

The primary conclusion from the scenarios is the system's relatively large net deferred investment gain will accelerate the amortization of the UAAL and will provide a cushion that will offset to some extent adverse investment experience.

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 the system's administrator, Ms. Gracie G. Flores. We have not audited the data provided but have reviewed it for reasonableness and consistency relative to the data provided for the December 31, 2018 actuarial valuation. Exhibit 1 is a distribution of the active firefighters by age and service. The assumed 2021 compensation used for projecting future contributions and benefits in the valuation was generally based on the actual pay for the 2020 calendar year without an adjustment to reflect no general pay increase effective October 1, 2020. The total of these assumed compensation amounts is our assumed annualized covered payroll for the plan year beginning January 1, 2021 and is used in the valuation to determine the UAAL amortization period. The averages of the assumed compensation amounts for the 2021 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, 2021. Exhibit 3 is a reconciliation of firefighters and pensioners from December 31, 2018 to December 31, 2020. Exhibit 4 shows a breakdown of the dollar level 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.

The summary of assets contained in Exhibit 6 is based on the December 31, 2020 market value of assets shown in the system's draft audited financial statements. This exhibit also shows a comparison of the market values and actuarial values of assets as of December 31, 2018 and December 31, 2020. Exhibit 7 contains the statement of changes in assets for the plan years ending December 31, 2020 and 2019. 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 asset class as of December 31, 2018 and December 31, 2020 is shown in Exhibit 10.

Assumptions

As a part of each actuarial valuation, we review the actuarial assumptions used in the prior actuarial valuation. In addition, this year we did a more comprehensive review of experience and assumptions and presented a written report dated August 13, 2021. As a result of our review and with the input of the board of trustees during their August meeting, we have selected and used actuarial assumptions we consider to be reasonable and appropriate estimates of future experience for the system for the long-term future. Their selection complies with the applicable actuarial standards of practice. Significant actuarial assumptions used in the valuation are:

1. 7.25% annual investment return net of investment-related expenses;
2. 2.75% annual general compensation increase combined with promotion, step, and longevity increases that average of 2.65% per year over a 30-year career;
3. Retirement rates which result in an average expected age at retirement of 58.4;
4. PubS-2010 (public safety employees) total dataset mortality tables for employees and for retirees, projected for mortality improvement generationally; and
5. City contribution rates increasing 0.984% each October from October 2021 through October 2025, starting at 21.28% on the valuation date and attaining the ultimate anticipated contribution rate of 26.2% over the remainder of the UAAL amortization period.

The following actuarial assumption changes have been made, and the new assumptions are compared to those used in the December 31, 2018 valuation:

1. We changed the investment return assumption from 7.5% to 7.25% and modified its components, increasing the assumed net real rate of return from 4.40% to 4.50% and lowering the assumed inflation rate from 3.1% to 2.75%.
2. We changed the assumed general compensation increase from 3.1 % per year to 2.75%, making it the same as the underlying price inflation assumption. As a result, we also changed the aggregate payroll increase assumption from 3.1% per

year to 2.75%. We think that the 0.35% reduction in the long-term rate of inflation is appropriate.

3. We changed the assumed compensation increases for promotion, step, and longevity increases to better reflect the recent patterns by years of service.
4. As a part of our review of the system’s experience, we reviewed the retirement experience of the system for the six years 2015-2020 and changed the assumed rates to better fit the actual recent experience by age, which includes the effect of the four-year RETRO DROP.

The effects of these changes in assumptions on the UAAL and on the UAAL amortization period are identified 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 system and to reasonable expectations. The assumptions represent a reasonable estimate of anticipated experience of the system 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 summarizes our review of the economic assumptions.

Funding Policy

The funding policy adopted by the board of trustees effective December 20, 2019 says that each actuarial valuation report will include a benchmark actuarially determined contribution (ADC) rate using a closed amortization period of 30 years beginning December 31, 2020. Then the fund’s actuary is to compare the benchmark ADC rate and the actuarial valuation results in the two key metrics, the amortization period and the total contribution rate.

	Amortization Period	Total Contribution Rate
Benchmark ADC rate	30.0 years	34.74%
Actuarial valuation	21.5 years	39.30%
Difference	-8.5 years	+4.56%

The actuarially determined amortization period in this actuarial valuation of 21.5 years is significantly less than the 30-year amortization period in the benchmark ADC rate. The total ultimate contribution rate reflected in this actuarial valuation of 39.3% is significantly more than the benchmark ADC rate of 34.74%. Therefore, there is a positive divergence between the total anticipated contribution rate in this actuarial

valuation and the cost of the benefits as measured by the benchmark ADC rate. Even though there is a positive divergence from the benchmark ADC rate, there is not enough of a divergence to indicate any changes in benefits. Without the anticipated phase-in increase of the city's contribution rate over five years, the amortization period would be 31.3 years. The city agreed to the planned phase-in increased contribution rate to strengthen the system.

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 7.25% 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, 2018 ¹	December 31, 2020
1. Actuarial present value of future benefits		
a. Those now receiving benefits or former firefighters entitled to receive benefits	\$ 126,390,302	\$ 135,601,665
b. Firefighters	<u>171,866,481</u>	<u>197,642,477</u>
c. Total	\$ 298,256,783	\$ 333,244,142
2. Actuarial present value of future normal cost contributions	\$ 47,224,106	\$ 58,023,458
3. Actuarial accrued liability (Item 1c – Item 2)	\$ 251,032,677	\$ 275,220,684
4. Actuarial value of assets	\$ 151,136,552	\$ 167,695,254
5. Unfunded actuarial accrued liability (UAAL) (Item 3 - Item 4)	\$ 99,896,125	\$ 107,525,430
6. Contributions (percent of pay)		
a. Firefighters	13.10%	13.10%
b. City of Corpus Christi	<u>21.28%</u>	<u>26.20%</u>
c. Total	34.38%	39.30%
7. Normal cost (percent of payroll)	16.11%	16.70%
8. Percent of payroll available to amortize the UAAL (Item 6c - Item 7)	18.27%	22.60%
9. Annualized covered payroll	\$ 32,678,079	\$ 35,823,542
10. Years to amortize the UAAL	29.8 years ²	21.5 years ³
11. Funded ratio (Item 4 ÷ Item 3) ⁴	60.2%	60.9%

¹ All items are from the December 31, 2018 actuarial valuation and reflect the Present Plan.

² Calculated reflecting the increase in the city contribution rate from 20.78% to 21.28% in October 2019.

³ Calculated reflecting the anticipated timing of increases in the city contribution rate each October from October 1, 2021 through October 1, 2025 from 21.28% as of the valuation date to 26.2% effective October 1, 2025.

⁴ 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 55.7% as of December 31, 2018 and 64.2% as of December 31, 2020. **The best indicator of the system'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 \$7,629,305 from \$99,896,125 as of December 31, 2018 to \$107,525,430 as of December 31, 2020. The table below summarizes the reasons for the increase.

Reason for Change	Amount
<ul style="list-style-type: none"> • Expected increase (interest on UAAL exceeding assumed amortization payments accumulated with interest) 	\$ 2,663,042
<ul style="list-style-type: none"> • Investment loss for the two years (based on the AVA average annual return of 7.1%) 	1,194,234
<ul style="list-style-type: none"> • Experience gain (net difference between actual experience and assumed experience for pay increases, retirements, mortality, and terminations, but primarily due to pay increases being less than assumed and to fewer retirements than expected) 	(1,316,169)
<ul style="list-style-type: none"> • Change in assumptions 	<u>5,088,198</u>
Total	\$ 7,629,305

Changes in Amortization Period

The amortization period, based on the Present Plan provisions, was determined in the actuarial valuation as of December 31, 2018 to be 29.8 years. Since two years have passed since that valuation date, a 27.8-year amortization period would be expected if all actuarial assumptions had been exactly met, no changes had occurred (other than those expected) in the firefighter and pensioner data, and no changes in assumptions or benefits or contribution rates had been made. Instead, the amortization period is now 21.5 years based on the Present Plan provisions. The actual experience occurring between December 31, 2018 and December 31, 2020 differed from the expected experience, and in combination with the changes in assumptions and in the city contribution rate, the resulting amortization period was 21.5 years, which is 6.3 years less than the expected 27.8-year period for the following reasons:

1. The average annual rate of investment return, net of investment-related expenses, on the market value of assets during the two plan years 2019 and 2020 was 14.4%. 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 2019 and 2020 was 7.1%, less than the assumed rate of return for those years of 7.5%. This resulted in an **increase** in the amortization period of 0.6 of a year.

2. The aggregate payroll increased an average of 4.7% per year from two years earlier instead of increasing at the assumed 3.1% per year rate, which caused the amortization period to **decrease** by 1.6 years. There was an increase in the number of active firefighters from two years earlier that averaged 2.4% per year.
3. The net result of all experience other than the investment experience and the aggregate payroll experience had the combined effect of **decreasing** the amortization period by 1.5 years. This was primarily the result of lower than assumed individual compensation increases and slightly favorable demographic experience.
4. The changes in the actuarial assumptions (the general compensation increase and aggregate payroll increase assumptions from 3.1% to 2.75%, the investment return assumption from 7.5% to 7.25% and the retirement rates) had the combined effect of **increasing** the amortization period by 6.0 years.
5. The increase in the city contribution rate from 21.28% to 26.20% to be phased in over five years **decreased** the amortization period by 9.8 years.

Section III

Contribution Policy and Benefit Improvements

The results of this actuarial valuation as of December 31, 2020 reveal that the system, based on the Present Plan of benefits, has an adequate contribution arrangement. As disclosed in both Sections I and II, the amortization period of the UAAL is 21.5 years. In order for benefit improvements to be made to the plan, they must be made in accordance with Section 7 of TLFFRA which requires approval of the board's actuarial firm, approval of the board, and approval of the firefighters.

The plan provisions in Section 3.9 of the Present Plan say that an amortization period of under 25 years is the first condition required for increases in benefits. The second condition required is that the actuary determines that the financial condition of the system allows the actuary to approve benefit increases. There are two reasons why we are unable to approve benefit increases (without additional firefighter contribution increases) at this time under the second condition.

Contribution Policy

The city recently agreed to a change in its contribution policy in order to strengthen the actuarial condition of the system over the long term. As a result, the plan is for the city to phase over five years from the 21.28% contribution rate that was in effect on the valuation date to a rate of 26.2%, which is twice the current firefighter contribution rate of 13.1%. The intent is to have five uniform annual increases of 0.984% effective each October 1 from October 1, 2021 to October 1, 2025. This actuarial valuation included the assumption that this intended new contribution policy will be followed.

If the city had not agreed to this change in policy but had instead continued contributing the 21.28% rate, the UAAL amortization period would have been 31.3 years. We believe that it would be wise for the board to wait until the city has carried through on its intended five-year phase in to the ultimate 26.2% contribution rate to allow it to begin its intended purpose of strengthening the actuarial condition of the system before considering benefit improvements that would rely on the continuation of the 26.2% city contribution policy. That is the first reason we are not willing to approve benefit improvements based on this actuarial valuation alone. However, we are willing to approve benefit improvements in connection with increases in the firefighter contribution rate.

Benefit Improvements

In addition to believing it is appropriate to wait until the city has fully phased into the intended ultimate contribution rate of 26.2%, we also believe it is now appropriate to amend Section 3.9 of the present plan in two ways. The 25-year amortization period

threshold in Section 3.9 was appropriate when it was incorporated into the plan document in 2007, but we believe that 25-year threshold is now too high. In addition, Section 3.9 includes provisions that require a complicated formula for increases to retirees and surviving spouses, that we believe, is also no longer appropriate.

We recommend that Section 3.9 be amended to remove the 25-year threshold and the complicated formula for increases to pensioners and to add language that would give the board and the retained actuary the responsibility to work together to determine when it would be appropriate to approve benefit improvements and to design increases to pensioners. This is the second reason we are not willing to approve benefit improvements at this time based on this actuarial valuation and the Present Plan provisions.

Exhibit 1
Distribution of Firefighters by Age and Service on December 31, 2020
with Average Annual Salary

Years of Service	Age									Total	Average Salary
	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	19	12	8	2	0	0	0	0	0	41	46,000
2	1	23	7	1	0	0	0	0	0	32	58,000
3	0	1	0	2	0	0	0	0	0	3	78,931
4	2	10	14	2	1	0	0	0	0	29	77,825
5	0	0	0	0	0	0	0	0	0	0	0
6	0	9	11	7	2	0	0	0	0	29	79,677
7	0	0	3	3	0	0	0	0	0	6	84,791
8	0	5	8	4	1	0	0	0	0	18	81,994
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	4	8	3	2	0	0	0	17	88,052
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	1	6	4	4	0	0	0	15	89,973
14	0	0	0	10	8	2	0	0	0	20	89,017
15	0	0	0	3	6	3	2	0	0	14	89,844
16	0	0	0	2	6	7	2	0	0	17	87,505
17	0	0	0	1	12	12	3	0	0	28	95,426
18	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	7	7	4	1	0	19	90,767
20-24	0	0	0	0	9	16	19	13	1	58	94,364
25-29	0	0	0	0	0	6	18	21	1	46	102,041
30-34	0	0	0	0	0	0	10	15	5	30	100,254
35+	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>4</u>	<u>9</u>	<u>13</u>	101,171
Totals	22	60	56	51	59	59	58	54	16	435	\$ 84,574

Average Salary \$49,388 \$73,983 \$91,202 \$98,229 \$95,484
 \$64,391 \$85,542 \$91,577 \$98,608 \$84,574

Average age 41.6
 Average years of service 14.9
 Average age at hire 26.7

Exhibit 2
Summary of Pensioner Data

Type of Benefit	Pensioner Data Used in December 31, 2020 Valuation	
	Number of Recipients	Total Monthly Benefit Payments
Service Retirement ¹	146	\$ 504,726
Disability Retirement ¹		
Not Eligible for Service Retirement	51	115,734
Eligible for Service Retirement	78	300,556
Vested Terminated (Deferred)	12	28,919
Surviving Spouse	49	140,391
Surviving Child	<u>2</u>	<u>4,325</u>
Total	338	\$ 1,094,651

¹ Includes alternate payees.

Type of Benefit	Comparison of Pensioner Count by Type as of The Prior and Current Actuarial Valuations			
	December 31, 2018	New ¹	Ceased	December 31, 2020
Service Retirement ¹	140	+16	-10	146
Disability Retirement ¹				
Not Eligible for Service Ret.	52	+2	-3	51
Eligible for Service Ret.	78	+5	-5	78
Vested Terminated (Deferred)	10	+2	0	12
Surviving Spouse	49	+9	-9	49
Surviving Child	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>
Total	331	+34	-27	338

¹ Includes alternate payees.

Exhibit 3
Firefighter and Pensioner Reconciliation

	Firefighters	Current Payment Status	Vested Terminated Firefighters	Total
1. As of December 31, 2018	415	321 ¹	10	746
2. Change of status				
a. retirement	(12)	12	0	0
b. disability	(7)	7	0	0
c. death	0	(26)	0	(26)
d. survivor payment begins	0	8	0	8
e. withdrawal	(9)	0	0	(9)
f. vested termination	(2)	0	2	0
g. QDRO alternate payee	0	3	0	3
h. data correction	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>
i. net changes	(30)	5	2	(23)
3. New firefighters	<u>50</u> ³	<u>0</u>	<u>0</u>	<u>50</u>
4. As of December 31, 2020	435	326 ²	12	773

¹ Includes 19 alternate payees.

² Includes 21 alternate payees.

³ Fifty (50) new firefighters is the sum of the 73 new firefighters in 2019 and 2020 minus 23 John Does included in the December 31, 2018 actuarial valuation to partially reflect the cadet class in early 2019.

Exhibit 4

Breakdown of Pensioners by Monthly Benefit Amounts as of December 31, 2020

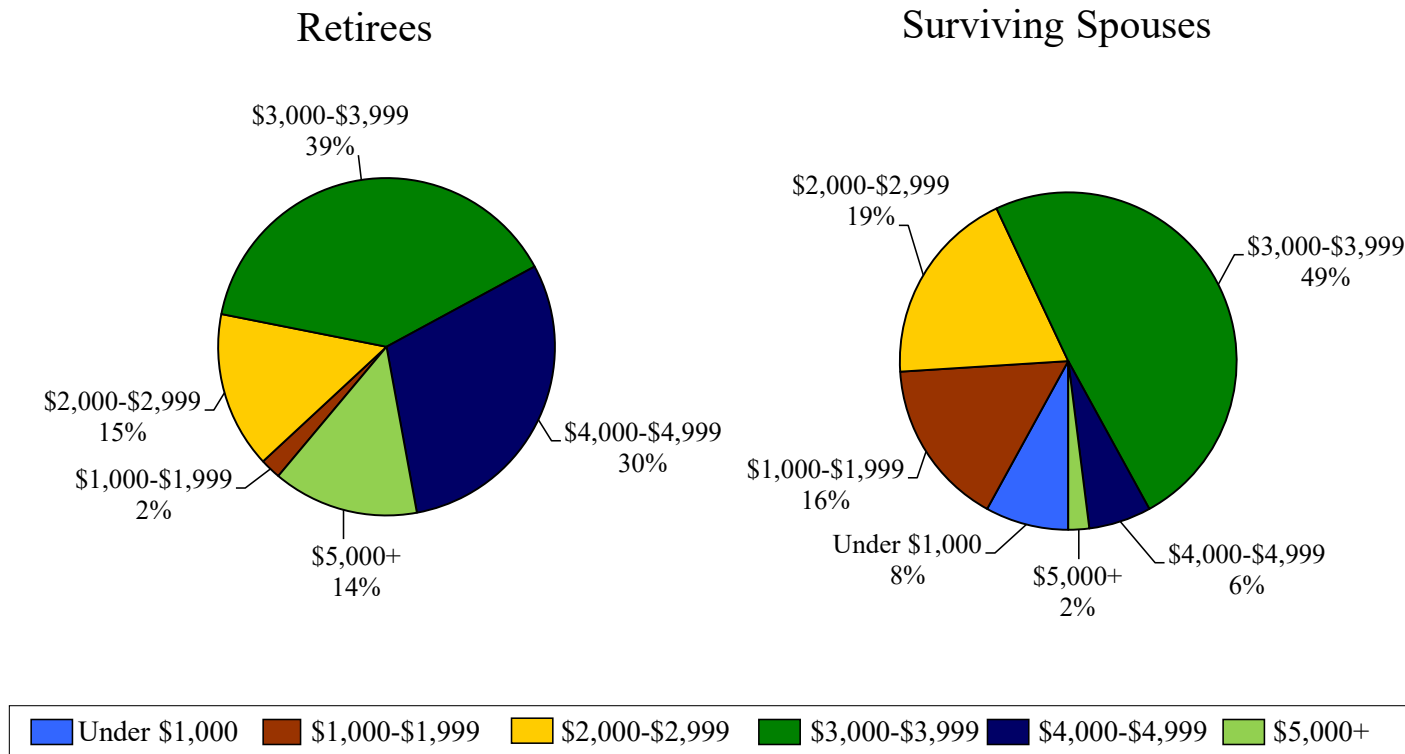


Exhibit 5

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

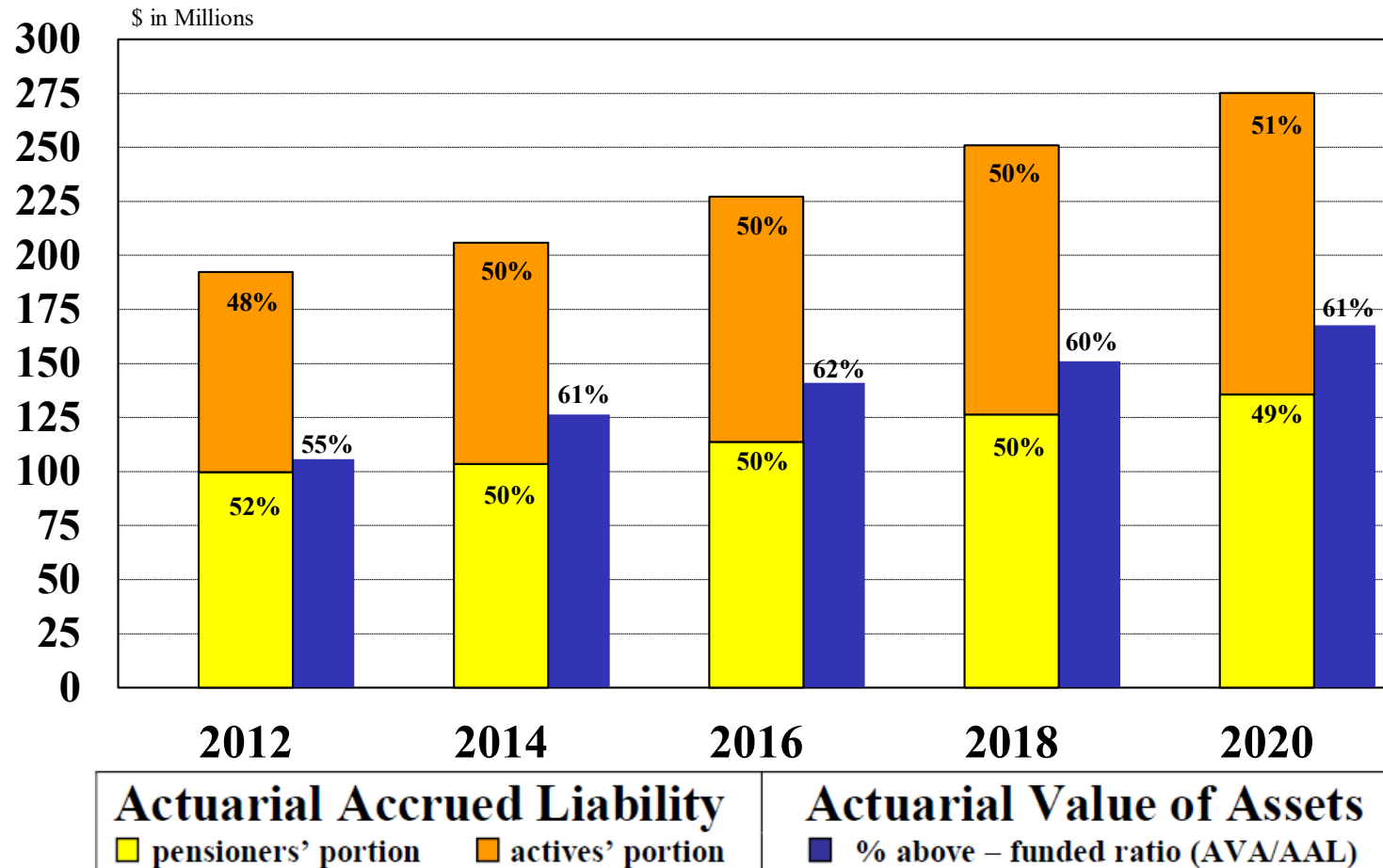


Exhibit 6
Summary of Asset Data

Asset Type	Market Value as of December 31, 2020	Allocation As a Percent of Grand Total
Equities		
Large Cap	\$ 44,223,279	25.0%
Small Cap	22,159,720	12.5
International Developed	23,419,592	13.3
Emerging Markets	11,246,640	6.4
Total	101,049,231	57.2
Fixed Income	56,099,678	31.8
Real Estate	18,953,271	10.7
Cash and Equivalents	584,624	0.3
Grand Total	\$176,686,804 ¹	100.0%

¹ The grand total is the draft audited amount. All of the investment amounts except cash are from the December 31, 2020 report from the investment consultant. Cash is the balancing item.

Comparison of Asset Values as of the Prior and Current Actuarial Valuation Dates		
	<u>December 31, 2018</u>	<u>December 31, 2020</u>
Market Value	\$139,811,086	\$176,686,804
Actuarial Value	\$151,136,552	\$167,695,254
Actuarial Value as a Percent of Market Value	108.1%	94.9%

Exhibit 7
Statement of Changes in Assets
for the Years Ended December 31, 2020 and 2019

	<u>12/31/2020</u>	<u>12/31/2019</u>
Additions		
1. Contributions		
a. Employer	\$ 8,414,319	\$ 7,040,090
b. Employees	<u>5,123,960</u>	<u>4,412,568</u>
c. Total	\$ 13,538,279	\$ 11,452,658
2. Investment Income		
a. Interest and dividends	\$ 2,346,812	\$ 2,800,497
b. Net appreciation in fair value	<u>19,365,905</u>	<u>18,617,826</u>
c. Total	\$ 21,712,717	\$ 21,418,323
3. Other Additions	<u>0</u>	<u>0</u>
Total Additions	\$ 35,250,996	\$ 32,870,981
Deductions		
4. Benefit Payments	\$ 15,452,948	\$ 14,275,964
5. Expenses		
a. Direct investment-related	\$ 428,620	\$ 502,933
b. General administrative	<u>269,765</u>	<u>316,029</u>
c. Total	\$ 698,385	\$ 818,962
Total Deductions	\$ 16,151,333	\$ 15,094,926
Net Increase in Assets	\$ 19,099,663	\$ 17,776,055
Market Value of Assets (Fiduciary Net Position)		
Beginning of Year	\$157,587,141	\$139,811,086
End of Year	\$176,686,804	\$157,587,141
Rate of Return		
Net of All Expenses	13.42%	14.88%
Net of Investment-Related Expenses	13.60%	15.13%
Gross	13.89%	15.52%
Direct Investment-Related Expenses	0.29%	0.39%

Exhibit 8

Development of Actuarial Value of Assets

Calculation of Actuarial Investment Gain/(Loss) Based on Market Value for Plan Years Ending December 31				
	2020	2019	2018	2017
1. Market Value of Assets as of Beginning of Year	\$157,587,141	\$139,811,086	\$148,732,822	\$133,901,631
2. Firefighter Contributions	5,123,960	4,412,568	4,100,046	4,137,182
3. City Contributions	8,414,319	7,040,090	6,503,739	6,562,646
4. Benefit Payments and Administrative Expenses ¹	(15,722,713)	(14,591,993)	(14,298,531)	(14,449,914)
5. Expected Investment Return ²	<u>11,737,119</u>	<u>10,368,106</u>	<u>11,383,622</u>	<u>10,232,061</u>
6. Expected Market Value of Assets as of End of Year	167,139,826	147,039,857	156,421,698	140,383,606
7. Actual Market Value of Assets as of End of Year	<u>176,686,804</u>	<u>157,587,141</u>	<u>139,811,086</u>	<u>148,732,822</u>
8. Actuarial Investment Gain/(Loss)	9,546,978	10,547,284	(16,610,612)	8,349,216
9. Market Value Rate of Return Net of Expenses	13.60%	15.13%	(3.56)%	14.07%
10. Rate of Actuarial Investment Gain/(Loss)	6.10%	7.63%	(11.31)%	6.32%

¹ Administrative expenses are included for all four years because the investment return assumption was net of investment-related expenses for those years.

² Assuming uniform distribution of contributions and payments during the plan year; actuarially assumed investment return was 7.75% for 2017 and 2018 and 7.5% for 2019 and 2020.

Plan Year	Investment Gain/(Loss)	Deferral Percentage	Deferred Gain/(Loss) as of 12/31/2020
2020	\$ 9,546,978	80%	\$ 7,637,582
2019	10,547,284	60%	6,328,370
2018	(16,610,612)	40%	(6,644,245)
2017	8,349,216	20%	<u>1,669,843</u>
Total			\$ 8,991,550

Actuarial Value of Assets as of December 31, 2020	
11. Market Value of Assets as of December 31, 2020	\$ 176,686,804
12. Deferred Gain/(Loss) to be Recognized in Future	<u>8,991,550</u>
13. Preliminary Value (Item 11 – Item 12)	\$ 167,695,254
14. Corridor for Actuarial Value of Assets	
a. 80% of Market Value as of December 31, 2020 (minimum)	\$ 141,349,443
b. 120% of Market Value as of December 31, 2020 (maximum)	\$ 212,024,165
15. Actuarial Value as of December 31, 2020	\$ 167,695,254
16. Write Up/(Down) of Assets (Item 15 – Item 11)	\$ (8,991,550)

Exhibit 9

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

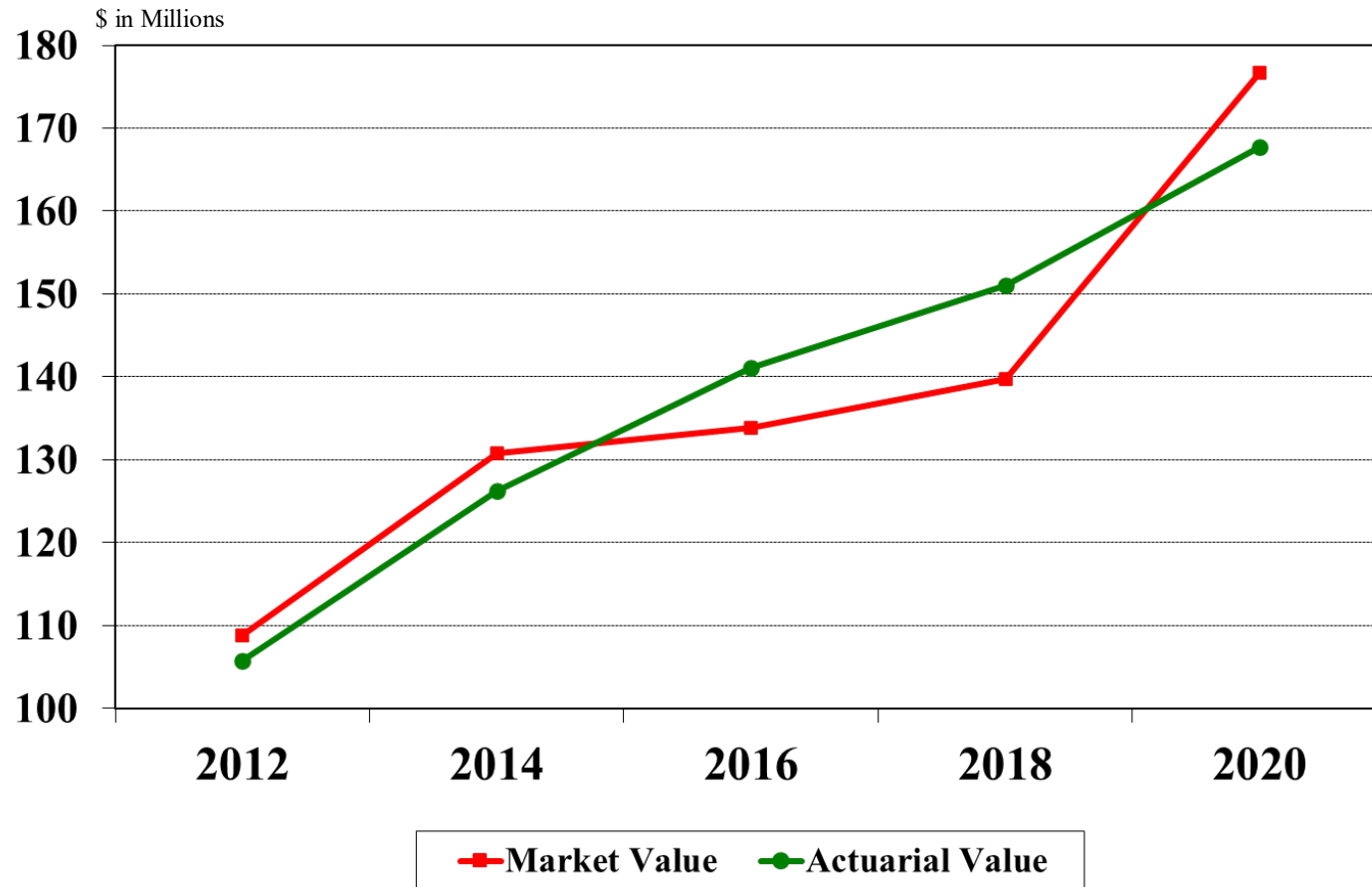


Exhibit 10

**Comparison of Market Value Asset Allocation as of the Prior and
Current Actuarial Valuation Dates**

December 31, 2018

December 31, 2020

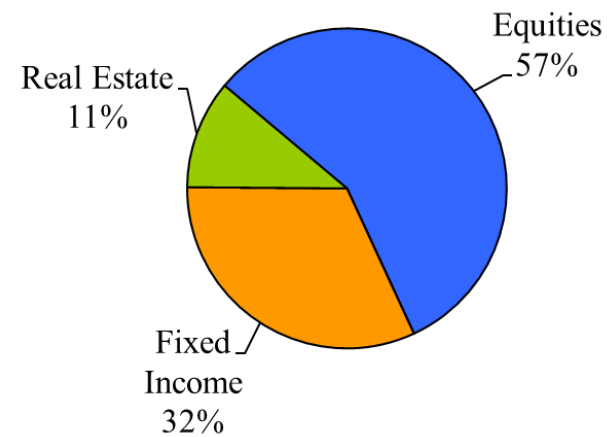
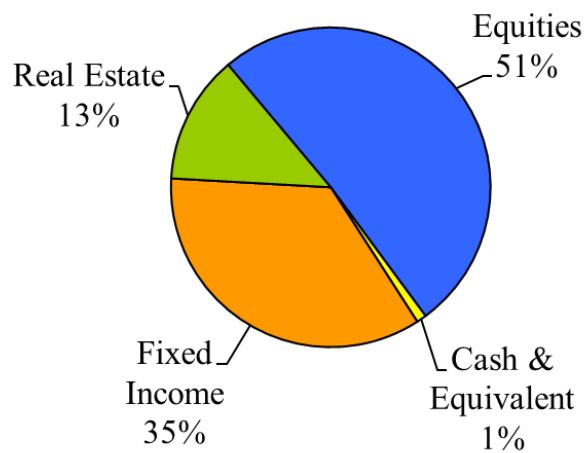


Exhibit 11

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 assumed 100% 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 2.75% 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 discuss them with the board before completing the actuarial valuation.

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 system for the long-term future.

1. Investment Return

7.25% 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-2018.

4. Compensation Increases

General increases of 2.75% per year combined with promotion, step, and longevity increases that average 2.65% per year over a 30-year career. See Exhibit 12.

5. Retirement Rates

Age	Rate per Year for Paid Firefighters Eligible to Retire
54	7%
55	7
56	15
57	15
58	35
59	20
60	50
61	20
62	20
63-64	50
65	100

The average expected retirement age for paid firefighters not yet eligible to retire based on these rates is 58.4.

6. RETRO DROP Election

- a. Percent of firefighters eligible electing RETRO DROP: 100% of service retirements eligible to elect at least a 12-month lump sum.
- b. Months assumed for lump sum: Maximum they are eligible for, up to 36 months for retirement before 60 and up to 48 months for retirement at ages 60 and above.

7. Termination Rates

See Exhibit 12.

8. Disability Rates

See Exhibit 12.

9. Reduction in Benefit after 2½ Years of Disability Retirement

45% weighted average reduction in benefit until eligible for normal service retirement.

10. Percent Married

85% of the firefighters are assumed to be married at retirement, disability, or death while employed, with male firefighters having a spouse two years younger and female firefighters having a spouse two years older.

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

- Joint and 100% to surviving spouse for the 85% assumed to be married
- Life annuity for the 15% assumed to be single

To the extent early retirement is elected and the amounts are determined under an actuarial basis which differs from the basis used in the valuation, actuarial gains or losses will occur. These gains or losses are expected to be immaterial and will be recognized through the valuation process for those retiring since the prior valuation who made an early retirement election.

12. Surviving Child's Death Benefit

None are assumed as a result of future deaths.

13. Firefighters' Contribution Rate

13.10% of covered pay.

14. City's Assumed Contribution Rate

26.2% of covered payroll ultimately, phasing in from 21.28% on the valuation date with five annual uniform increases of 0.984% from October 1, 2021 to October 1, 2025, and continuing the 26.2% rate for at least as long as the period required to amortize the unfunded actuarial accrued liability.

15. Covered Payroll for First Year Following Valuation Date

Actual (or annualized) pay for 2020 for each firefighter without adjustment to reflect that there was no general pay increase effective October 1, 2020. However, for firefighters whose 2020 pay increased more than 10% over their 2019 pay, the 2021 pay was assumed to be their 2019 pay increased by 10%.

16. General Administrative Expenses

The expenses paid by fund assets for other than investment-related expenses are assumed to be 0.85% of payroll. The normal cost rate as a percent of payroll is assumed to be 0.85% of payroll higher to reflect these expenses.

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	60	1	13.03%
21	0.15	1	54	2	28.44
22	0.16	2	48	3	11.48
23	0.17	3	42	4	11.48
24	0.18	4	37	5	11.48
25	0.19	5	32	6	11.48
26	0.21	6	27	7	3.78
27	0.23	7	24	8	3.78
28	0.25	8	21	9	3.78
29	0.28	9	19	10	3.78
30	0.31	10	17	11	3.78
31	0.35	11	14	12	3.78
32	0.40	12	12	13	3.78
33	0.46	13	11	14	3.78
34	0.53	14	10	15	3.78
35	0.61	15	9	16	3.78
36	0.71	16	9	17	3.78
37	0.83	17	8	18	3.78
38	1.00	18	8	19	3.78
39	1.22	19	8	20	3.78
40	1.50	20 & Over	0	21	2.75
41	1.85			22	2.75
42	2.28			23	2.75
43	2.80			24	2.75
44	3.42			25	2.75
45	4.14			26	2.75
46	4.86			27	2.75
47	5.58			28	2.75
48	6.30			29	2.75
49	7.02			30	2.75
50	7.74			31	2.75
51	8.46			32	2.75
52	9.18			33	2.75
53	9.90			34	2.75
54	10.62			35	2.75
55	0.00			36	2.75
56	0.00			37	2.75
57	0.00			38	2.75
58	0.00			39	2.75
59	0.00			40	2.75

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 earnings between entry age and assumed termination. 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 and Disability Retirement Monthly Benefit is the greater of the Formula 1 Amount or the Formula 2 Amount
 - (a) Formula 1 Amount is (i) plus (ii)

(i) Percent of Highest 60-Month Average Pay	52.00%
(ii) Additional benefit for each year of service in excess of 20 years	\$150.00
 - (b) Formula 2 Amount is for each year of service \$137.00

2. Normal Service Retirement Eligibility Age 54 and 20 Years

3. Retroactive Deferred Retirement Option Plan (RETRO DROP) provides a reduced monthly benefit and a lump sum
 - (a) Earliest RETRO DROP benefit calculation date Age 54 and 20 Years
 - (b) Maximum RETRO DROP benefit accumulation period

(i) Retirement before age 60	36 Months
(ii) Retirement at age 60 or above	48 Months
 - (c) Earliest employment termination date with maximum RETRO DROP accumulation period

(i) Retirement before age 60	Age 57 and 23 Years
(ii) Retirement at age 60 or above	Age 60 and 26 Years
 - (d) 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) no interest

4. Actuarially Equivalent Early Retirement Eligibility (Reduced Benefit Begins Immediately) 10 Years

5. Vested Terminated Benefit
 - (a) Eligibility 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
 - (f) Benefit is percent vested times normal service benefit

6. Disability Retirement Monthly Benefit for Firefighters Who Become Totally Disabled while Employed
 - (a) For initial 30-month period, is (i) plus (ii)
 - (i) Minimum monthly amount based on 20 years
 - (ii) Additional monthly amount per year of service in excess of 20 years
 - (b) Following initial 30-month period, is the greater of (i) and (ii)
 - (i) Initial benefit reduced by the portion of the initial benefit equal to estimated annual residual earning capacity divided by annual base earnings
 - (ii) Initial benefit multiplied by percentage of disability
 - (c) Upon attaining eligibility for normal retirement, the member's vested retirement benefit becomes payable if the disability benefit has been reduced

7. Surviving Spouse Monthly Death Benefit for Firefighters Who Die while Employed
 - (a) Minimum monthly amount based on 20 years
 - (b) Additional monthly amount per year of service in excess of 20 years
 - (c) Surviving spouse may elect RETRO DROP if firefighter was eligible for a service retirement benefit at time of death

8. The normal form of annuity payment at retirement is a Joint and 100% to Surviving Spouse, and payment is the last day of each month. The same benefit payable to the retired firefighter is payable to the surviving spouse as long as the spouse is alive (and does not remarry if the firefighter terminated employment as a firefighter prior to February 25, 1997). If there is no surviving spouse or the surviving spouse is ineligible, the death benefit shall be paid to the guardian of the deceased firefighter's dependent children, if any.

9. Pay used to determine the Highest 60-Month Average Pay includes all pay except for unused sick leave, unused vacation, unused comp time, or injury pay. The average is based on the 130 consecutive biweekly pay periods during which covered pay was highest. Any lump sum payment for a retroactive pay increase will be allocated to the applicable past biweekly pay periods and excluded from pay for the biweekly pay period in which it was actually paid.

10. 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 system or request a refund from the system.

11. Contributions
 - (a) Firefighters (percent of covered pay) 13.10%
 - (b) City of Corpus Christi (percent of covered payroll)
 - on valuation date 21.28%
 - ultimate expected rate 26.20%

Appendix A
Review of the Actuarial Economic Assumptions
for the December 31, 2020 Actuarial Valuation

Asset Allocation and Investment Return Assumption Development

<u>Asset Class (Investment Manager)</u>	<u>Gross Real Rate of Return¹</u>	<u>Investment-Related Expenses²</u>	<u>Net Real Rate of Return³</u>	<u>Asset Allocation</u>	
				<u>12/31/2020</u>	<u>Target</u>
Domestic Equity					
Large Cap Growth (Polen Cap Mgmt)	6.5%	0.64%	5.86%	6.9%	6.25%
Large Cap Growth (Clear Bridge)	6.5	0.59	5.91	6.8	6.25
Large Cap Growth (LSV Asset Mgmt)	6.5	0.69	5.81	11.4	12.50
Small Cap Growth (JP Morgan)	7.0	0.83	6.17	7.6	5.00
Small Cap Value (Fuller & Thaler)	7.0	0.89	6.11	<u>5.0</u>	<u>5.00</u>
				37.7	35.00
International Equity					
Developed (MFS)	7.0	0.85	6.15	6.1	6.25
Developed (Capital Group)	7.0	0.79	6.21	7.2	6.25
Emerging Market (Vanguard)	8.0	0.19	7.81	<u>6.4</u>	<u>6.00</u>
				19.7	18.50
Alternatives					
Real Estate (JP Morgan)	5.5	1.09	4.41	10.7	10.00
Fixed Income					
Domestic Core Plus (Garcia Hamilton)	2.5	0.27	2.23	23.8	27.50
Global (PIMCO)	2.5	0.71	1.79	<u>8.1</u>	<u>9.00</u>
				<u>31.9</u>	<u>36.50</u>
				100.0%	100.00%

Weighted Average Assumption

Net Real Rate of Return (net of investment-related expenses)	4.71%	4.53%
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Possible Theoretical Investment Return Assumption
(Net Real Rate of Return Plus Assumed Rate of Inflation)

Assumed 2.75% Inflation	7.46%	7.28%
Assumed 3.00% Inflation	7.71%	7.53%

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

² These assumed investment management expenses are based on expense information for 2020 from Ms. Gracie Flores and include both direct and indirect management expenses. They include 0.09% for direct investment expenses paid for investment consultant fees, bank custodial fees, and foreign tax.

³ Net = Gross – Investment-Related Expenses

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>
1955 – 2020	65	3.56%
1960 – 2020	60	3.68
1965 – 2020	55	3.90
1970 – 2020	50	3.83
1975 – 2020	45	3.50
1980 – 2020	40	2.80
1985 – 2020	35	2.51
1990 – 2020	30	2.25
1995 – 2020	25	2.14
2000 – 2020	20	2.04

Most inflation forecasts are for 10 years or less. For example, the 10-year forecast in the June 2021 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 2021 annual report of the OASDI Trust Funds (Social Security), the ultimate inflation assumptions for their 75-year projections were 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%. Shorter term considerations make the bottom half of that range more desirable.

Administrative Expenses as a Percent of Payroll

<u>Plan Year Ending 12/31</u>	<u>Administrative Expenses Paid by the System</u>	<u>Covered Payroll</u>	<u>Percent of Payroll (2) ÷ (3)</u>
<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>
2020	\$ 269,765	\$ 39,114,198	0.69%
2019	316,029	33,683,725	0.94
2018	252,645	31,298,070	0.81
2017	269,405	31,581,550	0.85
2017-2020	\$1,107,844	\$135,677,543	0.82%

The administrative expenses are reflected as a percent of payroll that is added to the normal cost contribution rate. For the December 31, 2020 actuarial valuation, we recommend 0.85%, the average developed above for the last four plan years, rounded up to the next multiple of 0.05%. (The covered payroll was determined as the firefighter contributions or the city contributions for the plan year divided by the appropriate contribution rate during the plan year.) The 0.85% assumption is the same as for the December 31, 2018 actuarial valuation.

Appendix A (continued)

Comparison of 12/31/2018 Actuarial Economic Assumptions
with 12/31/2020 Actuarial Economic Assumptions

<u>Actuarial Assumption^(A)</u>	<u>12/31/2018 Actuarial Economic Assumptions</u>	<u>12/31/2020 Actuarial Economic Assumptions</u>
Inflation (Price)	3.10%	2.75%
Net real rate of return ^(B)	<u>4.40</u>	<u>4.50%</u>
Net total investment return ^(B)	7.50%	7.25%
Firefighter pay increase ^(C)	4.92%	5.40%
Aggregate payroll increase	3.10%	2.75%
Admin. Expense (% of payroll)	0.85%	0.85%

^(A) All assumptions are annual rates.

^(B) Net of investment-related expenses.

^(C) For 12/31/2018, a 3.1% annual general compensation increase combined with annual promotion, step, and longevity pay increases that vary by length of service (highest in early years) and that average 1.82% per year over a 30-year career. For 12/31/2020, a 2.75% annual general compensation increase combined with annual promotion, step, and longevity pay increases that vary by length of service (highest in the early years) and that average 2.65% per year over a 30-year career.