



The Woodlands Firefighters' Retirement System
The Woodlands, Texas

Actuarial Valuation Report for
As of January 1, 2020

Prepared by
Retirement Horizons Inc.
April 9, 2020



April 9, 2020

Board of Trustees
The Woodlands Firefighters' Retirement System
P.O. Box 130388
The Woodlands, Texas 77393

Re: 2020 ACTUARIAL VALUATION

Ladies and Gentlemen:

The Board of Trustees for The Woodlands Firefighters' Retirement System (TWFRS) retained Retirement Horizons Inc. (RHI) to perform an actuarial valuation of the TWFRS as of January 1, 2020. This report summarizes the results of our study including measurements of the assets and liabilities as well as an analysis of current funded status. The associated GASB Nos. 67 and 68 results will be provided in a separate communication. This report is organized as follows:

- Section 1 – Valuation Highlights
- Section 2 – Executive Summary
- Section 3 – Actuarial Exhibits
- Section 4 – Valuation Basis

The unfunded actuarial liability was -\$2.77 million (107.0% funded status) as of January 1, 2020, compared to \$0.73 million (97.8% funded status) in the prior valuation. Based on the 2020 valuation and provided future TWFRS experience is consistent with the underlying methods and assumptions, the current assets and funding policy (total 24.00% of payroll) exceed the actuarial liability (no amortization needed), compared to an amortization period of 3.6 years to amortize the unfunded actuarial liability in the prior valuation.

Texas Pension Review Board (PRB) guidelines for actuarial soundness require a contribution policy that will amortize the unfunded liability over a preferred period of 10-25 years, not to exceed a maximum of 30 years. The 2020 valuation indicates the current funding policy exceeds the PRB's minimum preferred period.

We certify the amounts presented in the 2020 valuation report have been determined according to the actuarial assumptions and methods selected by the Board of Trustees. With the exception of the payroll growth assumption, RHI agrees the assumptions are reasonable best estimates. The payroll growth assumption of 0% is a conservative assumption set by the Board. As TWFRS has a surplus of assets as of the valuation date, this assumption does not impact the findings in this report.

It is important to note that future results may be materially different if actual TWFRS experience varies significantly from the underlying valuation basis. Differences could occur for a number of reasons such as plan experience differing from underlying demographic and economic assumptions, changes in the plan provisions, or changes in the law or accounting standards. Due to the limited scope of this report, an analysis of the potential range of impact on results from any such future measurements has not been performed.

Although the scope of this Actuarial Report is as stated above, there are events and anomalies that are identified below to disclose risks associated with their impact on the plan and its cost. The assessment and disclosure of these risk and the actual future results may reasonably be expected to differ. These risks can impact pension obligations, the funded status, and the adequacy of the funding policy.

Investment Risk - As the return on the trust assets is subject to market return, should the actual rate of return be lower than the expected return the cost of the TWFRS benefits will rise and vice versa.

Asset/Liability Mismatch Risk - The changes in assets are not tied to the changes in the value of liabilities in magnitude or direction.

Longevity and other Demographic Risks - Cessation from employment due to termination, disability, death, or retirement may not directly align with the assumptions used to value the Actuarial Accrued Liability (AAL). Actual demographic experience of the TWFRS' population may increase or decrease the future measurement of the AAL.

Contribution Risk - The expected amortization period to amortize the Unfunded AAL as stated in this valuation presumes future contributions equal to the current funding policy. If contributions are less than expected, the funded status will likely decrease over time. The current plan funding policy indicates that the members will contribute 12% of their compensation and the City will contribute 12% of payroll; thus, this valuation has not considered the possibility of unpaid contributions. If the Board knows of events that might impact the ability to follow the funding policy; these events should be discussed and evaluated as to how they may or may not impact the overall funded status of the plan.

Understand that the above risks may not be independent of one another. Thus, it is important to discuss upcoming changes in the Township's financials and the impact on the firefighters to better identify associated risks for the TWFRS. Please discuss with me any impending changes as soon as possible, so corresponding measures may be taken to align the pension plan liabilities with these variations.

Board of Trustees
April 9, 2020

Also understand that this valuation did not assess the likelihood or consequences of potential future changes in applicable law that would impact future benefits or funding of the plan. Should applicable law be changed, these changes will be addressed in separate actuarial communications.

The 2020 actuarial valuation was based upon member census data, financial information and plan provisions as provided by the Plan Administrator. We relied on the member census data provided and performed testing as needed to assure the reasonableness of the underlying input and the results of the study, but RHI did not perform a full audit of the member census data. The 2020 valuation was prepared in accordance with generally accepted actuarial principles and practices including compliance with applicable Actuarial Standards of Practice issued by the Actuarial Standards Board.

Information contained in this report was prepared for the Board of Trustees. It is not intended for any other purposes, and it should not be distributed to any outside party without the express written consent of RHI, as significantly different results from those contained in this report may be needed for other purposes.

The measures of funded status for long-term funding policy and PRB actuarial soundness should not be relied upon for assessing the sufficiency of plan assets for settlement of liabilities for plan termination.

The undersigned actuary has met the "Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States" and is available to respond to any questions regarding the information contained in this report or provide further details or explanations as needed, respectfully submitted by Retirement Horizons Inc.



David A. Sawyer, FSA EA MAAA FCA
Senior Actuarial Consultant



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Senior Pension Consultant

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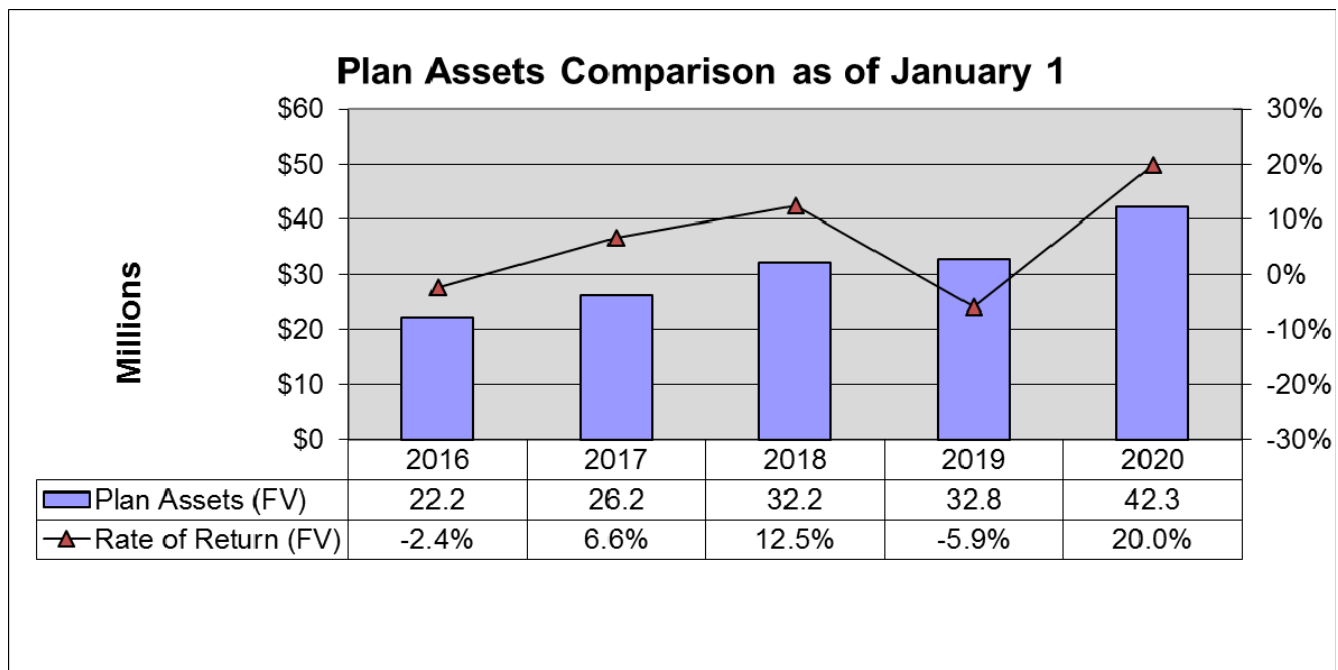
1. Valuation Highlights

FUNDING VALUATION	January 1, 2019	January 1, 2020
Fair Value of Assets	\$32,836,586	\$42,315,851
Average Annual Return: prior year	-5.9%	20.0%
Present Value of Projected Benefits % funded	\$64,248,138 51.1%	\$70,187,384 60.3%
Actuarial Accrued Liability % funded	\$33,562,742 97.8%	\$39,546,188 107.0%
Unfunded Actuarial Accrued Liability % of valuation compensation	\$726,156 6.1%	(\$2,769,663) -22.2%
Expected Unfunded AAL Amortization Period	3.6	-
City Contributions as a % of payroll	12.00%	12.00%
Firefighter Contributions as a % of payroll	12.00%	12.00%
Total Contribution Rate	24.00%	24.00%
PRB Funding Policy Guidelines		
- FSRP Threshold (40 years)		N/A
- Minimum UAAL Amortization Period (30 years)		N/A
- Preferred UAAL Amortization Period (25 years)		N/A
- Preferred UAAL Amortization Period (10 years)		N/A
DEMOGRAPHICS		
Active	138	141
Terminated with Deferred Benefits	6	4
Retirees and Beneficiaries in Pay	2	2
Total	146	147
Valuation Compensation	\$11,936,747	\$12,462,053
Average Valuation Compensation	\$87,130	\$88,383
ASSUMPTIONS		
Long-term Interest Rate	7.00%	7.00%
Salary Scale	Graded by Service	Graded by Service
Payroll Growth Assumption	0.00%	0.00%
Administrative Expenses	\$100,000	\$100,000

2.1 Plan Assets

The *fair value (FV)* of plan assets was \$42.3 million as of January 1, 2020, compared to \$32.8 million as of January 1, 2019. The net increase in FV of \$9.5 million over the prior year is the result of investment gain (net of investment expenses) of \$6.8 million and total contributions of \$2.9 million, partially offset by benefit payments and administrative expenses of \$0.2 million. Please see Exhibit 3.1 for more details on the development of the fair value of plan assets.

The net rate of return on the FV was 20.0% for 2019. As summarized in the graph below, the actual FV rate of return of the TWFRS has exceeded the long-term actuarial assumption of 7.00% (net of investment expenses) 2 out of the last 5 years (period 2015-2019), producing an average rate of return of 5.7%.



Recognizing the strong actuarial position, the *actuarial value (AV)* of TWFRS assets is based on the fair market value as of the measurement date, rather than using a smoothing method to defer recognition of investment gains and losses (compared to the long-term assumption). As a result, the valuation results may be more volatile, but the AV will always reflect the current financial position.

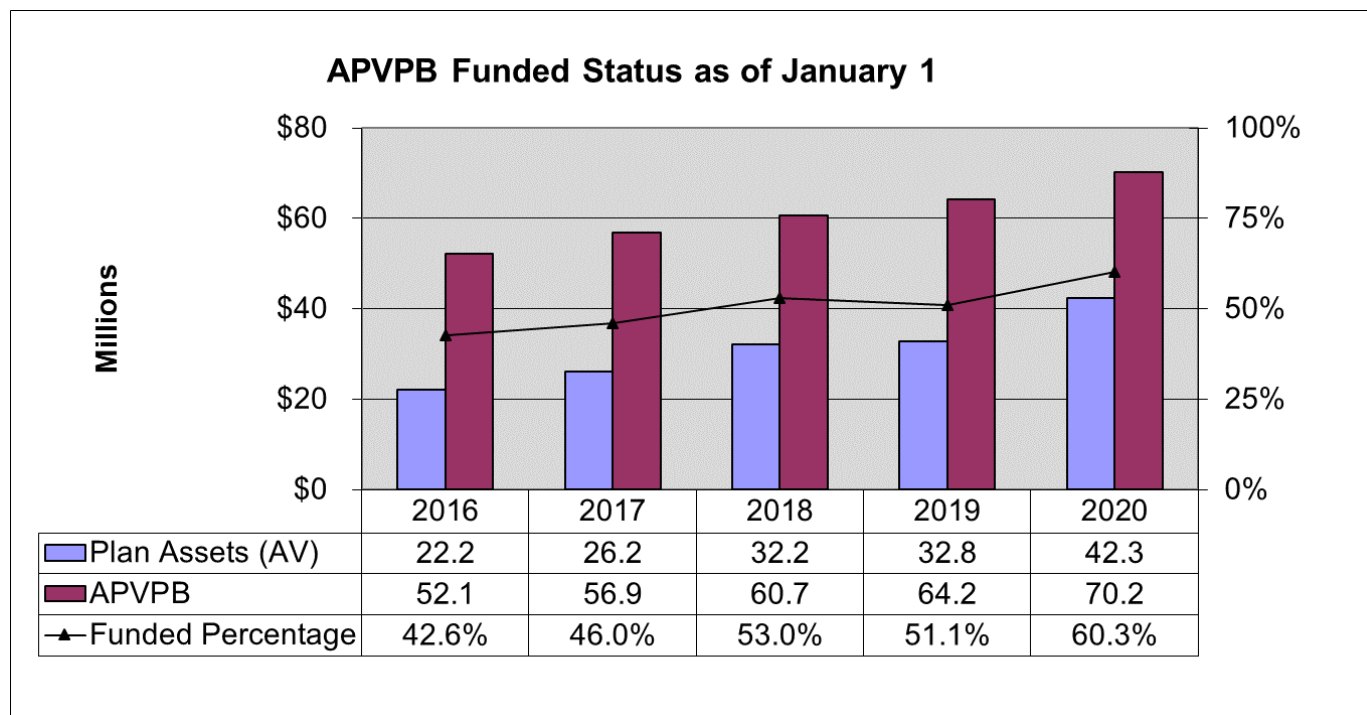
2.2 Actuarial Present Value of Projected Benefits

The true cost of a pension plan is the accumulation of benefit payments less investment income (net of expenses), over the lifetime of the program. In the actuarial valuation process, we use a mathematical model to project the future stream of plan benefits. The model incorporates current plan provisions and member census data, using the actuarial assumptions to predict future events.

Discounting the stream of expected future benefit payments for the time value of money produces the *actuarial present value of projected benefits (APVPB)*. This represents the hypothetical amount of plan assets necessary to fully fund all future plan costs – assuming future plan experience follows the actuarial assumptions. This measure of pension liability includes benefits that have not yet been earned for current employees, based on expected future pay increases as well as projected service, a portion of which will be funded by future contributions.

The total APVPB was \$70.2 million as of January 1, 2020, compared to \$64.2 million for the prior valuation. The net increase of \$6.0 million is primarily attributable to the normal operation of the TWFRS and assumption changes adopted for this valuation. Please see Exhibit 3.2 for more details on the development of the APVPB.

Comparing the AV of TWFRS assets to the APVPB provides one measure of the progress in the long-term funding policy. The funded status on this basis was 60.3% as of January 1, 2020, compared to 51.1% for the prior valuation. Below is an historical comparison of TWFRS assets to the APVPB, indicating the APVPB funded status has improved over the last four years. This result is primarily due to contributions growing at a faster rate than assumed.



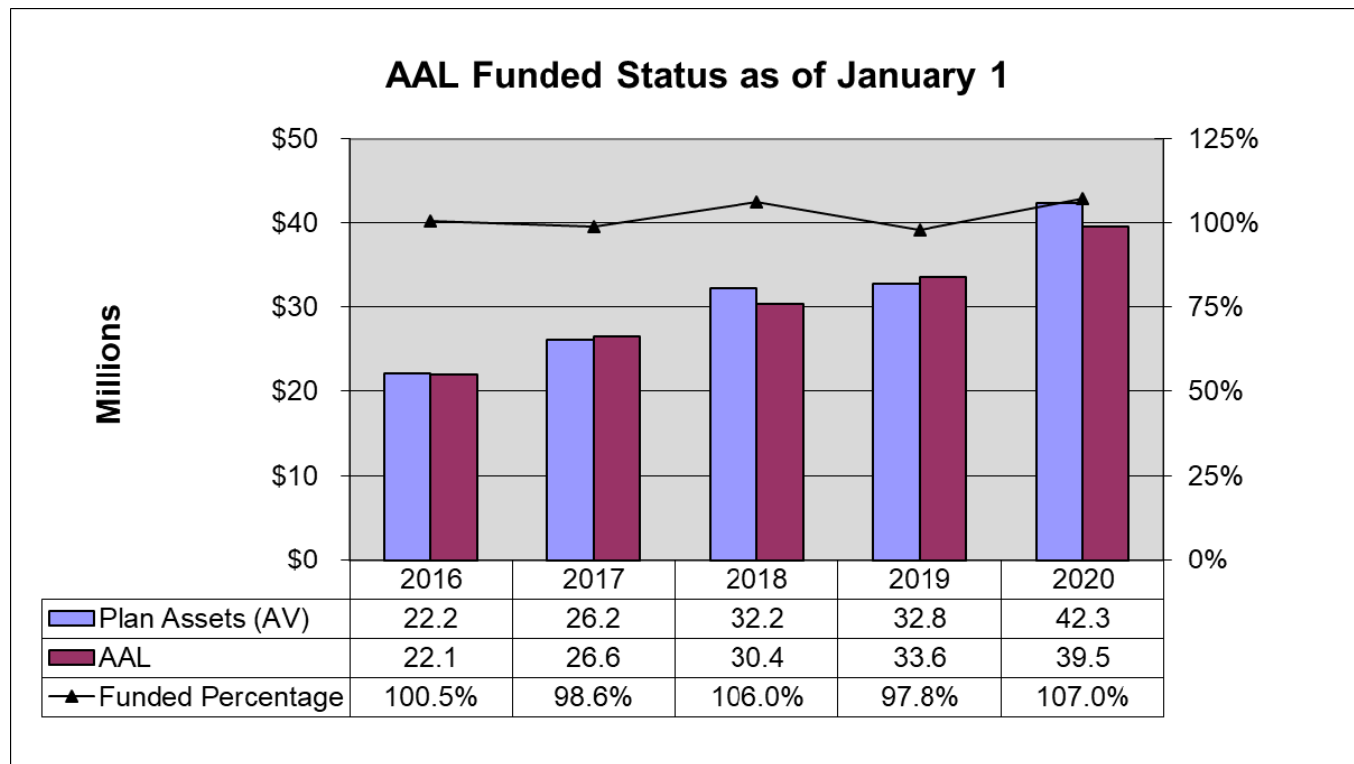
2.3 Actuarial Accrued Liability

As a practical matter, few plan sponsors can afford to fully fund benefits before they have been earned. Generally accepted actuarial principals apply a mathematical formula known as an actuarial cost method to allocate the APVPB over periods of employee service. The portion of cost attributable to periods of employee service rendered prior to the valuation date is the *actuarial accrued liability (AAL)*, and the allocation to the current year is referred to as *normal cost (NC)*.

Comparing AAL to TWFRS assets provides a more appropriate measure of progress in the long-term funding policy, in terms of attribution of pension liabilities and cost to periods of employee service rendered. The unfunded actuarial accrued liability (UAAL) was -\$2.8 million (107.0% funded status) as of January 1, 2020, compared to \$0.7 million (97.8% funded status) as of January 1, 2019.

The net UAAL decrease of \$3.5 million is primarily attributable to the increase in the fair market value of the TWFRS assets. Please see Exhibit 3.3 for more details on the development of the UAAL.

The increase in the AAL funded status ratio since the prior valuation (from 97.8% to 107.0%) is primarily attributable to favorable investment experience, partially offset by the assumption changes adopted. As illustrated in the graph below, the UAAL funded status fluctuated around 100% over the last four years.



2.4 Funding Policy Analysis

Texas Pension Review Board Guidelines

Under generally accepted actuarial practice, a sound funding policy should provide monies sufficient to cover the current year normal cost and amortize the unfunded actuarial accrued liability (UAAL) over a reasonable period, which generally should not extend beyond the average future working lifetime of the active members.

Recently revised Texas Pension Review Board guidelines recommend a funding policy that will amortize the UAAL over a period of 10-25 years, not to exceed a maximum period of 30 years. As of January 1, 2020, the TWFRS had a surplus (no UAAL), therefore; the TWFRS's funding policy currently exceeds the PRB's preferred minimum.

Furthermore, benefit improvements should not be considered if the resulting expected amortization period would exceed 25 years.

Based on the 2020 actuarial valuation and provided future TWFRS experience is consistent with the actuarial methods and assumptions, the current funding policy (total 24.00% of pay) will continue to be sufficient to amortize the unfunded actuarial liability. Please see Exhibits 3.4 and 3.5 for more details.

Scenario Analysis

At the time this report is being written, the impact of the Corona Virus pandemic is causing severe health and economic problems. As a result, the markets are experiencing one of the most volatile periods in history. While we do not know how long this will last nor the long-term impact, TWFRS is in the best position to weather this difficult period of any TLFFRA Fund. That being said, if the economy doesn't fully rebound, the Board will need to make decisions regarding the future valuation assumptions and TWFRS benefits. Below is one possible scenario.

If this economic event had occurred in 2019 and the trust lost \$6.4 million (about a 15% of the January 2020 value), the Unfunded AAL would have been approximately \$3.6 million. Retaining the current payroll growth assumption of 0%, would result in an infinite amortization period. That is, the UAAL would never be eliminated based on the current funding policy.

As noted in our certification page, the 0% payroll growth assumption is not a best estimate of future experience, but rather an assumption selected by the Board to create some conservatism in the funding policy measurements. For example, the annual payroll growth was slightly higher than 3.5% over the last two years. Using a payroll growth assumption of 3.5% would reduce the expected UAAL amortization period to 53 years, but that would still be outside the PRB funding policy guidelines.

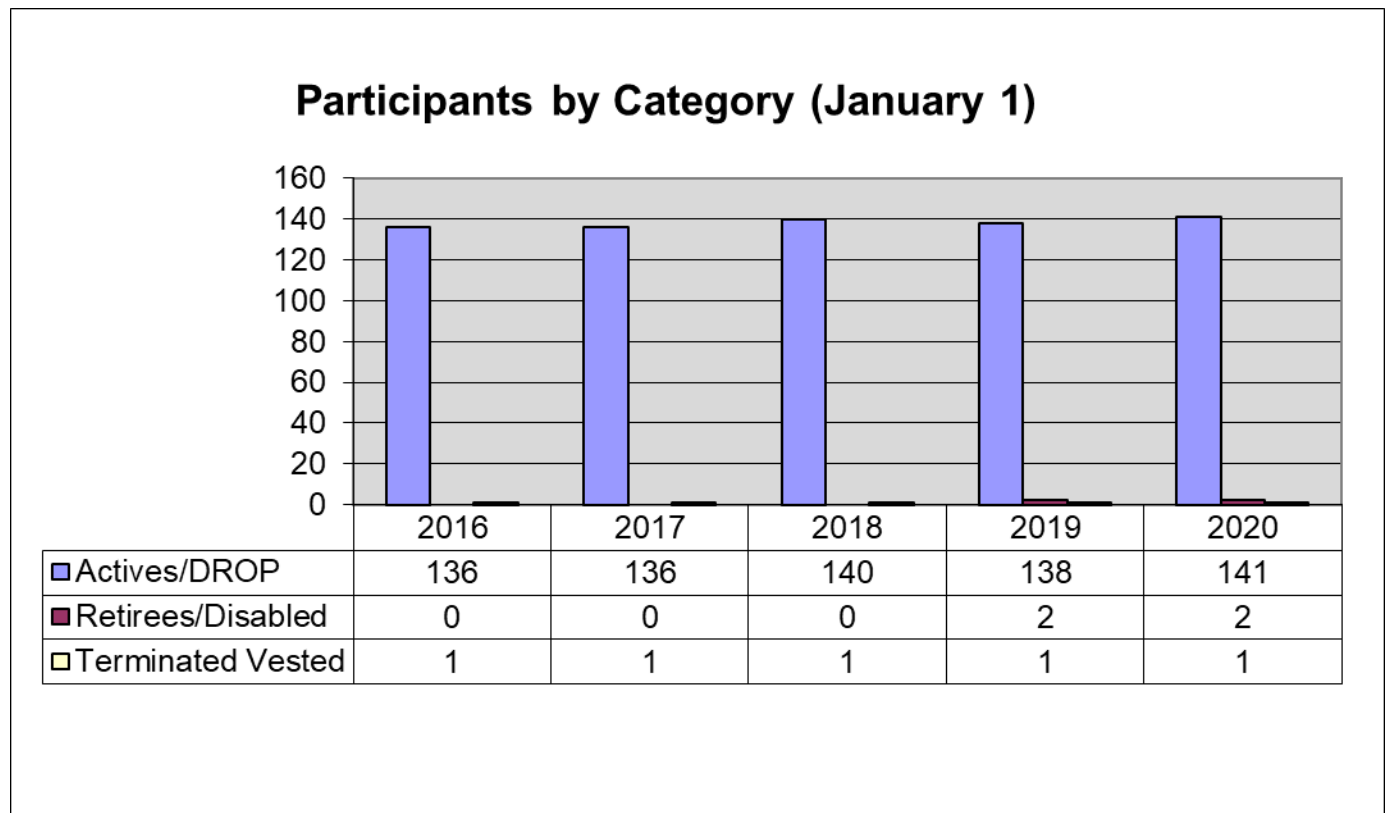
The primary reason for these extreme swings in the expected UAAL amortization period is the leverage resulting from the small difference between the funding policy (24% of payroll) and the normal cost rate (22% of payroll). That is, any increase in the UAAL has to be amortized by contributions equal to 2% of payroll. Hopefully, the markets rebound by the next valuation, but this scenario analysis provides some insight into the relationship between the funding policy, the normal cost rate, and the volatility of expected UAAL amortization period.

2.5 Membership Demographics

Since the 2019 valuation, the number of active members (including DROP) increased from 138 to 141 (2.2%), while total valuation payroll increased from \$11.9 million to \$12.5 million (4.4%) over the last year. Average pay increased from \$87,130 to \$88,383 (1.4%). Average age increased from 40.7 years to 41.5 years, and average service decreased from 13.1 years to 12.1 years.

The number of retired and disabled members and beneficiaries in pay status remained at 2. The number of terminated vested members remained 1. In addition, there were 3 recently terminated members that are due a refund of contributions.

Please see Exhibit 4.1 for a summary of census data used in the current valuation, along with a comparison to the prior valuation. Exhibit 4.2 provides a reconciliation of data by member group and exhibit 4.3 provides an age/service distribution of active members.



2.6 Actuarial Assumptions and Methods

Introduction

Sponsoring a defined benefit pension plan is a long-term commitment, with the ultimate cost dependent on a number of financial and demographic variables. The actuarial valuation process uses a mathematical model and applies actuarial assumptions to predict these future events. Periodic updates of the actuarial valuation process are necessary to ensure the model is financially sound, comparing emerging plan asset and liability experience to valuation projections to measure actuarial gains and losses, making adjustments to the long-term actuarial assumptions if appropriate.

Actuarial Standards of Practice (ASOP)

ASOP No. 27 provides a framework for the actuary in providing advice on development of economic actuarial assumptions. Because no one knows for certain what the future holds with respect to volatile financial markets and a dynamic global economy, ASOP No. 27 emphasizes use of professional judgment to develop a best estimate for each economic assumption.

Under generally accepted actuarial principles, each individual assumption should represent a best estimate of expected long-term experience and should also be reasonable and realistic in the aggregate. The GASB accounting standards confirm that actuarial assumptions should be based on the actual plan experience (to the extent credible), emphasizing expected long-term future trends rather than giving undue weight to recent past experience.

ASOP No. 35 requires the actuary to use professional judgment in the selection of demographic and other non-economic actuarial assumptions considering the relevant universe of possible choices. It also directs the actuary to consider the specific characteristics of the particular benefit provisions and covered group of the plan being valued.

Reasonable demographic assumptions are defined as those that are expected to model the contingency being measured appropriately without producing any significant cumulative actuarial gains and losses over the measurement period. ASOP No. 35 encourages the use of more sophisticated approaches if appropriate for the situation (e.g. large plans) while also acknowledging that simplified techniques may actually be more appropriate in other situations (e.g. small plans).

Please see Exhibit 4.4 for a summary of actuarial assumptions and methods used for the 2020 valuation of the Fund. The amounts presented in this actuarial report have been determined according to the actuarial assumptions and methods selected by the Board of Trustees with review and concurrence by RHI.

2.6 Actuarial Assumptions and Methods (continued)

Interest Rate

The interest rate is the most powerful assumption in the actuarial valuation process, used to project the average rate of return expected on assets and also used to discount future benefit payments in the actuarial present value calculations. To illustrate the sensitivity, a one-percentage-point increase in the interest rate assumption will generally decrease liabilities and cost 10% to 15% based on plan demographics.

The net rate of return on the *fair value of assets (FV)* was 20.01% for 2019 and -5.9% for 2018, producing an average annual rate of return of 6.3% from the period between January 1, 2018 to January 1, 2020, compared to the long-term actuarial assumption of 7.00% (net of investment expenses). As summarized Section 2.1, the actual FV rate of return of the TWFRS has been higher than the long-term actuarial assumption of 7.00% (net of investment expenses) 2 out of the last 5 years (period 2015-2019), producing an average annual rate of return of 5.7%.

It is also important to consider that the long-term interest rate assumption adopted by the Board is 7.00% net of investment management expenses only, with the administrative expenses now separately accounted for as required under GASB rules. As the investment expenses have averaged about 43 basis points in recent years, the TWFRS will need to earn a gross rate of return of about 7.43% in order to achieve the long-term actuarial assumption of 7.00% net of investment expenses.

Based on long-term historical capital market performance and the current TWFRS asset allocation of 72.8% equity, 18.0% fixed income, 9.2% real estate and cash, an expected rate of return of 7.43% is reasonable. However, forward looking capital market rate of return expectations over the next 10-15 years from organizations like J.P. Morgan indicate it may be difficult to achieve a 7.43% gross rate of return with the current investment allocation model:

Capital Market Expectations	JP Morgan Forward Looking Return Expectations	The Woodlands FF Forward Looking Return Expectations
U.S. Equity – Large Cap	5.60%	
U.S. Equity – Small Cap	6.50%	
U.S Domestic Equities		10.00%
International Equity – EAFE	7.20%	
International Equity – Emerging Markets	9.20%	
International Equity		11.00%
U.S. Treasury Bonds	1.60%	
U.S. Corporate Bonds – Investment Grade	3.40%	
Domestic Bonds		5.00%
International Bonds		6.00%
US REITs	6.00%	
Real Estate		7.00%

Given the critical importance of this assumption, the Board requested input from its investment advisors. Based on the investment advisor's forward looking expectations (far right column in the table above), the Board retained the 7.00% interest rate (net of investment expenses).

2.6 Actuarial Assumptions and Methods (continued)

Amortization Method and Payroll Growth

For the level percent of pay method, the assumption used to project growth in total payroll for calculating amortization of the *UAAL* should not necessarily be the same as the salary scale assumption. Individual members may experience this rate of pay growth as they progress through their careers, but those exiting the workforce (due to termination, retirement, etc.) will in effect be replaced by lower paid entry level employees. Assuming the number of employees remains constant (i.e. no increase in head count), the net growth in total payroll will generally be less than the salary scale and closer to the basic inflation rate.

The TWFRS currently uses a payroll growth rate assumption of 0.0% per annum. The actual rate of growth in total payroll averaged 4.10% over the period 2015-2019, but only 3.13% after adjusting for the net increase in number of active members over this period. As previously mentioned, the current 0% payroll growth assumption is not a best estimate, but rather a conservative assumption set by the Board for funding policy measurements. We suggest the Board continue to monitor this assumption and look to Section 2.4 for more discussion on the impact of this assumption.

Year	2015	2016	2017	2018	2019	Average
Payroll (\$ millions)	\$10.63	\$11.38	\$11.9	\$11.9	\$12.5	n/a
Rate of Increase	n/a	7.1%	4.6%	0.3%	4.4%	4.10%
No. of Members	136	136	140	138	141	n/a
Average Annual Pay	\$78,128	\$83,706	\$85,029	\$87,130	\$88,383	n/a
Rate of Increase	n/a	7.1%	1.6%	2.5%	1.4%	3.13%

Mortality

Although not as powerful in the valuation model as investment return, updates to the mortality assumption are still an important factor in the actuarial valuation process. The baseline mortality assumption continues to use the PubS-2010 above median mortality tables but with generational mortality projection using Scale MP-2019 (previously the mortality tables were projected 5 years after the valuation date using Scale MP-2018).

Using the new assumption, a 55-year-old male member is expected to live to 86.9 years of age. This is a future life expectancy of 31.9 years compared to 30.4 years under the prior assumption. As shown in the table below, this new mortality basis reflects increases in life expectancy ranging from 0.2 to 4.2 years based on gender and age as of the measurement date. This increase is primarily the result of the increase in the mortality improvement from the generational application of the projection scale.

Age	Future Life Expectancy in Years - Males			Future Life Expectancy in Years- Females		
	Prior Basis	Revised Basis	Change	Prior Basis	Revised Basis	Change
25	59.9	64.0	4.1	61.0	65.2	4.2
35	49.9	53.1	3.2	51.0	54.3	3.3
45	39.9	42.2	2.3	41.0	43.4	2.4
55	30.4	31.9	1.5	31.5	33.0	1.5
65	21.5	22.3	0.8	22.6	23.4	0.8
75	13.6	13.8	0.2	14.6	14.8	0.2

2.7 System Provisions

Please see Exhibit 4.5 for a summary of provisions included in the current year valuation. There have been no changes in TWFRS benefit provisions.

2.8 Special Study

There was no request for any special studies related to changes to the TWFRS provisions, assumptions or methods.

3.1 Fair Value of Plan Assets

	Asset Values as of January 1		
	2018	2019	2020
A. Fair\Actuarial Value of Plan Assets			
1. Fixed Income	\$7,399,197	\$7,850,300	\$7,597,732
2. Equities	\$23,904,797	\$23,470,743	\$30,815,840
3. Cash Equivalents	\$913,894	\$696,249	\$850,612
4. Alternatives	\$0	\$819,294	\$3,051,667
5. Total Fair Value	\$32,217,888	\$32,836,586	\$42,315,851
B. Change in Fair\Actuarial Value	Change	Change	
1. Contributions			
a. Firefighters	\$1,377,955	\$1,461,364	
b. City	\$1,377,955	\$1,461,363	
c. Total	\$2,755,910	\$2,922,727	
2. Disbursements			
a. Monthly Payments	(\$45,489)	(\$100,704)	
b. Lump Sum Payments	\$0	\$0	
c. Refund of Contributions	(\$18,923)	(\$42,619)	
d. Administrative Expenses	(\$99,498)	(\$135,495)	
e. Total	(\$163,910)	(\$278,818)	
3. Investment Return			
a. Interest and Dividends	\$772,651	\$1,095,557	
b. Realized and Unrealized Gain/(Loss)	(\$2,607,679)	\$5,887,417	
c. Investment Expenses	(\$138,274)	(\$147,618)	
d. Total Return	(\$1,973,302)	\$6,835,356	
4. Net Change	\$618,698	\$9,479,265	
5. Average Rate of Return			
a. Average Asset Value	\$33,513,888	\$34,158,541	
b. Income Net of Investment Expenses	(\$1,973,302)	\$6,835,356	
c. Annual Return Net of Investment Expenses	-5.89%	20.01%	
d. Annual Return Net of All Expenses	-5.58%	19.58%	
6. Investment Gain/(Loss)	(\$4,319,274)	\$4,444,258	

Notes: The 2019 valuation report was published before the 2018 plan year audit was complete. The 2020 values shown above reflect the adjustments to true-up for the differences in the 2019 actuarial and 2018 audit reports. Below are specific details of these adjustments:

- Member contributions were increased by \$20,465
- Employer contributions were increased by \$20,464
- Administrative expenses were increased by \$315
- Investment returns were increased by \$73,594

3.2 Actuarial Present Value of Projected Benefits

	<u>January 1, 2019</u>	<u>January 1, 2020</u>
A. Discount Rate	7.00%	7.00%
B. Present Value of Projected Benefits		
1. Active	\$61,952,103	\$68,206,474
2. Contribution Refund Payable	\$552,341	\$170,650
3. Terminated Vested	\$758,118	\$821,622
4. Retired	\$674,492	\$676,024
5. Disabled	\$0	\$0
6. Beneficiary	\$311,084	\$312,614
7. Total	<u>\$64,248,138</u>	<u>\$70,187,384</u>
C. Change in Present Value of Projected Benefits		
		<u>Change</u>
1. Benefits Accumulated		\$0
2. Benefits Paid		(\$143,323)
3. Decrease in Discount Period		\$4,492,353
4. Plan Experience		\$159,476
5. Actuarial Assumptions		\$1,430,740
6. Plan Amendments		\$0
7. Net Change		<u>\$5,939,246</u>
D. Actuarial Value of Assets	<u>\$32,836,586</u>	<u>\$42,315,851</u>
E. Present Value of Future Payroll	\$145,067,483	\$139,223,758
F. Present Value of Future Contributions		
1. Firefighter	\$17,408,098	\$16,706,851
2. City	\$17,408,098	\$16,706,851
3. Total	<u>\$34,816,196</u>	<u>\$33,413,702</u>
G. Funded Status	51.1%	60.3%

3.3 Actuarial Accrued Liability and Normal Cost

	<u>January 1, 2019</u>	<u>January 1, 2020</u>
A. Discount Rate	7.00%	7.00%
B. Actuarial Accrued Liability (EAN)		
1. Active	\$31,266,707	\$37,565,278
2. Contribution Refund Payable	\$552,341	\$170,650
3. Terminated Vested	\$758,118	\$821,622
4. Retired	\$674,492	\$676,024
5. Disabled	\$0	\$0
6. Beneficiary	\$311,084	\$312,614
7. Total	<u>\$33,562,742</u>	<u>\$39,546,188</u>
C. Actuarial Value of Assets	<u>\$32,836,586</u>	<u>\$42,315,851</u>
D. Unfunded Actuarial Liability	<u><u>\$726,156</u></u>	<u><u>(\$2,769,663)</u></u>
E. Change in Unfunded Actuarial Accrued Liability		<u>Change</u>
1. Contributions		(\$2,922,727)
2. Benefits Accumulated		\$2,450,184
3. Decrease in Discount Period		(\$11,097)
4. Administrative Expenses		\$135,495
5. Plan Asset Experience		(\$4,444,258)
6. Plan Liability Experience		\$547,354
7. Actuarial Assumptions		\$749,230
8. Plan Amendments		\$0
9. Net Change		<u><u>(\$3,495,819)</u></u>
F. Funded Status	97.8%	107.0%
G. Present Value of Future Normal Cost	\$30,685,396	\$30,641,196
H. Present Value of Future Payroll	\$145,067,483	\$139,223,758
I. Normal Cost Rate	21.15%	22.01%

3.4 Expected Amortization Period

	<u>January 1, 2019</u>	<u>January 1, 2020</u>
A. Discount Rate	7.00%	7.00%
B. Present Value Future Compensation (PVFComp)	\$145,067,483	\$139,223,758
C. Present Value Future Contributions (PVFContrb) % of Compensation	\$34,816,196 24.00%	\$33,413,702 24.00%
D. Present Value Projected Benefits (PVFB)	\$64,248,138	\$70,187,384
E. Actuarial Accrued Liability (AAL)	<u>\$33,562,742</u>	<u>\$39,546,188</u>
F. Present Value of Future Normal Costs (PVFNC) % of PVFComp	\$30,685,396 22.11%	\$30,641,196 22.01%
G. PVFContrb available to payoff UAL % of PVFComp	\$4,130,800 1.89%	\$2,772,506 1.99%
H. Valuation Compensation	\$11,936,747	\$12,462,053
I. Current Contribution Available to pay off UAL		
1. Current Contribution in Excess of PVFNC	\$225,605	\$239,746
2. Administrative Expenses	\$0	(\$96,674)
3. Current Contribution Available to pay off UAL	<u>\$225,605</u>	<u>\$143,072</u>
J. Unfunded Actuarial Liability	\$726,156	(\$2,769,663)
K. Expected Amortization Period (0% Payroll Growth)	3.5 [▼]	0.0

4.1 Demographic Summary

	<u>January 1, 2019</u>	<u>January 1, 2020</u>
A. Active Members		
1. Number	138	141
2. Valuation compensation	\$11,936,747	\$12,462,053
3. Average pay	\$87,130	\$88,383
4. Average age	40.7	41.5
5. Average service	13.1	12.1
B. Terminated Vested	1	1
C. Retired or Disabled	1	1
D. Beneficiaries	1	1
E. Refund of Contributions	5	3
F. Total Member Count	146	147

4.2 Data Reconciliation

	Refund Deferred					Total	
	Active	Only	Annuity	Disabled	Retired Beneficiaries		
A. Included in January 1, 2019 Valuation	138	5	1	0	1	1	146
B. Change due to:							
1. New hires, rehires	4	(1)	0	0	0	0	3
2. Termination	0	0	0	0	0	0	0
3. Retirement	0	0	0	0	0	0	0
4. Disability	0	0	0	0	0	0	0
5. Death	0	0	0	0	0	0	0
6. Refund of Contributions	(1)	(1)	0	0	0	0	(2)
7. Data Corrections	0	0	0	0	0	0	0
8. Net change	3	(2)	0	0	0	0	1
C. Included in January 1, 2020 Valuation	141	3	1	0	1	1	147

4.3 Active Members by Age and Service

Attained Age	Years of Service as of January 1, 2020								Total
	Under 1	1-4	5-9	10-14	15-19	20-24	25-29	30 & up	
Under 25	0	0	0	0	0	0	0	0	0
25-29	1	7	1	0	0	0	0	0	9
30-34	2	8	10	2	0	0	0	0	22
35-39	0	3	13	15	4	0	0	0	35
40-44	0	0	7	9	9	2	0	0	27
45-49	0	0	3	8	9	8	0	0	28
50-54	0	0	0	0	7	2	0	0	9
55-59	0	0	0	1	4	3	1	0	9
60 & up	0	0	0	0	0	2	0	0	2
Total	3	18	34	35	33	17	1	0	141

Not Vested	Vested	Retirement Eligible
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4.4 Assumptions and Methods

Economic Assumptions

- Investment Return 7.00% per annum (net of investment expenses).
- Administrative Expenses \$100,000 annually, as previously approved by the Board of Trustees.
- Salary Scale The salary increase is based on years of service according to the following table:

Years of Service	Salary Increase
0 – 4	11.5%
5 – 9	6.3%
10 – 14	5.0%
15 +	4.0%

Demographic Assumptions

- Active Mortality PubS-2010 (Above-median, amount-weighted) employee Mortality tables projected generationally with Scale MP-2019.
- Retiree and Vested Mortality PubS-2010 (Above-median, amount-weighted) healthy retiree Mortality tables projected generationally with Scale MP-2019.
- Contingent Survivor Mortality PubS-2010 (Above-median, amount-weighted) contingent survivor Mortality tables projected generationally with Scale MP-2019.
- Disability Mortality PubS-2010 (amount-weighted) disabled retiree Mortality tables projected generationally with Scale MP-2019.

4.4 Assumptions and Methods (continued)

- Retirement Active firefighters are assumed to retire based on rates that vary by age (sample rates shown below).

<u>Age</u>	<u>Service</u>	
	<u>20-23 Years</u>	<u>24+ Years</u>
52	11.67%	11.67%
53	6.67%	6.67%
54	6.67%	6.67%
55	6.67%	6.67%
56	8.33%	75.00%
57	8.33%	75.00%
58	10.00%	76.67%
59	10.00%	76.67%
60	16.67%	83.33%
61	16.67%	83.33%
62	33.33%	100.00%

- Disability Active firefighters are assumed to incur disabilities based on rates that vary by age (sample rates shown below).

<u>Age</u>	<u>Probability</u>
20	0.07%
30	0.09%
40	0.15%
50	0.50%

- Termination Active firefighters are assumed to terminate based on rates that vary by age (sample rates shown below).

<u>Age</u>	<u>Probability</u>
20	9.8%
30	2.8%
40	0.4%
50	0.2%

- DROP Election Two-thirds (2/3) of Members who are eligible for Normal Retirement are assumed to enter DROP, with an assumed DROP Period of four years.

4.4 Assumptions and Methods (continued)

- Marital Status 75% of active participants are assumed to be married. Males are assumed to be three years older than females.
- Form of Payment 10-Year Certain and Life Annuity for participants
- Contribution Rates 12.00% of earnings for Member Contributions
12.00% of annual payroll for Township Contributions

Changes in Assumptions

The mortality table was changed to project generationally with Scale MP-2019. There are no other changes in actuarial assumptions since the prior year valuation.

4.4 Assumptions and Methods (continued)

Methods

Valuation Date

January 1, 2020

Asset Valuation Method

December 31, 2019 fair value of assets

Entry Age Normal Actuarial
Cost Method

The Entry Age Normal Actuarial Cost Method

The present value of the projected benefit (PVB) is determined as of the date the member entered the plan (or would have entered if the plan had always been in effect). The present value of future salary (PVFS) is also determined at entry age. The percentage of the PVFS represented by the PVB is the level percent of pay which, if contributed every year, would exactly fund the benefit if the valuation actuarial assumptions were realized. The actuarial accrued liability (AAL) is the theoretical value of assets which would result from the accumulation of these contributions from the plan entry until the valuation date.

4.5 Plan Provisions

Effective Date	The Plan was created January 1, 2015 and most recently restated effective September 14, 2018.
Eligibility	A firefighter shall become a member when he first becomes employed with The Woodlands Fire Department.
Credited Service	Total years and months of years during which a Member makes contributions to the TWFRS, including years of prior service purchased.
Compensation	Base pay, including standard overtime pay.
Average Final Compensation	Average Earnings for the highest consecutive 36 months over the last 120 months of service.
Contributions	12.00% of earnings for Member Contributions 12.00% of annual payroll for Township Contributions
Service Retirement	Attainment of age 52 and completion of 20 years of service. 2.50% of Average Final Compensations times Credited Service for first 20 years, plus 3.00% of Average Final Compensation times Credited Service thereafter.
Disability Retirement	Members who are total and permanently disabled, as determined by the board, receive 2.50% of Average Final Compensation times Credited Service, but not less than 50% of Average Final Compensation.
Vested Termination Benefit	Members are eligible to receive a Normal Retirement benefit if 20 or more years of Credited Service has been attained. Normal Retirement benefit payable at age 52.
Refund of Contributions	Non-vested Members are always entitled to a refund of their accumulated contributions (without interest).

4.5 Plan Provisions (continued)

Pre-Retirement Death Benefit

- Spouse

Upon the duty-related death of an active firefighter, a benefit is payable to his beneficiaries commencing on the first of the month following his death.

The benefit payable to the surviving spouse of a firefighter is equal to 75% of the service retirement benefit the firefighter would have been eligible to receive as of the date of death (utilizing at least 20 years of service). This benefit shall be paid as 10-Year Certain and Life Annuity.
- Single

The benefit payable to beneficiary of a firefighter is equal to 75% of the service retirement benefit the firefighter would have been eligible to receive as of the date of death (utilizing at least 20 years of service). This benefit shall be paid as 10-Year Certain Only Annuity.

4.5 Plan Provisions (continued)

Deferred Optional Retirement Program (DROP)

A paid firefighter can elect a FORWARD DROP benefit calculation date no earlier than a date which is the first day of the month following the date of attainment of age 52 and completion of 20 years of service.

The DROP period is not to exceed 60 months and must be in whole year increments.

Each Member who elects to participate in DROP has his monthly annuity benefit calculate as of the date of election. Such monthly benefit will be deferred and will commence at the time of the firefighter's actual retirement from the department. Depending on the Member's election, during the DROP Period, certain amounts will be credited each month to a bookkeeping account under the Member's name (the "DROP Account") in accordance with Option #1 or Option #2 below.

Option #1: During the DROP Period, a Member's monthly annuity benefit amount will be credited each month to the DROP Account. The member must continue to make the required contributions to the TWFRS during the DROP Period, but such contributions will not be credited to the Member's DROP Account.

Option #2: During the DROP Period, a Member's monthly annuity benefit amount and the Member's contributions will be credited each month to the DROP account. The Monthly annuity benefit amount shall be reduced by five percent (5%) under this option. The reduction to the monthly annuity benefit amount still applies following the DROP period.

Changes in Plan Provisions

There have been no changes to the plan provisions since the January 1, 2019 valuation.